Fugitive Emissions from Petroleum Refinery Equipment in Heavy Liquid Service

Joint Study between the

Bay Area Air Quality Management District

and

Western States Petroleum Association

Representing

Chevron Richmond Refinery
Phillips 66 San Francisco Refinery (Rodeo)
PBF (formerly Shell) Martinez Refining Company
Marathon (formerly Tesoro) Golden Eagle Refinery
Valero Benicia Refinery

April 2022

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ACKNOWLEDGEMENTS

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ABSTRACT

Over the course of five years, the Bay Area Air Quality Management District conducted a joint study with five San Francisco Bay Area petroleum refineries and their trade association, Western States Petroleum Association. The objective of the study was to understand the average emissions rate of organic compounds from leaks of petroleum refinery components (valves, connectors, pumps, and pressure relief devices that relieve to atmosphere) handling materials with an initial boiling point greater than 302 degrees Fahrenheit.

Over 10,000 components were screened for equipment leaks using portable hydrocarbon analyzers that measured leak concentrations of organic compounds. From the screened components, 165 components had mass emissions measured. These measurements were used to develop regression equations using linear regression analysis. Correlations between mass emissions and screening measurements (on the logarithm scale), operating temperature, and operating pressure were considered. Because operating pressure information was missing from approximately 30 percent of the screened components, correlation equations were established only for screening and temperature measurements.

Regression equations were used to estimate emissions from all screened components. Statistical procedures (bootstrapping with replacement, simulation) were used to address measurement and sampling errors. Average emission factors by component type for connectors, valves, and pump seals were developed. There were an insufficient number of screened pressure relief devices that relieved to atmosphere to develop an average emission factor.

The emissions averages resulting from this study are lower than commonly used emission factors developed by the United States Environmental Protection Agency for components in heavy liquid service.

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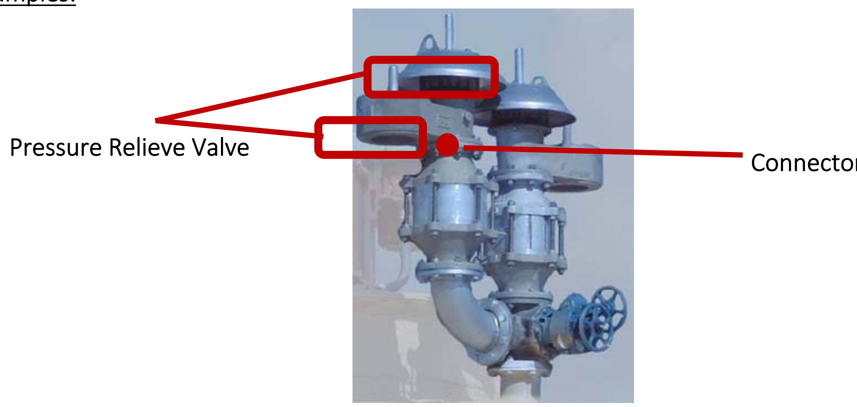
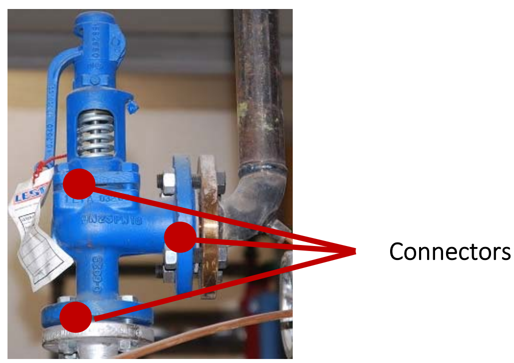
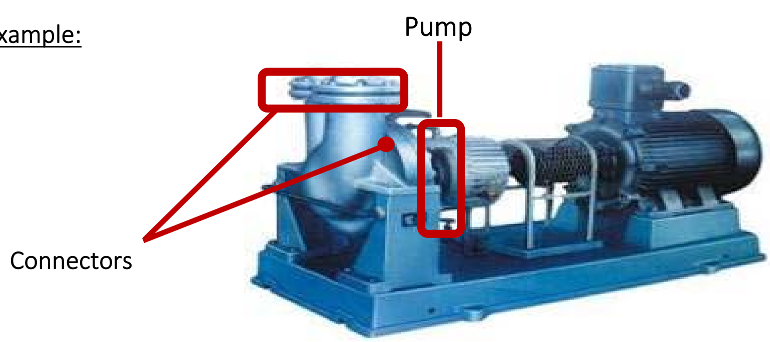
Acronyms

Abbreviation	Explanation
API	American Petroleum Institute
ASTM	ASTM, International (formerly American Society for Testing and Materials)
BAAQMD	Bay Area Air Quality Management District
CAPCOA	California Air Pollution Control Officers Association
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FID	Flame ionization device
LDAR	Leak detection and repair
LOD	Limit of detection
OVA	Organic vapor analyzer
PFD	Process flow diagram
P&ID	Piping and instrumentation diagram
PPM or PPMV	Parts by million or parts by million by volume
PRD	Pressure relief device
TOC	Total organic compound
TVA	Toxic vapor analyzer
VOC	Volatile organic compound
WSPA	Western States Petroleum Association

Glossary

Term	Definition
Accuracy	How close a measurement is to the “true” actual value
ASTM D-86	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure
Background	The ambient concentration of total organic compounds determined at least 3 meters (10 feet) upwind from the equipment to be inspected and not influenced by any specific emission point.
Bagging	Encapsulating an area of an equipment component where a leak is located for the purpose of measuring fugitive hydrocarbon emissions using a sampling train.
Confidence Interval	Designates the bounds within which a parameter is expected to lie within a stated degree of confidence
Connector	A flanged, screwed, or other joined fitting used to connect any piping or equipment. This includes sub-components of larger equipment.
Correlation Equation	An equation that relates fugitive hydrocarbon mass emission rates in kilograms/hour, pounds/hour, pounds/day, or pounds/year to instrument screening values in parts per million by volume. Correlation equations are used to calculate emissions from individual instrument screening values.
Default Zero	An average emission rate to be used for components that do not give instrument screening values higher than the background reading.
Duplicate Sample	An independent sample of the same component as another sample but at a different time (for understanding possible temporal variation) or by a different sampling team (for understanding variation by sampling team and/or technique).
Equipment	All components including, but not limited to: valves, pumps, compressors, pressure relief devices, diaphragms, hatches, fittings, sampling ports, pipes, plugs, open-ended lines, gages or sight-glasses.
Error	The amount by which an assumed value deviates from its true value
Gas	Material in gaseous state at operating conditions
Heavy Liquid	Liquids with an ASTM D86 initial boiling point greater than or equal to 150 degrees Celsius (302 degrees Fahrenheit)
I&M	Inspection and Maintenance
LDAR	Leak Detection and Repair
Leak	A screening reading above background. For the pilot refinery, any screening reading of 2.5 ppmv or more above background. For non-pilot refineries, any screening reading of 25 ppmv or more above background.
Light Liquid	Any hydrocarbon liquid that is not a “heavy liquid”; the definition between the two has varied slightly between different programs.
Method 21	EPA Method 21, 40 CFR Part 60 Appendix A-7
Non-Process Lube Oil	Finished lubricants and base oils that require no further processing, other than blending, to produce finished lubricant products, and are at an operating temperature of less than 200 degrees Fahrenheit
Other	Component not classified as a connector, pressure relief device, pump, or valve

Precision	How close two or more measurements are to each other under the same conditions, regardless of whether those measurements are accurate or not. Precision is the measure of the spread of different readings and reflects the reproducibility of a measurement
Pressure Relief Valve	The discharge horn or vent of an automatic pressure-relieving device actuated by the static pressure upstream of the valve and that relieves to atmosphere. Examples:  
Pump	The rotating components of a mechanical device using suction or pressure to raise or move liquids. Non-rotating components may be considered connectors. Example: 
Range	The extent over which an instrument can reliably function within the confines of its specification
Replicate Sample	An independent sample taken as close as possible to the same point in time and space as a primary sample.
Resolution	The smallest discernible change in the parameter of interest that can be registered by a particular instrument.

Screening	monitoring an equipment component for fugitive hydrocarbon emissions using an instrument that measures the concentration of hydrocarbon leaks
Steam-Quenched Pump	A pump that utilizes steam to quench the pump seal.
Valve	The rotating part of any device that regulates the flow or process material by means of an external actuator acting to permit or block passage of liquids or gases. Due to bagging concerns, for the purposes of this study, any valve bonnet flanges will be considered part of the valve.

EXECUTIVE SUMMARY

Petroleum refineries are comprised of thousands of pieces of equipment, piping, and fittings that handle a variety of process streams. This equipment may leak emissions ("fugitive emissions") from gaps in the equipment. Process streams handled by this equipment have historically been categorized by phase, vapor pressure, and/or boiling point as being in either gas, light liquid (initial boiling point equal to or below 302 degrees Fahrenheit), or heavy liquid service (initial boiling point greater than 302 degrees Fahrenheit).

In the Bay Area and more broadly, petroleum refineries are commonly required to monitor equipment in gas or light liquid service for any leaks on a periodic basis and correct any leaks found above a given leak action threshold.

In December 2015, the Bay Area Air Quality Management District's (Air District) Board of Directors approved a revised Regulation 8, Rule 18 (Equipment Leaks) that removed the monitoring exemption for components in heavy liquid service (materials with an initial boiling point greater than 302 degrees Fahrenheit) beginning in January 2018. The Board's adopting resolution directed Air District staff to examine emission reduction and cost effectiveness issues related to the inclusion in Regulation 8, Rule 18 of requirements for monitoring of components in heavy liquid service. This direction required re-evaluating the estimates used for existing emissions from such components as well as well emissions expected to be reduced from such components. Subsequently, as part of a settlement of a legal challenge to the 2015 rule revision, the Air District agreed to: a) complete an ongoing joint study; b) in consultation with affected refineries, produce a report on the results of the study; and c) re-visit the cost effectiveness of monitoring components in heavy liquid service.

This report summarizes the findings of the joint study. The refineries and trade organization that participated in the study have reviewed this report, and their comments have been considered and incorporated as deemed appropriate by the Air District.

The Heavy Liquids Study (or "Study") involved measuring and evaluating emissions from equipment in heavy liquid service at five Bay Area petroleum refineries:

- Chevron Richmond Refinery (Richmond, California),
- Phillips 66 San Francisco Refinery (Rodeo, California),
- Shell Martinez Refinery (Martinez, California),
- Tesoro Golden Eagle Refinery (Martinez, California), and
- Valero Benicia Refinery (Benicia, California).

Two of the five petroleum refineries were subsequently acquired by different entities. The Shell Martinez Refinery is now owned and operated by PBF Energy and is known as the Martinez Refining Company. The Tesoro Golden Eagle Refinery was acquired twice and is now owned and operated by the Marathon Petroleum Corporation and referenced as the Marathon Martinez Refinery.

Study results by petroleum refinery have been blinded in this report.

Four types of equipment were identified for inclusion within the Study: valves, connectors, pump seals, and pressure relief devices that relieve to the atmosphere. The total estimated population of each component type at the five petroleum refineries is shown in the following table.

Table ES-1. Estimated Population of Components in Heavy Liquid Service by Component Type

Component Type	Estimated Population (Start of Study)	Estimated Population (End of Study)
Valves	78,163	52,595
Pumps	2,932	1,075
Connectors	287,700	184,359
Pressure Relief Valves	249	594
Total	**369,044**	**238,623**

The Study involved several phases including study design, preliminary activities, component selection, component screening, mass emissions measurement, laboratory analysis, statistical analysis, and reporting of findings.

Prior to initiating the Study, the Air District, through numerous meetings over the course of a year, discussed and developed the study design with representatives of the five petroleum refineries and their trade association, Western States Petroleum Association ("WSPA").

The Study involved screening selected components in heavy liquids service using a portable screening instrument to measure the concentration of total hydrocarbons from any equipment leaks. From the screened components, a subset had mass emissions measured through physically enclosing the component and drawing a sample of the leak under a vacuum through sorbent tube media that were then sent to an offsite third-party laboratory for analysis.

From the estimated population and using the results of previous studies, a sample size of 2,000 components in heavy liquids service per refinery, 10,000 components in total, were targeted for screening. To begin the Study, 20 components per facility, for a total of 100 samples, were collected and sampled. This number was expanded to address two requests from the petroleum refineries: 1) to sample more components with very low leaks, and 2) to incorporate components associated with storage tanks with materials at ambient temperatures and pressures (to address a concern that Study results may be biased high if only components in process units were included).

Because of the relatively few numbers of pumps and pressure relief devices, it was deemed feasible to include all pump seals and pressure relief devices in heavy liquid service at the five petroleum refineries within the Study.

For connectors and valves, rather than follow a similar methodology for selecting study components that was used in a previous EPA study that developed the existing average emission factors, the five petroleum refineries requested that only connectors and valves within two process units at each petroleum refinery be studied as a practical consideration based on their impact on operations and the additional time that would be required if more process units were studied. Additional process unit(s) at any individual refinery were included in the Study to reach the 2,000-component count to be screened at each facility.

Process units were first selected by the Air District using process flow diagrams provided by each petroleum refinery. After selecting process units, individual process lines were identified by the Air District from petroleum refinery-provided piping and instrumentation diagrams. This selection was done offsite to prevent any bias by the testers related to selection of components via physical examination.

From November 2016 to May 2018, over 10,000 components at the five petroleum refineries were screened. Initially, screening was conducted by personnel from the Air District's Compliance and Enforcement Division who were familiar with both petroleum refinery operation and screening for equipment leaks from components in gas or light liquid service. However, while screening at the second refinery (Refinery B), there was a safety stand down.

Subsequently, due to Air District staff safety concerns, it was decided that each petroleum refinery's fugitive monitoring personnel would screen their own components with a third-party auditor(s) overseeing the process.

Screening personnel followed a protocol that listed the minimum and maximum specifications for screening equipment, calibrations, screening instrument performance tests, and screening technique to follow.

Personnel used standardized field data sheets to record information about each component that was screened including the following:

- Petroleum refinery
- Screening personnel name
- Date and time
- Windspeed / Direction
- Screening instrument serial number
- Process Unit / Area
- Sub-Area
- Component Type
- Component Subtype
- Component Size
- Stream Service
- Component Vibration Amount (None, Low, High)
- Component Cyclic Vibration (Yes, No)
- Elevation
  (Ground, Platform, Top of Vessel / Column, Other)
- Operating Temperature
- Operating Pressure
- Screening Start / Stop Time
- Background Screening Measurement
- Component Screening Maximum Measurement
- Comments

This information was used to identify components to have their mass emissions sampled, as well as to identify components in subsequent analyses.

Sampling of 165 unique components at the five petroleum refineries occurred between January 2017 and November 2018. Each sample included a primary and replicate sample. Additional samples were taken of the background atmosphere within sampled process units as well as several duplicate samples.

The Air District sampled eight components at Refinery A while the remaining were sampled by a third-party contractor hired and managed by WSPA.

The number of components that were screened and sampled by component type is shown in Table ES-2.

Table ES-2. Number of Samples by Component Type

Component Type	Number Screened	Number Sampled	Sampled (%)
Pump Seals	734	32 [1]	4
Connectors	4,710	61	1
Valves	5,349	72	1
Pressure Relief Devices	30	0	0
Total	**10,823**	**165**	**1.5**

Note:

1. Includes one sample of a storage tank agitator seal leak.

Each petroleum refinery is comprised of dozens of process units and process areas that were functionally distinct. Process units were selected for inclusion (meaning sampling was done within these) within the Study with a goal to have a diversity of process unit types.

Table ES-3. Samples Collected in Each Petroleum Refinery Process Unit Type Included in the Heavy Liquids Study

General Process Unit / Area Category	Number of Components Screened	Number of Components Sampled	Sampled (%)
Aromatic Saturation	8	1	13
Asphalt Plant	71	2	3
Blending / Tank Farm	8	2	25
Catalytic Cracking	875	10	1
Catalytic Reformer	2	0	0
Coker	1,450	5	0.3
Crude Unit	1,123	8	1
Crude Unit / Coker	159	2	1
Fuel Gas Treatment	53	0	0
Gas Recovery	22	0	0
Hydrocracker	1,074	38	4
Hydrogen Production	32	0	0
Hydrotreater	4,464	72	2
Hydrotreater and Hydrocracker	834	0	0
Isomerization	1	0	0
Marine Terminal	10	0	0
Other	25	2	8
Polymerization	11	0	0
Reformulation	17	1	6
Separation	9	0	0
Solvent Deasphalting	26	0	0
Sulfur Recovery	114	1	1
Tank Farm	433	21	5
Utilities	2	0	0
Total	10,823	165	1.5

Study Conclusions

The following conclusions may be drawn from the Heavy Liquids Study:

Results:

- Average emission rates at the five petroleum refineries for valves, connectors, and pump seals in heavy liquid service were lower than previously relied upon assumptions.
- Average emission rates were derived for valves, connectors, and pump seals in heavy liquid service as presented in Table ES-4.

Table ES-4. Average Emission Rates by Component Type in the Heavy Liquids Study

Component Type	Previous Emission Factor		Study	
	Emission Factor [(1)] (kg/hour/component)	95% Confidence Interval[(2)] (kg/hour/component)	Emission Factor (kg/hour/component)	90% Confidence Interval (kg/hour/component)
Connectors	2.50E-04	(9.07E-05, 1.13E-03)	9.4E-06	(6.6E-06, 1.60E-05)
Valves	2.30E-04	(9.07E-05, 6.80E-04)	2.84-05	(1.80E-05, 4.43E-05)
Pump Seals	2.10E-02	(8.62E-03, 4.99E-02)	1.18E-04	(4.82E-05, 4.87E-04)

Source:

1. Table IV-1a of CAPOCA in *California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities*, dated February 1999.
2. Table 5-6 of EPA in *Assessment of Atmospheric Emissions from Petroleum Refining: Volume 1. Technical Report,* dated April 1980 (converted to metric units)

- Lighter compounds (C_1 to C_4) were found to comprise only a small portion (less than one percent) of measured emissions although the sample size was limited (emissions from only four components in two process units at one refinery were evaluated).
- Screening values, operating temperature, and operating pressure were found to correlate with measured emissions. However, because of the number of missing operating pressure information for screened components, regression equations were developed using only screening value and temperature.
- Significant differences were found in the responses of screening instruments when screening components in heavy liquid service by process stream material and process stream temperature. Heavier streams typically required longer screening and instrument recovery times for the same component type, subtype, and size.

Issues Uncovered:

- Study design may have impacted results (there is a greater probability of missing large leakers),
- Screening of heavy liquid streams causes screening instruments to drift low (measured screening values are lower than actual),
- Screening pace was faster at Refineries B, C, D, and E, which may have impacted measured screening values (and resulting estimated emissions).

- Study results are dependent upon the petroleum refineries including all components that handle material with an initial boiling point greater than 302 degrees Fahrenheit in the gaseous phase within their leak detection and repair programs.

Recommendations:

- Several improvements (outlined in Section IV.viii **Future Studies**) were identified for future studies including in study design, screening, and sampling techniques.
- Results include emissions from components in heavy liquid service that are currently not in Air District emissions inventories including:
    - components associated with storage tanks and blending areas,
    - components in process units that do not have components in gas or light liquid service, and
    - components in process units that are not currently covered by the existing estimation methodology.

  Because there is no current methodology for estimating the number of such components, methodologies for estimating these components will need to be developed.
- There were several component types for which average emission rates could not be derived either because there were insufficient numbers, their emissions could not be evaluated, or they are recommended for inclusion in a future study:
    - Pressure relief valves that relieve to atmosphere (insufficient numbers)
    - Pump seals with steam or hot oil quenching systems (emissions could not be evaluated)
    - Components handling non-process lube oil (included in a future study).

I. Introduction

This report describes the efforts and results of a study ("Heavy Liquids Study" or "Study") undertaken between the Bay Area Air Quality Management District ("Air District"), five local petroleum refineries (Chevron Richmond Refinery, Phillips 66 San Francisco Refinery, Shell Martinez Refinery, Tesoro Golden Eagle Refinery, and Valero Benicia Refinery), and the Western States Petroleum Association (WSPA) to understand total organic compound emissions from petroleum refinery equipment handling materials with an initial boiling point greater than 302 degrees Fahrenheit. This study was conducted between 2016 and 2021 and included sampling of emissions from equipment leaks at five Bay Area petroleum refineries.

i. Background

Petroleum refinery equipment (pumps, valves, connectors, etc.) leak emissions as "fugitive" emissions through physical gaps in sealing mechanisms and interfaces of components. The material that this equipment serve has historically been categorized as either: 1) gas/vapor, 2) light liquid, or 3) heavy liquid.

The definition of heavy liquid has varied over the years but is based on either: 1) the initial boiling point, 2) the temperature at which 10 percent evaporates after reaching the initial boiling point, or 3) the vapor pressure of the material or components that comprise a significant percentage of the material.

There have been several studies of fugitive emissions from petroleum refinery equipment. In the late 1970s, the United States Environmental Protection Agency (EPA) initiated the Petroleum Refinery Assessment Study, and equipment leak data from 13 petroleum refineries was collected. In this study, equipment was screened using portable analyzers that measured total organic compound leak concentrations on a parts per million by volume (ppmv) basis and a fraction of the screened components had mass emissions sampled through bagging of selected components. Average emission factors and correlations for each equipment type were developed based on the screening and bagging data collected in this study. The results of this study (called the 1980 Refinery Study or 1980 EPA Study in this report) were published in 1980 ("EPA 1980 Report").

From this study, EPA developed three methods for estimating fugitive emissions from components based upon whether a component was routinely monitored as part of an inspection and maintenance (I&M) program, now commonly referred to as a leak detection and repair (LDAR) program. In an I&M or LDAR program, components are periodically monitored for leaks and any component discovered leaking above a leak threshold is repaired or replaced.

EPA developed three methods for estimating fugitive emissions from equipment leaks:

1) average emission factors (where no monitoring is done),
2) screening range emission factors (where leak/no leak monitoring is done), and
3) Correlation Equations (where monitoring of individual leak concentrations is done).

For components that are not monitored as part of an LDAR program, EPA developed average emission factors that varied based on the component type (e.g., pump seals, valves, connectors) and stream service (gas/vapor, light liquid, heavy liquid). When using this method, emissions are estimated by multiplying the number of components in a given stream service by a corresponding average emission factor and the number of hours within a year that each component was in service.

For components that are monitored as part of an LDAR program but where individual leak concentrations are not recorded but only whether a component is leaking above or below a leak threshold, EPA developed separate average emission factors for components leaking below and above the threshold. These factors also varied by component type and stream service.

Where leak concentration measurements are recorded as part of an LDAR program, EPA developed regression equations that correlated leak concentrations to mass emissions by component type.

These three methods of estimating emissions are shown in the following table.

Table I-1. Methods for Estimating Fugitive Emissions

Method	Description	LDAR Monitoring
Method 1	Average Emission Factors	No monitoring
Method 2	Screening Data	"Leak/No Leak" monitoring
Method 3	Correlation Equations	Individual monitor readings

In 1993, the Western States Petroleum Association (WSPA) and the American Petroleum Institute (API) conducted a joint study ("1993 Refinery Study") to develop new emission correlation equations for refineries using Method 3 to estimate fugitive emissions.

Samples were collected from five refineries: two located in southern California, two in northern California, and one in Pennsylvania. All five refineries had I&M programs to reduce the number of leaking components. Sampling was conducted over approximately a six-month period by two separate sampling teams. Approximately 270 components were sampled at the five refineries. The study sampled the following component types: valves, pumps, connectors, and open-ended lines.

EPA updated a 1993 "Protocol for Equipment Leak Emission Estimates" to present standard procedures for estimating mass emissions from equipment leaks and included the average emission factors from the 1980 study as well as revised correlation equations, default zero emission rates, and pegged emission rates from the 1993 WSPA/API study. The results were published in a 1995 report ("EPA 1995 Report").

In 1996, API published (API Publication Number 337 *Development of Emission Factors for Leaks in Refinery Components in Heavy Liquid Service*), the results of a study to develop new average emission factors for components in heavy liquid service. Existing LDAR screening data from four refineries in Southern California were combined with new screening data from two Washington state refineries.

The screening results were combined with Method 3 correlation equations, as listed in the 1995 EPA Protocol, to derive average emission factors for components in heavy liquid service.

Two of the Southern California refineries included heavy liquid service components into their LDAR program. The other two refineries conducted heavy liquid service screening as part of a planning effort for the 1993 WSPA/API study.

The California Air Pollution Control Officers Association (CAPCOA), with input from six air districts and the California Air Resources Board (CARB), reviewed the EPA 1995 Report and developed guidelines for estimating mass emissions from fugitive leaks. These guidelines were published in *California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities*, dated February 1999.

The guidelines listed four methods for estimating emissions from equipment leaks:

Table I-2. CAPCOA Guidelines Methods for Estimating Fugitive Emissions

Method	Description	LDAR Monitoring
Method 1	Average Emission Factors	No monitoring
Method 2	Screening Data	"Leak/No Leak" monitoring
Method 3	Correlation Equations	Individual monitor readings
Method 4	Unit-Specific Correlation Equations	Individual monitor readings

The guidelines incorporated the 1980 EPA Refinery Study emission factors for Method 1 and Method 2 and the 1993 WSPA/API data with some revisions for Method 3. Method 4 is a process for determining process unit-specific correlation equations.

In addition, CAPCOA surveyed California air districts for which components are excluded from regulatory-required Inspection and Maintenance (I&M or LDAR) programs and created an exclusion list for those components from components counts when using the Correlation Equations (Method 3) since those components would not be monitored. By default, those components would be required to use average emission factors (Method 1).

Because the published average emission factors are on a per component basis, when using Method 1 (Average Emission Factors) to estimate emissions, an inventory of the different component types by stream service is required. However, as components are routinely added, removed, and replaced for maintenance or modification purposes, petroleum refineries typically do not maintain an inventory of components unless required to do as part of an LDAR program. The petroleum refineries within the Air District have an inventory of components in gas and light liquid service but, except for one petroleum refinery, do not have an inventory of heavy liquid service components.

To estimate emissions from components in heavy liquid service using average emission factors, the number of such components are estimated using U.S. EPA published component counts by process unit for a model refinery. However, when comparing the actual inventories of components in gas and light liquid service with those published for a model refinery, the model refinery counts were found to be significantly lower than actual. Therefore, rather than using the proposed counts, multipliers representing the number of components in heavy liquid service to the number of components in gas and light liquid service for a given process unit were derived from the published count. These multipliers in conjunction with the actual inventory of components in gas and light liquid service are used to estimate the number of components in heavy liquid service at a petroleum refinery where an actual inventory is unknown. However, this method for estimating heavy liquid service components does not account for process units that are not listed in the EPA document as well as process units that may only have components in heavy liquid service. For example, storage tank farms are not included in EPA's table of process units. Therefore, the number of components in heavy liquid service that are associated with storage tanks have not historically been estimated and emissions from these components have not been included in any emissions inventory.

In 2013, the Air District determined that the petroleum refineries were not reporting previously reported emissions from non-monitored components handling heavy liquid streams within annual emissions inventory updates. Since these components were not monitored within a leak inspection program, the petroleum refineries were required to estimate and report these emissions using the Method 1 average emission factors from the 1999 CAPCOA Guidelines. In late 2014 and early 2015, the petroleum refineries and the Western States Petroleum Association began discussions with the Air District regarding the use of these average emission factors and how best to obtain representative data to use as a substitute.

The Air District's Regulation 8 (*Organic Compounds*), Rule 18 (*Equipment Leaks*) limits emissions of total organic compounds from equipment leaks at petroleum refineries, chemical plants, bulk plants, and bulk terminals. Regulation 8, Rule 18 includes emissions standards, inspection, monitoring, and recordkeeping requirements.

Regulation 8, Rule 18 limits the maximum allowable concentration (parts per million by volume, ppmv) of equipment leaks before a leak is required to be minimized and then repaired within a given time allowance that is based on who discovers the leak (the Air District or the facility). Unless exempted, each piece of equipment is required to have a unique identifier and required to be monitored within an LDAR program.

Regulation 8, Rule 18 does not include a definition for heavy liquid service. Rather, the rule had a limited exemption for components handling organic liquids having an initial boiling point greater than 302 degrees Fahrenheit. Equipment that met this criterion were subject to emission standards but exempted from monitoring requirements.

In December 2015, the Air District's Board of Directors approved a revised Regulation 8, Rule 18 that removed the monitoring exemption for components in heavy liquid service beginning in January 2018.

As a basis for determining that monitoring of components in heavy liquid service is cost effective for the rule amendment, the Air District relied upon the existing average emission factors for components in heavy liquid service that were published in the EPA 1980 Report and carried forward in the EPA 1995 Report and the 1999 CAPCOA Guidelines.

Since the average emission factors were developed, there have been significant advances in component design and sealing mechanisms, principally to meet increasingly stringent leak standards for components handling gas and light liquid streams. In addition, industry standards and regulatory requirements improved upon the audio-visual-olfactory (AVO) inspections of component handling heavy liquid streams and thus, significant leaks are more likely to be found. WSPA and the local petroleum refineries posited that because of these advancements, the existing average emission factors likely do not represent the average emission rates of components at the five Bay Area refineries.

The Air District's Board of Directors considered these arguments and along with the revised rule, the Board passed a resolution requiring the Air District to conduct a joint study with the petroleum refineries to measure mass emissions from components in heavy liquid service and re-visit the cost effectiveness determination made with the revised rule.

As such, a new sampling study was required.

ii. Study Objectives

The principal objective of the Study was to answer the following:

- What are the average emission rates for Bay Area petroleum refinery components in heavy liquid service?

The results of this objective will be used by the Air District to address the questions by the Air District's Board of Directors' resolution in a separate report ("Regulation 8, Rule 18 Staff Report").

In addition, the Air District analyzed data collected from the study to answer the following questions:

- Are there significant differences in emission rates for components in different heavy liquid streams?
- Are there significant differences when monitoring components handling heavy liquid streams as compared to gas/vapor or light liquid streams?
- What, if any, correlations exist between component classifications and leak rates and/or emission rates?
- Which factors have a statistically significant impact on emission rates from components in heavy liquid service?
- Can data generated from the current study be combined with data from other sources/previous studies?

The following questions were also expected to be addressed by the Study:

- Can confidence intervals (accounting for emissions rate variability, population uncertainty, and systemic and random errors in experimental design, sampling, chemical analysis, and statistical analysis) be constructed for each computed emission factor?
- Were there any errors introduced during selection, sampling, or processing of collected data that may affect the internal or external validity of study results?

iii. Historical Perspectives

There have been multiple studies, reports, and other documents developed by agencies and industry over the past 70 years pertaining to fugitive emissions from petroleum refinery equipment.

This section identifies and discusses studies germane to the current effort but is not intended to be an exhaustive listing of all petroleum refinery fugitive emissions related studies.

Several studies and documents have been identified through references in others, but copies of these primary documents could not be located for review. In some places, the results of these studies were discussed and presented in secondary documents, which were used as reference material. Where neither primary documents nor references could be found, it is believed the work discussed in those documents has been superseded by subsequent efforts.

I.iii.1. Joint District, Federal and State Project for the Evaluation of Refinery Emissions

In September 1955, a multiple agency study ("Los Angeles County Joint Project") was initiated and carried out over a three-year period to understand emissions from petroleum refineries in Los Angeles County.

The agencies and organization involved in the study included:

- Los Angeles County Air Pollution Control District (predecessor to South Coast Air Quality Management District)
- U.S. Department of Health, Education, and Welfare, Public Health Service, Air Pollution Engineering Research,
- State of California, Department of Public Health, Bureau of Air Sanitation (predecessor to California Air Resources Board), and
- Western Oil and Gas Association (predecessor to Western States Petroleum Association), Air Pollution Control Committee.

This study evaluated emissions from various petroleum refinery source categories including:

- storage tanks,
- catalyst regeneration units,
- pipeline valves and flanges,
- pressure relief valves,
- pumps and compressors,
- compressor engines,
- cooling towers,
- loading facilities,
- wastewater separators and process drains,
- turnarounds, equipment maintenance, and blowdown systems
- waste gas flares,
- pipeline blind changing,
- boilers and process heaters,
- vacuum jets, and
- air blowing operations (air blown through petroleum products, agitation during treating, asphalt processing).

Results were published in nine reports (collectively titled "*Joint District, Federal and State Project for the Evaluation of Refinery Emissions*"):

1. Kanter, C.V., et al., "Interim Progress Report". July 1956.
2. Palmer, R.K., "Hydrocarbon Losses from Valves and Flanges". Report No. 2. March 1957.
3. Steigerwald, B.J., "Hydrocarbon Leakage from Pressure Relief Valves". Report No. 3. May 1957.
4. Sussman, V.H., "Atmospheric Emissions from Catalytic Cracking Unit Regenerator Stacks". Report No. 4. June 1957.
5. Bonamassa, F., "Emissions of Hydrocarbons to the Atmosphere from Cooling Towers". Report No. 5. August 1957.

6. Steigerwald, B.J., “Emissions of Hydrocarbons from Seals on Pumps and Compressors”. Report No. 6. December 1957.
7. DeVorkin, H., Steigerwald, B.J., “Emissions to the Atmosphere from Boilers and Process Heaters”. Report No. 7. May 1958.
8. Kanter, C.V., et al., “Emissions to the Atmosphere from Eight Miscellaneous Sources in Oil Refineries”. Report No. 8. June 1958.
9. Kanter, C.V., et al., “Emissions of Air Contaminants from Oil Refineries”. Final Report. June 1958.

Copies of the above reports could not be located for review. However, the results of these reports were discussed and referenced within a document (Public Health Service 1960) that was published two years after these reports as well as in subsequent reports including EPA 1976.

Table I-3. *Fugitive Components Surveyed in Los Angeles County Joint Project*

Component Type	Refineries Surveyed	Component Population	Components Surveyed
Valves	11	132,000 (1)	~ 10,000 (2)
Flanges	Unknown	Unknown	326 (1)
Pressure Relief Valves (to atmosphere)	7 (4)	1,465 (vapor systems) (3) 690 liquid lines)	> 400 (1) (vapor systems)
Pressure Relief Valves (recovery systems)		1,768 (4)	0
Pumps (1)	Unknown	1,985	Unknown
Pump Seals (1)	Unknown	2,786	~17 percent

Notes:
1. Pages 19, 21, 22, and 30 of EPA 1976.
2. Page 20 of EPA 1960.
3. Table 10 of EPA 1976.

Table I-4. *Fugitive Emissions Measured in Los Angeles County Joint Project*

Component Type	Service / Component Subtype (1)	Emission Rate (1) (lb/day/component)	Emission Rate (1) (kg/hour/component)
Valves	Light Materials (Vapor Pressure > 15 psia at 60 degrees)	0.5	9.45E-03
	Heavier Liquid Products	0.05	9.45E-04
Flanges	Unknown	Negligible	Negligible
Pressure Relief Valves	Vessels	2.9	5.48E-02
	Pressure Storage Tanks	0.6	1.13E-02
Pumps	Centrifugal pumps – packed seals	4.3	8.13E-02
	Centrifugal pumps – mechanical seals	7.1	1.34E-01
	Reciprocating pumps – packed seals	7.7	1.46E-01
Pump Seals	Centrifugal pumps – packed seals	4.8	9.07E-02
	Centrifugal pumps – mechanical seals	3.2	6.05E-02
	Reciprocating pumps – packed seals	5.4	1.02E-01
	All pump seals	4.2	7.94E-02

Notes:
1. Pages 20 to 22 of EPA 1960.
2. Emission rates converted from pounds per day per component.

Table I-5. Distribution of Fugitive Emissions by Measured in Los Angeles County Joint Project by Component Type

Component Type	Service / Application	Distribution (%)	Emission Rate (lb/day/component)
Valves (1)	Gaseous	83.5	No leakage
		11.3	0.1
		5.2	9.1
	Liquid	88.3	No leakage
		10.6	0.1
		1.0	2.6
		0.1	166.1
Flanges (2)	Unknown	98.8	No leakage
		1.2	"Small"
Pressure Relief Valves (3)	Operational	81.3	No leakage
		13.3	0.9
		3.6	25.3
		1.2	154
		Average	2.9
	Pressurized Storage (All)	73.5	No leakage
		21.7	0.9
		9.7	8.9
		Average	0.6
	Pressurized Storage (Single)	81.0	No leakage
		16.7	0.9
		2.3	7.5
		Average	0.3
	Pressurized Storage (Dual)	57.0	No leakage
		32.9	0.9
		10.0	9.4
		Average	1.24
	All	Average	2.4

Notes:
1. Table 9 of EPA 1976.
2. Page 21 of EPA 1976.
3. Table 10 of EPA 1976.

The results of this study were the basis for most emission factors listed in the "petroleum refinery" section of the first edition of U.S. EPA's AP-42 Compilation of Air Pollutant Emission Factors.

I.iii.2. 1970s Studies

In the 1970s, multiple studies were undertaken by industry and various agencies to understand volatile organic compound emissions from equipment leaks. EPA contracted with a third-party to evaluate and revise petroleum refinery emission factors in a large-scale study over a three-year period with results published in 1980. This work is discussed in the next section (**1980 EPA Study**).

In 1976 to 1977, the California Air Resources Board contracted with KVB Engineering to conduct a study (KVB Study) in the South Coast Air Basin like the Los Angeles County Joint Project. However, there was less testing at petroleum refineries. Fugitive organic emissions (emission rate and composition) from petroleum refinery valves, pumps, separators, and cooling towers were measured.

Study results were published in “Control of Hydrocarbon Emissions from Stationary Sources in the California South Coast Air Basin”, Final Report Volumes I and II, KVB, Inc., 1978. A copy of this publication could not be located. However, the author, Hal Taback, presented a summary of the findings in a presentation titled “Petroleum Refinery Fugitive Emissions Measurement Emission Factors and Profiles” that was published in EPA “Proceedings: Symposium/Workshop on Petroleum Refining Emissions”, April 1978.

The study occurred over one week at a small (40,000 barrels per day) asphalt refinery and two weeks at a large (180,000 barrels per day) petroleum refinery. Valves and flanges were sprayed with a soapy solution to detect leaks and then any found leaks were classified as either “small”, “medium”, or “large” based upon the rate of bubble formation. The method for measured emission was dependent upon the leak classification. Components with large leaks were enclosed in a polyethylene bag with gas allowed to escape through tubing to a gas meter, sample bottle and total hydrocarbon analyzer. Small and medium leaks, a dilution method was used. Filtered (using activated charcoal and silica gel) ambient air was metered into the polyethylene bag and a sampling pump connected to the sampling tube drew a steady sample stream. After reaching steady state (determined by an attached hydrocarbon analyzer), the leak rate was the product of measured air flow and measured hydrocarbon concentration.

The KVB Study found leaks varied by component subtype (Table I-6) as well as stream material and component size (Table I-7).

Table I-6. KVB Study Results by Component Type

Component Type	Number Tested (1)	Leaks Measured	Leakers Identified (1)		
			Small	Medium	Large
Valves (All)	5,800	25	157	62	33
Plug	1,300	15	76	21	24
Gate	3,100	5	47	6	4
Control	75	2	9	0	3
Unclassified	1,300	3	25	35	2
Flanges	12,000	0	38	20	7

Notes:
1. Source: Table 2 of EPA Proceedings 1978.

Table I-7. KVB Study Large Refinery Results by Stream Material, Leak Size, and Component Size for Valves and Connectors

Stream Material and Leak Size	Valves		Fittings and Flanges	
	< 2 inches	≥ 2 inches	< 2 inches	≥ 2 inches
Propane	928	596	1,180	1,583
Small	56	39	13	3
Medium	10	12	0	0
Large	8	16	0	0
Light Gasoline	137	88	146	249
Small	0	0	0	0
Medium	0	0	0	0
Large	0	1	0	0
Gasoline	538	358	551	1,007
Small	5	13	1	0
Medium	1	0	0	0
Large	1	0	1	0
Naphtha	56	60	230	176
Small	3	1	0	0
Medium	0	0	0	0
Large	0	0	0	0
Gas Oil	227	352	4	1,004
Small	0	1	0	1
Medium	0	0	0	0
Large	0	0	0	0
Fuel Oil	327	220	765	655
Small	4	1	0	0
Medium	2	0	0	0
Large	0	0	0	0
Crude Oil	96	126	367	357
Small	0	4	0	0
Medium	0	1	0	0
Large	0	0	0	0
Residual Oil	62	29	70	80
Small	0	0	0	0
Medium	0	0	0	0
Large	0	0	0	0
Ethane	52	56	73	152
Small	1	4	1	0
Medium	1	0	1	0
Large	0	5	0	0
Freon	37	30	37	75
Small	0	0	0	0
Medium	0	0	0	0
Large	0	0	0	0
Sour Water	47	50	0	0
Small	0	0	0	0
Medium	0	0	0	0
Large	0	0	0	0

Notes:
1. Source: Table 3 of EPA Proceedings 1978.

For pump seals, the KVB Study identified leaks using a Bacharach Threshold Limit Value (TLV) total hydrocarbon analyzer and then measured emissions similarly to valves and flanges for any found leaks. The study found differences in results between the types of pump seals. Although both mechanical and packed seal pumps had similar leak frequency (approximately 50 percent), mechanical seals had much lower (one-sixth) emissions than packed seal for gas service (a Reid Vapor Pressure of greater than 26 psi) than for liquid service pumps where emissions for both mechanical and packed seal pumps were nearly the same.

Table I-8. KVB Study Large Refinery Results by Pump Seal Type and Reid Vapor Pressure

Pump Seal Type	Reid Vapor Pressure (psi)	Number Tested (1)	Leakers Identified (1)			Emission Factor (1) (lb/day/seal)
			Small	Medium	Large	
Mechanical	> 26	19	8	0	2	7
	< 26	93	17	4	3	0.3
	Total	63	22	3	4	N/A
Packed	> 26	4	0	0	1	40
	< 26	12	5	0	1	0.4
	Total	16	5	0	2	N/A

Notes:
1. Source: Table 6 of EPA Proceedings 1978.

The KVB Study concluded that the emission factors for valves, flanges, and pumps in AP-42 that were based on the 1957 Los Angeles County Joint Study were reasonable.

The KVB Study found valves and flanges leaked less often as found in the Los Angeles Joint Project but with greater magnitude of emissions. Because of this disparity and the limited refinery sample size, CARB initiated its own study. The results of this study were published in a CARB Publication titled “Control of Emissions from Leaking Valves and Flanges at Oil Refineries” by J.J. Morgester (CARB Chief of Enforcement) and others, dated November 15, 1978. A copy of this publication could not be located for review. However, the authors of the publication summarized the study within a 1979 journal article (Chemical Engineering Progress 1979) that was available for review.

For nine days in February 1978, CARB staff inspected valves and flanges in 49 process units at six Los Angeles area refineries. Because of time constraints, only valve-associated flanges were inspected. Components were visually inspected for liquid leaks as well as sprayed with a soapy solution for detecting gaseous leaks. Any identified gaseous leaks were characterized as either a “slow” or “fast” leak based on either the number of drops per minute (for liquid leaks) or the rate and size of soap bubble formation (for gaseous leaks). To measure emissions, any liquid leaks were collected in graduated cylinders and quantified. Components with gaseous leaks were enclosed in a polyethylene plastic bag and had tubing attached to the bag and to a pressure gauge and dry gas volume meter. After waiting until leakage in the bag reached steady state, the gas leakage flow rate at standard conditions was calculated. A gas sample was taken in a Mylar bag and analyzed for methane and non-methane hydrocarbon content.

Table I-9. Summary of 1978 CARB Study at Six Los Angeles Area Petroleum Refineries

Process Unit	Number of Units Inspected [1]	Valves [2]			Flanges [2]		
		Inspected	Leaks	Percent Leaks	Inspected	Leaks	Percent Leaks
Crude Unit	9	1,243	15	1.2	2,377	3	0.1
Coker	4	870	19	2.2	1,805	1	0.1
FCC	4	1,737	43	2.5	2,673	0	0
Storage	8	2,398	476	20	4,849	45	0.9
Loading	3	349	54	15	668	3	0.5
Hydrocracker	2	609	34	5.6	1,599	10	0.6
Hydrotreating	3	637	26	4.1	1,275	1	0.1
Reformer	4	1,803	51	2.8	2,509	3	0.1
Alkylation	3	1,522	272	18	2,046	8	0.4
Isomerization	1	114	16	14	32	0	0
Fractionation	4	1,540	162	11	2,622	20	0.8
Blending	1	30	2	6.7	85	0	0
LSFO	1	726	50	6.9	1,980	15	0.8
Flare	1	60	2	3.3	133	0	0
Compressor Unit	1	47	1	2.1	173	0	0
Totals	49	13,685	1,223	8.9	24,826	109	0.4

Notes:

1. Source: Table 1 of Chemical Engineering Progress 1979.
2. Source: Table 2 of Chemical Engineering Progress 1979.

In the late 1970s, the Bay Area Technical Subcommittee of the Western Oil and Gas Association contracted with the Radian Corporation to evaluate fugitive emissions at six San Francisco Bay Area petroleum refineries. In addition to the current five petroleum refineries, a sixth petroleum refinery, Pacific Refining Company, was operating in Hercules, California. Pacific Refinery, which began operation in 1966, ceased operations in 1995. The results of this study were published in a document titled "Valve Screening Study at Six San Francisco Bay Area Petroleum Refineries", Radian Report DCN 79-219-370-03, dated January 24, 1979. A copy of this document could not be located for review.

I.iii.3. 1980 EPA Study

In 1977, the U.S. EPA's Office of Air Quality Planning and Standards, through a contractor (Radian Corporation), reviewed and adjusted emission factors for petroleum refinery source categories within EPA's AP-42 document. Source categories were prioritized for future emissions evaluation and a testing strategy was developed for source categories given a high priority. The results of this effort were documented in EPA's 1977 *Revision of Emission Factors for Petroleum Refining* (EPA 1977).

The fugitive source category was one of four categories that were recommended as a high priority for an emissions testing program. As a rationale for testing, the report identified several emissions dependent parameters (equipment type, equipment age, housekeeping practices, and frequency of maintenance) as having changed since fugitive emission factors were developed from the Los Angeles County Joint Project. However, the document stated that "improved fugitive emission factors may still have an error of ± 50% to ± 75%" (page 39 of EPA 1977). Fugitives were assigned a high priority as "they represent the second largest source of refinery emissions and the source with the greatest potential for emission factor development." (Page 44 of EPA 1977)

As a result of this recommendation, a three-year refinery assessment program was initiated and carried out between 1977 and 1980 by Radian Corporation under an EPA contract. This program collected and evaluated emissions at 13 petroleum refineries located throughout the United States from multiple refinery source categories including from fugitive sources. One of the objectives of the program was the "quantification of fugitive hydrocarbon emissions from petroleum refineries".

Petroleum refineries were selected based on age and size (larger or smaller than 50,000 barrels per day of crude oil capacity) in one of four geographical areas: East Coast, Gulf Coast, West Coast, and Middle United States (Midwest and Mid-Continent). Because of the complexity and difficulty of doing otherwise, the age of the oldest refinery operating unit was used for selection. Petroleum refineries where the oldest refinery operating unit was more than 20 years old were defined as old while refineries that had no operating unit older than 20 years old were classified as new. Using this categorization, eight old / large, four old / small, and one new / large petroleum refineries were identified for inclusion within the study.

For the fugitive source category, components at nine petroleum refineries were studied.

As operating temperature and operating pressure were anticipated to significantly impact fugitive emissions from a component, process units were categorized as high or low pressure (above or below 150 psig) and high or low temperature (above or below 100 degrees Celsius). This classification was based on the major process unit equipment (such as a reactor) as this information was not identified for each piece of equipment.

Process unites were distributed equally among the categorizations, but the choice of process units "was made on an individual refinery basis, with as much diversity among units sampled as the differences among refineries allowed." (Page 5 of EPA 1980 Volume 2 Appendix A)

At each refinery, six to nine refinery process units were selected (see Table I-10).

Table I-10. Number of Process Units Sampled in 1980 EPA Study

Refinery Process Unit	Number of Sampled Units [1]
Atmospheric Distillation	7
Vacuum Distillation	4
Thermal Operations (Coking)	2
Catalytic Cracking	5
Catalytic Reforming	6
Catalytic Hydrocracking	2
Catalytic Hydrorefining	2
Catalytic Hydrotreating	7
Alkylation	6
Aromatics / Isomerization	3
Lube Oil Manufacture	2
Asphalt Manufacture	1
Fuel Gas / Light Ends Processing	11
LPG	2
Sulfur Recovery	1
Other	3

Note:
1. Table 3-1 of EPA 1979.

Choice parameters (those variables which directly impact emissions) and correlating parameters (additional variables that have a secondary impact on emissions) were identified. However, only choice parameters were used for selecting specific components in a statistical experimental design (fractional factorial experimental design).

Table I-11. Choice Variables and Variable Ranges by Component Types in 1980 EPA Study

Component Type [1]	Choice Variable	Variable Ranges Found for Screened Sources
Valves	Pressure	-10 to 3,000 psig
	Temperature	100 to 925 °F
	Fluid State	Gas, Liquid, Two-Phase
	Service	In-Line, Open-ended
	Function	Block, Throttling, Control
	Size	0.5 to 36 inches
Flanges	Pressure	-14 to 3,000 psig
	Temperature	-30 to 950°F
	Fluid State	Gas, Liquid, Two-Phase
	Service	Pipe, Exchanger, Vessel, Orifice
	Size	1 to 54 inches
Pump Seals	Pressure	0 to 3,000 psig
	Temperature	0 to 800°F
	Capacity	0 to 100,000 gallons per minute
	Shaft Motion	Centrifugal, Reciprocating
	Seal Type	Mechanical Seal, Packed Seal
	Liquid Reid Vapor Pressure (RVP)	Complete range
Pressure Relief Valves	Pressure	0 to 1,350 psig
	Temperature	40 to 1,100 °F
	Fluid	Gas, Liquid

Notes:

1. Only component types included in the Heavy Liquids Study are shown here.
2. Source: Table 4-1, 1980 U.S. EPA Volume 1

After identifying choice parameters, a test plan was created that specified the number of components with various variable configurations (e.g., four control valves in gas service that 4 to 8 inches in size in a reforming process unit) for inclusion within the study.

Other than process drains, specific components within each test category were randomly selected from petroleum refinery drawings (piping and instrumentation diagrams and process flow diagrams) and given a unique identification number. This method removed potential bias from selecting in the field (preventing selection of components visually leaking or not) as well ensured that the designated number of components were distributed in as wide a range of process variables.

Each of the pre-selected individual components were physically located in the field and affixed with physical tags with the assigned unique identification number. When components could not be located or were physically inaccessible, alternate components were selected from refinery drawings.

Selected components at each refinery were first "screened" for leaks using portable hydrocarbon detectors that measured the concentration of hydrocarbons being emitted at a leak location. Components found leaking at 200 parts per million by volume (ppmv) or greater were candidates to have mass emissions sampled.

Components were screened using a Bacharach Instrument Company J-W Model Threshold Limit Value Sniffer (TLV Sniffer), a catalytic combustion detector, calibrated with hexane and using component type-dependent established screening procedures. The instrument probe was held as close as possible to the location of a potential leak to increase screening reading reproducibility and reduce potential wind effects.

A second instrument, Century Instrument Company Organic Vapor Analyzer (OVA) Model OVA-108, was also used. However, because the OVA instrument employs a flame ionization detector rather than catalytic combustion detector, components identified with this instrument were re-screened with the TLV Sniffer prior to sampling for consistency purposes.

For valves, both the valve stem and packing gland were screened by placing the instrument probe at the interface (0 centimeters from surface) and held at the location for a minimum of five seconds after which the detector reading was recorded. This was repeated at three other points that were 90 degrees apart. The maximum of the eight readings was compared against the sampling criterion. In addition, a wire extension guide was used to obtain two additional measurements, one for the valve stem and one for packing gland, at five centimeters from the surface.

For flanges, the probe was placed at 2-inch intervals all around and right against the outside perimeter of the flange interface and held for a minimum of five seconds and the detector reading recorded. The maximum of all readings was used with the sampling criterion.

For pressure relief valves, only those that vented to atmosphere were screened. Those that did not vent to atmosphere were considered flanges as they could only leak to the atmosphere at the connecting flanges. The instrument probe was placed at two-inch intervals around the perimeter of the vent as well as the center of relief vent exit (“horn”), held for a minimum of five seconds, and the instrument reading recorded. If the top of the horn could not be accessed, the relief valve weep hole (located near the bottom of the horn) was screened.

Pump seals were screened similarly as valves where the instrument probe was placed as close as possible to interface of the pump shaft and pump housing and four readings at 90 degrees apart from each other recorded. The maximum reading was used with the sampling criterion. Some larger pumps were found to have two seals (inboard and outboard) and each seal was screened separately.

Emissions rates from components that had leaks with screening values below 200 ppmv hydrocarbon were considered negligible. Therefore, only components with leaks that had screening values greater than 200 ppmv hydrocarbon were candidates for sampling.

Several modifications to the experimental design were made as the study progressed. Because components in gas and light liquid service were found to leak at a greater frequency and magnitude, a higher proportion of valves and pump seals in gas and light liquid service were sampled. The number of sampled flanges was also reduced due to low leak frequency and emissions magnitude found from earlier study stages.

Components selected for sampling were enclosed in 1.5 to 5 mil Mylar sheeting, forming a “tent” or “bag”, fitted with bulkhead fittings, and had Teflon tubing connected where enclosed emissions were pulled through a cold trap (to condense any water vapors), a dry gas meter, and a vacuum pump (see Figure I.1). A small diaphragm pump connected after the dry gas meter pulled a slip steam into a sample bag. The tent was kept under a vacuum – monitored by a magnehelic gauge connected to a separate line – to ensure that emissions did not escape.

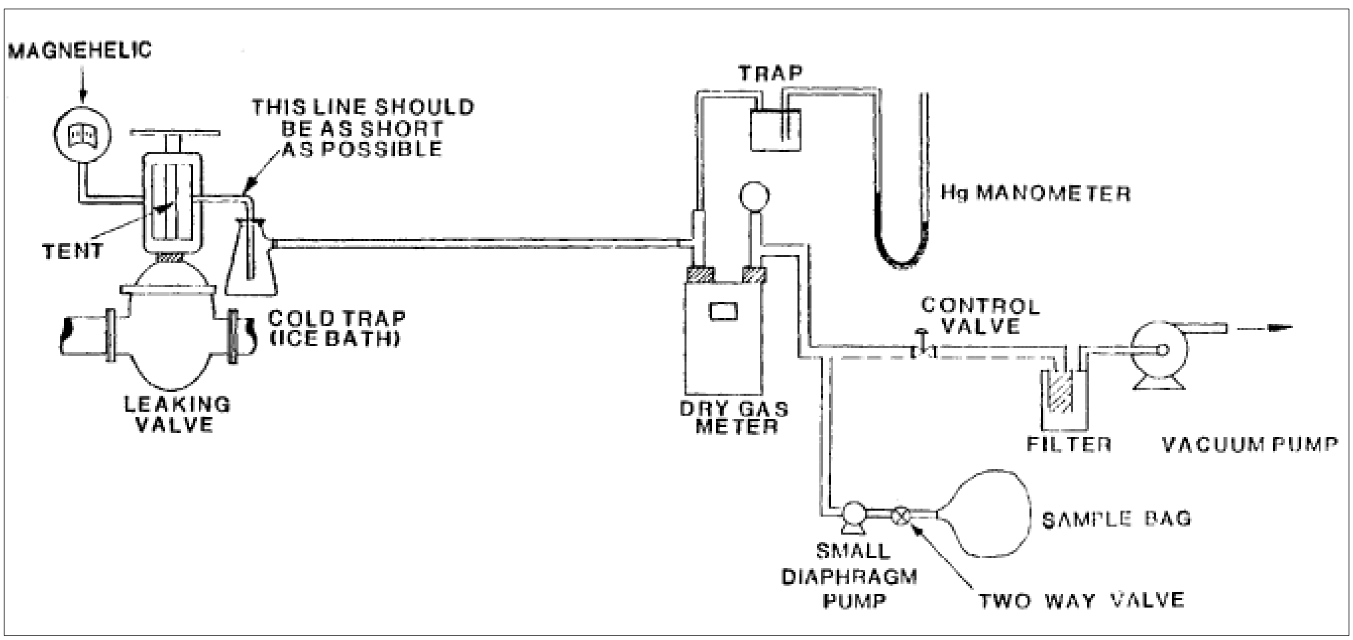


***Figure I.1**. Sampling Train for 1980 EPA Study*

(Source: Figure 4-1, p. 70 of EPA 1980 Volume 1)

Mylar was used for its high melting point, toughness, and ability not to significantly adsorb hydrocarbons.

Sampling occurred after the vacuum pump created a vacuum and once the tent enclosed space reached equilibrium, determined by measuring the hydrocarbon concentration exiting the sampling train with a TLV Sniffer. After flushing the sample bag with sample gas, between five to seven liters of sample gas was captured. In addition, a sample of the ambient air near the tent was captured via a plastic syringe and injected into a separate sample bag. The two sample bags (component sample and ambient air sample) as well as the sealed cold trap (for organic condensate analysis) were sent to and analyzed at an onsite mobile laboratory.

In the case of large leaks, the sampling train in Figure I.1 was altered where the vacuum pump was disconnected, and sample gas allowed to exit after the dry gas meter.

The number of components that were screened and sampled by stream service is shown in Table I-12.

Table I-12. Number of Components Screened and Sampled in 1980 EPA Study

Component Type [1]	Stream Service	Number of Components	
		Screened [2]	Sampled [3]
Valves	Gas / Vapor	563	154
	Light Liquid / Two-Phase	913	330
	Heavy Liquid	485	32
Flanges	All	2,094	62
Pump Seals	Light Liquid	470	296
	Heavy Liquid	292	66
Pressure Relief Valves	Gas [4]	148	58

Notes:

1. Includes only those component types that are included in the Heavy Liquids Study
2. Source: Table 5-1 of 1980 EPA Volume 1
3. Source: Table 5-4 of 1980 EPA Volume 1
4. Per Page 61 of 1980 EPA Volume 1, only pressure relief valves in gas service were selected for testing.

The study found screening results (see Table I-13) to be skewed where results were not normally distributed.

Table I-13. Distribution of 1980 EPA Study Components by Screening Range

Component Type [1]	Stream Service	Summary Type	Components within Screening Range [2] (ppmv)					
			Missing	0	1 – 200	201 – 1,000	1,001 – 10,000	> 10,000
Valves	Gas / Vapor	Number	1	278	134	33	47	71
		%	0.2	49.3	23.8	5.8	8.3	12.6
	Light Liquid / Two Phase	Number	1	386	211	70	142	104
		%	0.1	42.2	23.1	7.7	15.5	11.4
	Heavy Liquid	Number	N/A	335	121	21	7	1
		%	N/A	69.1	25.0	4.3	1.4	0.2
Flanges	All	Number	64	1,748	225	29	17	11
		%	3.1	83.5	10.7	1.4	0.8	0.5
Pump Seals	Light Liquid	Number	N/A	67	107	79	104	113
		%	N/A	14.3	22.8	16.8	22.1	24.0
	Heavy Liquid	Number	N/A	114	115	24	28	11
		%	N/A	39.0	39.4	8.2	9.6	3.8
Relief Valves	Gas	Number	112	61	33	11	23	12
		%	44.4	24.2	13.1	4.4	9.1	4.8

Notes:

1. Includes only those component types that are included in the Heavy Liquids Study
2. Source: Table 5-3 of EPA 1980 Volume 1

It was not possible to sample all candidate components (those that that had screening values greater than 200 ppmv) because of equipment and time constraints. Therefore, a sampling strategy was employed.

As not all candidate components were sampled, emissions from non-sampled components had to be estimated. Because results from sampled components displayed a similar skewness as screening results, a correlation between the two was identified.

Least square regression analyses were done for each component type using the logarithm of the screening value and logarithm of the sampled emissions rate.

Different sets of equations were established using screening values originally measured during field screening as well as those measured before sampling and the equation that had the highest correlation coefficient was used to estimate emissions from non-sampled components. For valves, pump seals, and relief valves; the screening values measured before sampling resulted in the highest correlation (correlation coefficients of 0.78, 0.68, and 0.78) while for flanges, the original screening value resulted in the highest correlation (correlation coefficient of 0.74).

These equations were used to estimate emissions from non-sampled components that had screening values greater than 200 ppmv and components with screening values less than 200 ppmv were assumed to have negligible (zero) emissions.

Using a mixed lognormal model and accounting for systematic errors, emission factors by component type and stream service were developed (Table I-14).

Table I-14. Estimated Non-Methane Hydrocarbon Emissions from Fugitive Components from 1980 EPA Study

Component Type	Stream Service	Emission Factor Estimate (2) (lb/hour/component)
Valves	Gas / Vapor	0.059
	Light Liquid / Two-Phase	0.024
	Heavy Liquid	0.0005
Flanges	All	0.00056
Pump Seals	Light Liquid	0.25
	Heavy Liquid	0.046
Pressure Relief Valves	Gas	0.19

Notes:
1. Per Table 5-6 of EPA 1980 Volume 1

I.iii.4. 1993 Refinery Study and 1995 EPA Protocol

In 1993, the Western States Petroleum Association and the American Petroleum Institute (API) initiated and carried out a study (1993 Refinery Study) to develop new correlation equations for estimating emissions from hydrocarbon leak concentration measurements. These equations were compared to those found during the 1980 EPA Study. Emissions data was collected by Radian Corporation personnel from five petroleum refineries (two in northern California, two in southern California, one in Pennsylvania). Each refinery had an inspection and maintenance program for identifying and correcting leaks.

A Regulatory Advisory Committee comprised of the U.S. EPA, CARB, Air District, and the South Coast Air Quality Management District provided input on planning, auditing, and results review. In addition, Air District and SCAQMD staff performed side-by-side screening (at Air District and SCAQMD refineries, respectively) with Radian personnel for comparisons of screening results. The U.S EPA contracted with an auditor, Research Triangle Institute, performed duplicate sampling as well as testing at four refineries.

The 1993 Refinery Study produced revised correlation equations as well average emission factors for components found leaking at background concentrations (called “default zeros”) as well as components leaking at concentrations greater than instrument spans (either 10,000 ppmv or 100,000 ppmv if a dilution probe were used) called “pegged factors”. The use of these equations, default zeros, and pegged factors was contingent upon component screening. The study did not attempt to revise average emission factors for where routine component screening was not being done.

These results were published in two API documents (API Publication 4612 and API Publication 4613) as well as incorporated by the EPA into a document (U.S. EPA 1995 EPA Protocol for Equipment Leak Emission Estimates. November 1995. EPA-453/R-95-017, “1995 EPA Protocol”) that outlined the methodologies for estimating emissions from equipment leaks.

The 1995 EPA Protocol combined data from the 1993 Refinery Study and additional studies conducted at marketing terminals (1993 Marketing Terminals Study), oil and gas production sites (1993/1995 Oil and Gas Production Study) and synthetic organic chemical manufacturing industry (SOCMI) to provide established procedures and methodologies for estimating fugitive hydrocarbon emissions.

The average emission factors from the 1980 EPA Study were incorporated into the 1995 EPA Protocol.

I.iii.5. API Publication Number 332

Depending upon the regulatory requirement, components may be required to be screened for equipment leaks either at the surface or at up to one centimeter from the surface. The screening distance may also vary based on the access to the surface, potential for instrument contamination (presence of water on the component surface), or potential safety hazard (such as the presence of rotating parts). Typically, the choice of screening instrument is left to the facility.

However, the component leak screening value recorded by a screening instrument may be affected by both the monitoring distance and the screening instrument used. To understand these differences, WSPA and the American Petroleum Association conducted a study to develop correlation equations between fugitive hydrocarbon screening instruments that were commonly in use at the time. The study investigated four different screening instruments:

- Foxboro OVA 108,
- Bacharach Threshold Limit Value Sniffer (TLV Sniffer®),
- HNU® PI-101, and
- Foxboro Total Vapor Analyzer (TVA) 1000, both flame ionization detector (FID) and photo ionization detector (PID).

The study collected equipment leak screening data from a southern California refinery over one week in December 1993 and from a northern California over one week in January 1994. It is not stated but it is believed that the southern California refinery was in the South Coast Air Quality Management District while the northern California refinery was in the Air District.

The study identified there to be approximately 400,000 valves and connectors between the two refineries and chose 271 components for the intercomparison of screening instrument performance. Most components were identified by each petroleum refinery and the rest by study field staff.

However, not all 271 components were screened with all four instruments (due to instrument difficulties) although all were screened by the OVA-108.

The study concluded there to be differences between measured component leak screening values based on screening instrument and screening distance and developed correlation equations (see Table I-15) to convert screening values at different screening distances between instruments.

Table I-15. API Publication 332 Equations Relating Screening Values from Different Instruments

Screening Instruments	Screening Distance	Number of Data Pairs	Correlation Equation (2)	Correlation Coefficient
OVA versus TLV Sniffer ®	At Surface	174	OVA@ = $(6.09 \times 10^{-1}) \times (TLV@)^{1.216}$	0.85
	1 centimeter	164	OVA1 = $(4.58 \times 10^{-1}) \times (TLV1)^{1.222}$	0.75
OVA versus TVA FID	At Surface	54	OVA@ = $(1.54) \times (TVAF@)^{0.935}$	0.90
	1 centimeter	52	OVA1 = $(1.02) \times (TVAF1)^{1.013}$	0.83

Notes:
1. Source: Table ES-1, API Publication Number 332 (August 1995). *Comparison of Screening Values from Selected Hydrocarbon Screening Instruments.*
2. OVA@ = OVA screening value at the surface of a component
   OVA1 = OVA screening value at 1 centimeter from the surface of a component
   TLV@ = TLV Sniffer ® screening value at the surface of a component
   TLV1 = TLV Sniffer ® screening value at 1 centimeter from the surface of a component
   TVAF@ = TVA screening value at the surface of a component
   TVAF1 = TVA screening value obtained at 1 centimeter from the surface of a component

In addition, the study developed an adjustment factor for adjusting OVA screening values taken at 1 centimeter from the surface of a component to OVA screening values taken at the surface.

$$OVA@ = (3.60) \times (OVA1)^{0.962} \qquad [I\text{-}1]$$

where:
OVA@ = OVA screening value at the component surface
OVA1 = OVA screening value at 1 centimeter from the surface

From an inspection of Equation I-1, screening at the surface would result in screening value measurements that are 2.5 to 3.6 times greater (depending upon the screening value) than when measuring at one centimeter from the surface.

The variation in screening measurements that are represented in Equation I-1 is shown in Figure I.2 .

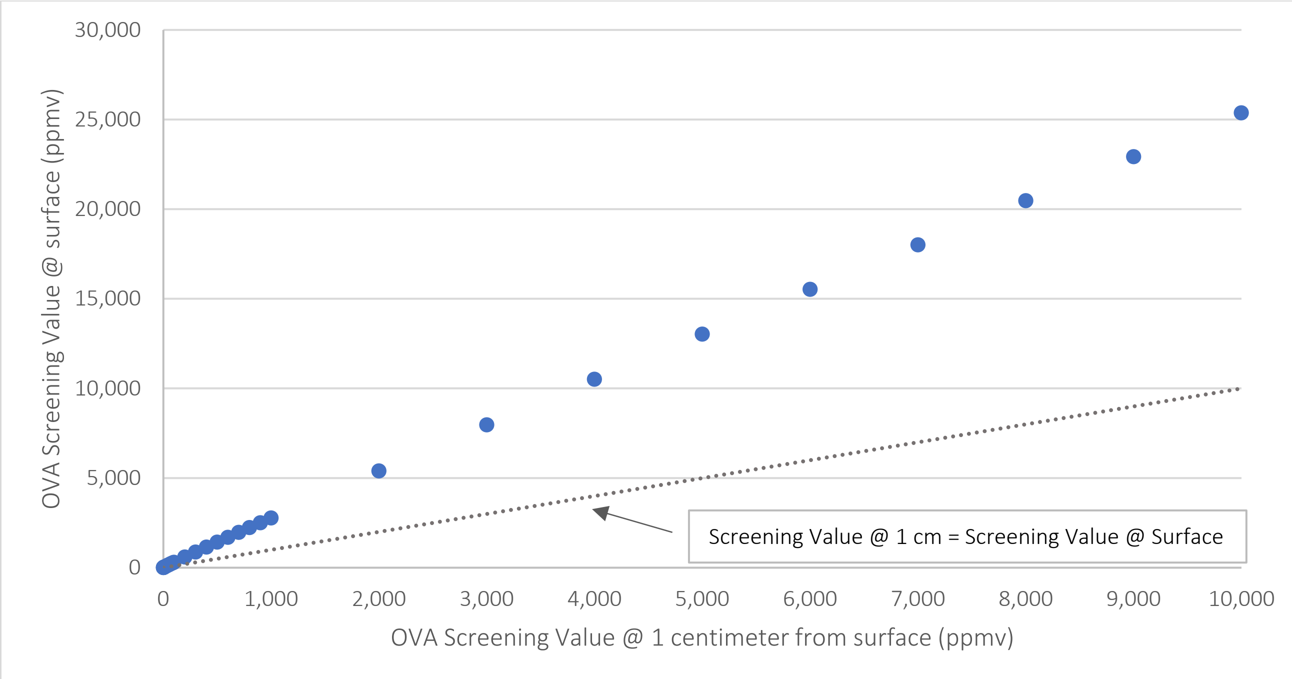


Figure I.2. OVA screening Values at 1 centimeter from surface versus at the surface

To convert screening values of different screening instruments to different screening distances, the study recommended using Equation I-1 and the correlation equations in Table I-15. Using Equation I-1 and the correlation equations for converting screening measurements between OVA and TVA FID, TVA FID screening measurements taken at 1 centimeter from the surface may be converted to TVA FID screening measurements at the surface. Plotting the results in Figure I.3 shows a significant difference between the two.

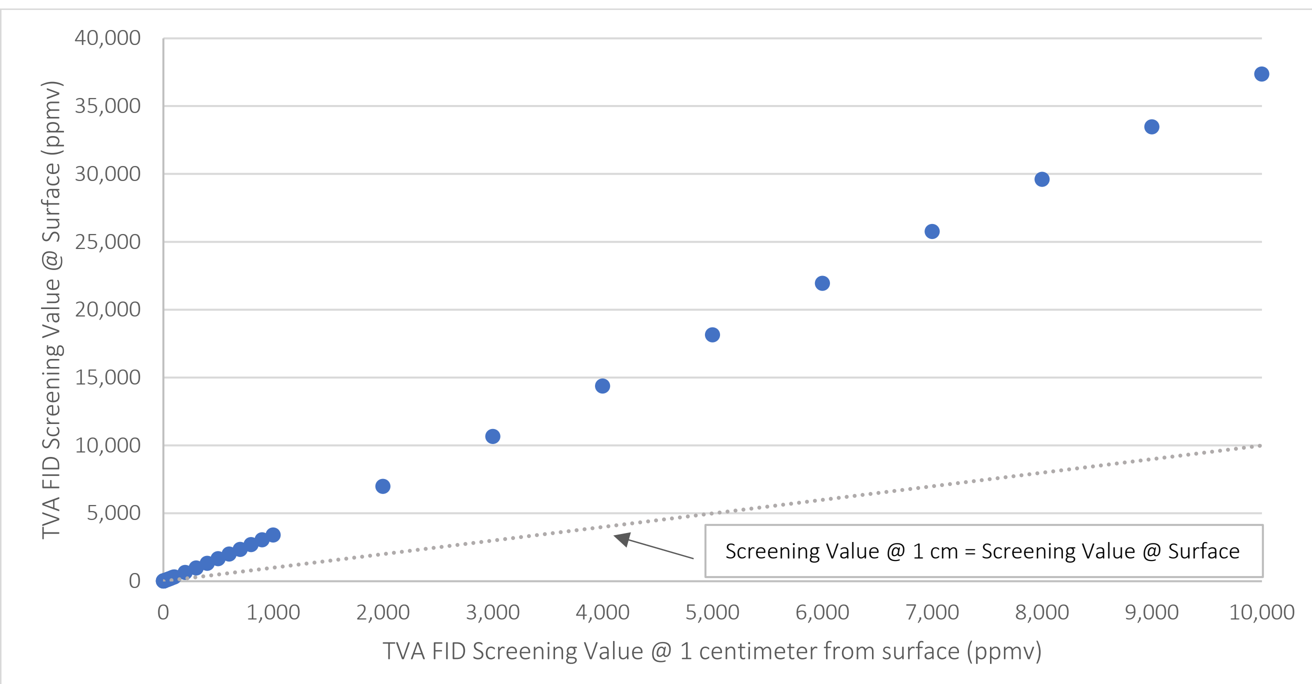


Figure I.3. TVA FID screening values at 1 centimeter from surface versus at the surface

I.iii.6. 1996 API Study

In 1996, API conducted a study to develop new average factors for equipment leaks from components in heavy liquid service. The results of the study were published in API Publication Number 337 (August 1996) *Development of Emission Factors for Leaks in Refinery Components in Heavy Liquid Service.*

The study incorporated existing screening data from four refineries in Southern California and conducted screening at two refineries in Washington State.

The screening results were combined with Method 3 correlation equations, as listed in the 1995 EPA Protocol, to derive average emission factors for components in heavy liquid service.

Two of the Southern California refineries included heavy liquid service components into their LDAR program even though screening was not required per the South Coast Air Quality Management District's (SCAQMD) Rule 1173 (Fugitive Emissions of Volatile Organic Compounds).

The other two refineries conducted heavy liquid service screening as part of a planning effort for the 1993 WSPA/API study. The following components were included in the study:

Table I-16. *API Publication 337 Study Component Counts by Refinery and Component Type*

Refinery	Component		Count	LDAR Inclusion?
CA 1	Valve		28,265	YES
	Fitting		100,482	
	Flange		23,370	
	Pump		787	
	Other		12,077	
	PRD		871	
		Total	165,852	
CA 2	Valve		5,468	YES
	Fitting		14,268	
	Flange		1,536	
	Pump		72	
	PRD		66	
		Total	21,410	
CA 3 & CA 4	Valve		10,137	Unknown
	Fitting		13,312	
	Pump		116	
	PRD		463	
		Total	24,028	
WA 1 & WA 2	Fitting		862	NO
	Flange		766	
	OEL		7	
	Other		91	
	Pump		35	
	Valve		787	
		Total	2,548	
All		Total	213,838	N/A

The California screening data was not categorized by streams. However, components at the Washington State refineries were.

Table I-17. API Publication 337 Study Component Counts by Process Stream

Refinery's Stream Description	10% Distillation Temp (Degrees Fahrenheit)		Count
300 – 499 °F, Middle Distillate, Medium			
Light Flash Distillate	340		122
Heavy/Light Gas Oil	340		112
Kerosene	349		158
Light Gas Oil	358		82
Aeronautical Turbine Fuel	360		384
Cracked Heavy Gas Oil	440		26
Cracked Hot Heavy Gas Oil	440		13
Light Catalytic Gas Oil	464		69
Circulating Reflux	470		40
Light Diesel	477		89
Cracked Very Light Gas Oil	480		28
Cracked Very Light	480		69
Heavy Gas Oil	492		163
		Sub-Total	1,355
500 – 699 °F, Middle Distillate, Heavy			
Residual # 6	500		166
Intermediate Diesel	560		52
Heavy Flash Distillate	575		230
Extra Heavy Gas Oil	590		89
Residual	615		76
Light Vacuum Gas Oil	675		146
Extra Heavy Flash Distillate			118
		Sub-Total	877
≥ 700 °F, Residual			
Atmospheric Bottoms	700		30
Heavy Vacuum Gas Oil	722		163
Heavy Vacuum Circulation Reflux	733		6
DA Oil	820		98
Asphalt	920		19
		Sub-Total	316
		Total	2,548

The study found the following equipment leak concentration rates:

Table I-18. API Publication 337 Study - Percentages of Measurements by Screening Range

	Measurements in Screening Ranges (%)					
Refinery	≤ 10	11 – 99	100 – 999	1,000 – 9,999	10,000 – 49,999	≥ 50,000
CA 1	99.88	0.03	0.06	0.01	0.01	0.00
CA 2	99.53	0.15	0.04	0.19	0.07	0.02
CA 3	99.53	0.15	0.04	0.19	0.07	0.02
CA 4	97.18	1.75	0.76	0.09	0.22	0.00
WA 1	90.30	5.06	4.22	0.42	0.42	0.06
WA 2	94.69	3.32	1.73	0.00	0.00	0.00

These rates correspond to the following approximate number of components:

Table I-19. API Publication 337 Study - Measurement Counts by Screening Range

	Measurements in Screening Ranges (ppmv)					
Refinery	≤ 10	11 – 99	100 – 999	1,000 – 9,999	10,000 – 49,999	≥ 50,000
CA 1	165,653	50	100	17	17	0
CA 2	21,310	33	9	41	15	5
CA 3	7,548	136	60	7	18	0
CA 4	13,372	2,498	280	80	23	12
WA 1	1,670	93	78	8	0	1
WA 2	662	24	12	0	0	0
Total	210,241	2,825	526	151	73	19

The study concluded the following:

- Screening values for heavy liquid service are independent of stream temperature and hydrocarbon composition (as defined by the 10% Distillation Temperature, ASTM Method D86).

- An explanation for the above conclusion was that heavier hydrocarbons, which are more viscous and less volatile at ambient temperatures, inherently circulate in higher temperature process streams.

I.iii.7. 1999 CAPCOA Guidelines

After the 1995 EPA Protocol was published, the California Air Pollution Control Officers Association (CAPCOA) identified technical concerns with the information. Starting in October 1996, CAPCOA and representatives of California air quality districts began discussions with the EPA and the petroleum industry (both WSPA and individual petroleum refineries).

In May 1997, CAPCOA produced an analysis ("Review of the 1995 EPA Protocol: The Correlation Equation Approach to Quantifying Fugitive Hydrocarbon Emissions at Petroleum Industry Facilities") of the document that justified necessary revisions.

Technical corrections and adjustments were made that resulted in revised correlation equations. These revised equations as well as procedures and methodologies for estimating fugitive hydrocarbon emissions from California petroleum facilities were published by CAPOCA in *California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities*, dated February 1999.

These guidelines included the average emission factors from the 1980 EPA Study for where routine component screening is not being conducted.

II. Methodology

An approach like previous studies was adopted for this study. Components were selected for inclusion into the study, screened for leaks, and a subset had mass emissions sampled. Not every component found leaking had mass emissions sampled due to both cost considerations as well as practical difficulties encountered in the field. As such, mass emissions sampling results were extrapolated to components where leaks were measured but were not sampled.

To reduce introducing a potential bias that may affect the validity of the study or study results, measures were taken for component selection, measurement, and analyses.

Quality assurance procedures and quality control checks were implemented to improve the accuracy and relevance of study data.

The following general principles were employed:

- use of established statistical methodologies,
- to the extent it was reasonable, the methodologies employed in deriving the existing average emission factors were followed,
- individual data were evaluated for quality assurances purposes,
- prior to excluding any data for failure to meet quality assurance procedures, discussed with the refinery that generated such data to ensure that quality assurance determinations were correct, and
- to the extent that assumptions were used, all such assumptions as well as all analyses performed were documented.

Preliminary activities included: data gathering, component identification, component selection, enforcement agreement (for components found leaking above a standard but would not have mass emissions sampled prior to a required repair requirement), standardized forms, personnel selection, and personnel training.

Components to be included within the study were identified by the Air District through refinery-provided process flow diagrams/drawings (PFDs), piping and instrumentation diagrams (P&IDs), survey information, and Air District-created test matrices.

i. Experimental Design of the Study

There are many factors or variables that may potentially affect equipment leak emissions. Prior to initiating this study, some of these variables were identified either from previous studies or from current efforts. Identifying and accounting for these variables was primarily to address two questions:

- How to find a “representative” sample?
- What factors may contribute significantly to emissions?

The first question is necessary for determining an “average” emission rate. The second question is necessary for answering the first question, both to account for any potential bias resulting from over or under sampling of components with emission-significant attributes and for estimating emissions from non-sampled components.

As the population of petroleum refinery components handling heavy liquid streams was estimated to be in the hundreds of thousands, conducting a census (sampling every component) of the entire population was not practicable nor feasible.

The following sections discuss what measures were taken for identifying and selecting components to include and exclude within the Study.

II.i.1. Refinery Selection

Although there are several refiners and re-refiners in the Bay Area, this study only included components at five petroleum refineries located within the Air District:

- Chevron Richmond Refinery (Richmond, California),
- Marathon Golden Eagle Refinery (formerly Tesoro Golden Eagle Refinery, Martinez, California),
- PBF Martinez Refining Company (formerly Shell Martinez Refinery, Martinez, CA),
- Phillips 66 San Francisco Refinery (Rodeo, California), and
- Valero Benicia Refinery (Benicia, California).

All five facilities are considered deep conversion petroleum refineries that have cracking, coking, and sulfur treating capabilities. At the time of the study, each petroleum refinery had a Nelson Complexity Index (a measure of refinery complexity and capabilities) of between 13.3 and 16.1 as stated by petroleum refinery corporate published information.

Each petroleum refinery had multiple, designated personnel that contributed to the Study in their areas of expertise.

After emissions sampling was completed but prior to issuance of this report, two of the five petroleum refineries were sold and acquired by different entities. The Tesoro Golden Eagle Refinery was sold to Andeavor, which was subsequently acquired by the Marathon Petroleum Corporation. The Shell Martinez Refinery was sold to PBF Energy. As corporate governance and corporate specific standards (e.g., design, equipment selection, inspection, and maintenance frequency) may influence emissions, the corporate entities that owned and operated the components under study are referenced in this report.

Therefore, for the purposes of this study, the Marathon Golden Eagle Refinery is referred to as the Tesoro Golden Eagle Refinery and the PBF Martinez Refining Company is referred to as the Shell Martinez Refinery. For ease of reference, each refinery will be referred to by its corporate name: Chevron, Phillips 66, Shell, Tesoro, and Valero.

Although each petroleum refinery is of a similar category (deep conversion), there are significant distinguishing features between them including age, operable capacity, size, and configuration.

Table II-1. Distinguishing Features of Petroleum Refineries Included in the Study

Refinery	Started	Size (acres)	Operable Capacity [1] (barrels/day)
Chevron	1902	2,900	245,271
Phillips 66	1896	1,110	120,200
Shell	1915	860	156,400
Tesoro	1913	2,200	166,000
Valero	1968	800	145,000

Note:
1. Operable capacity at time of emissions sampling as listed in the U.S. Energy Information Administration – Refinery Capacity Report June 21, 2017.

Each corporate entity has its own corporate standards for equipment design, selection, installation, inspection, and maintenance frequency, as well as varying criteria for when a component should be replaced. The components studied varied in age and type and therefore, may represent different company standards depending upon when the component was installed and the owner at the time. The following table lists the ownership history of the five petroleum refineries included in the Study.

Table II-2. Ownership History of Petroleum Refineries Included in the Study

Refinery [1]	Started	Ownership [2]	Ownership Years [2]
Chevron	1902	Pacific Coast Oil	1902 - 1906
		Standard Oil Company	1906 - 1926
		Standard Oil Company of California (SoCal)	1926 – 1977
		Chevron USA Inc.	1977 – 2001
		ChevronTexaco Corporation	2001 – 2005
		Chevron Corporation	2005 - Present
Phillips 66	1896	Union Oil Company of California	1955 - 1983
		Unocal	1983 – 1997
		Tosco Corporation	1997 – 2001
		Phillips	2001 – 2002
		ConocoPhillips	2002 – 2012
		Phillips 66	2012 - Present
Shell	1915	Shell Company of California	1915 – 1939
		Shell Oil Company, Incorporated	1939 – 1949
		Shell Oil Company	1949 – 1998
		Equilon Enterprises (joint venture of Shell Oil Company & Texaco, Incorporated)	1998 - 2002
		Shell Oil Company	2002 – 2020
		PBF Energy	2020 - Present
Tesoro	1913	Associated Oil Company	1913 – 1937
		Tidewater Associated Oil Company	1937 - 1966
		Phillips Petroleum	1966 – 1976
		Tosco Corporation	1976 – 2000
		Ultramar Diamond Shamrock	2000 – 2002

Refinery [1]	Started	Ownership [2]	Ownership Years [2]
		Valero Refining Company	2002
		Tesoro	2002 - 2013
		Tesoro Refining & Marketing	2013 -- 2017
		Andeavor	2017 – 2018
		Marathon	2018 - Present
Valero	1968	Exxon Company USA	1968 – 200
		Valero Refining Company	2000 - Present

Notes:

1. Denotes ownership during time of the Study.
2. https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/californias-oil-refineries/california-oil [Accessed: March 14, 2021]

II.i.2. Process Unit Selection

Each petroleum refinery is comprised of a dozen or more different functional areas, process areas or process units. Raw, intermediate, and finished materials are received and shipped via either pipeline, marine vessel, rail car, or trucks and stored within aboveground storge tanks located in “tank farms”, areas that include dozens of storage tanks interconnected with piping.

Process units may be generically categorized by process type and function:

- Separation
- Conversion
- Treatment
- Blending
- Support
- Storage

For pragmatic reasons, only two process units per refinery were initially targeted to be included within the study. However, although two process units per refinery were initially selected, additional process units were included to meet a target number of study components.

The following process units were included in the study:

- Crude Unit (Atmospheric and Vacuum Distillation)
- Catalytic Cracking
- Hydrocracking
- Hydrogen Production
- Delayed Coking
- Alkylation
- Fuel Gas/Light Ends Processing
- Hydrotreating,
- any other unit and/or refinery area group identified as containing heavy liquid service components.

Process units were identified and categorized according to:

- function,
- age,
- capacity,
- turnaround history,
- modification history,
- number of components
- process streams,
- operating temperature and operating pressure, and
- initial boiling points of process streams.

Process flow diagrams (PFDs) provided by the petroleum refineries were used to identify potential process units to be screened. Piping and Instrumentation Diagrams (P&IDs) provided by the petroleum refineries were used to identify potential process lines within selected process units to be screened.

II.i.3. Component Types

There are several kinds of components that handle or may handle materials classified as heavy liquid service. This study principally investigated emissions from four general classifications or types of components:

- pump seals,
- valves,
- connectors, and
- pressure relief devices that relieve to atmosphere.

Each component type has different points and mechanisms for how and where equipment leaks may occur. Leaks typically occur at gaps between mating surfaces of two or more pieces of equipment. A variety of techniques are used to mitigate potential leaks including the use of gasket materials, barrier fluids, and lubricating oils.

Some component types by their design and operation have dynamic parts such as rotating shafts, rotating or oscillating valve stems, or lift plates that are intended to move depending on the operation.

Connectors

Connector is a generic term used to describe a flanged, screwed, or other joined fitting used to connect any piping or equipment and includes sub-components of larger equipment.

Some of the various types of connectors include flanges, unions, threaded piping, compression tubing fittings, sight glasses, plugs, manways, hatches, and pressure gauges.

There are dozens of connector sub-types, but the most frequent encountered is a flange located at the end of a pipe and connected to a flange on a separate piece of pipe by bolts. A gasket is employed to prevent gaps.

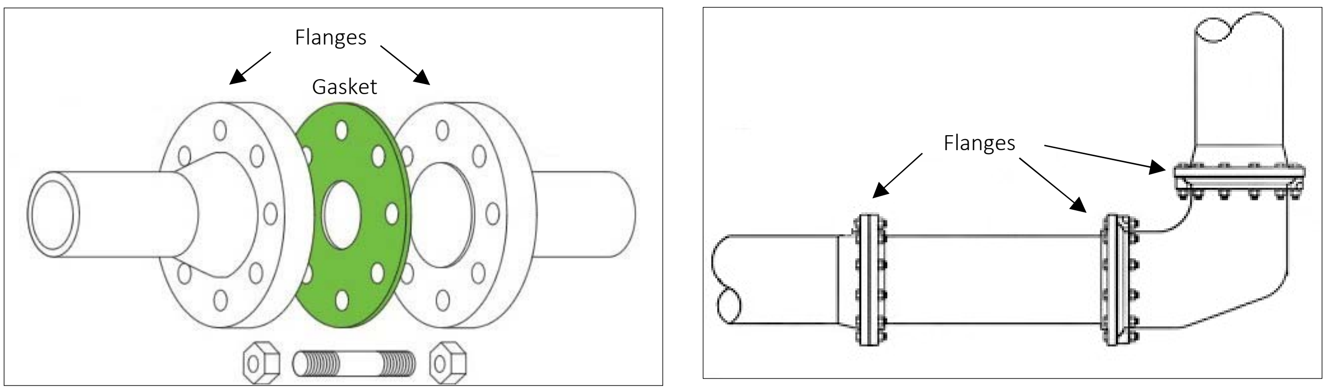


Figure II.1. *Examples of flanges*

Pump Seals

A pump is a mechanical device that moves fluids via a mechanical action where there is typically one inlet (suction) and one outlet (discharge).

Although there are dozens of different types of pumps, pumps may be broadly categorized as either dynamic or positive displacement type.

Dynamic pumps use kinetic energy to move fluids by use of an impeller (centrifugal pumps) or other mechanism (Venturi effect, cantilever, electromagnetism, etc.).

Positive displacement pumps trap and force a fixed amount of fluid to a discharge outlet via a reciprocating (piston, plunger, diaphragm, etc.), rotary (gear, lobe, screw, vane, etc.), or linear (rope, chain) mechanism.

Pumps that have a reciprocating or rotating shaft typically prevent fluid from escaping around the shaft through use of a seal (single, double, or other) where the seal could be packing, mechanical, or a barrier fluid (inert gas, hot oil, etc.).

Because of the oscillating motion (either reciprocating or rotary), escaping fluids from these pump shaft seals are expected to be the primary leak mechanism and emission source of equipment leaks from pumps. The other expected source of equipment leaks from pumps are from the pump housing and pump casing where different parts joined together using bolts. However, as these parts are static and appear like other connectors, the pump housing and pump casing are considered connectors for the purposes of the Study.

Valves

A valve controls the movement of a fluid by allowing or physically obstructing a passageway.

The primary purposes of different valves are:

- Stop (Isolation) – stop or isolate the flow of fluid to a downstream location or system,
- Regulating – control the pressure of fluid (liquid or gas) to a desired pressure, and
- Back Flow Prevention – prevent fluids from flowing in a reverse direction.

Each valve comprises multiple parts including the valve body, bonnet and bonnet flange, internal elements, actuator, valve stem, and packing material.

There are dozens of different valve subtypes although gate valves (see Figure II.2 for an example) are the most prevalent.

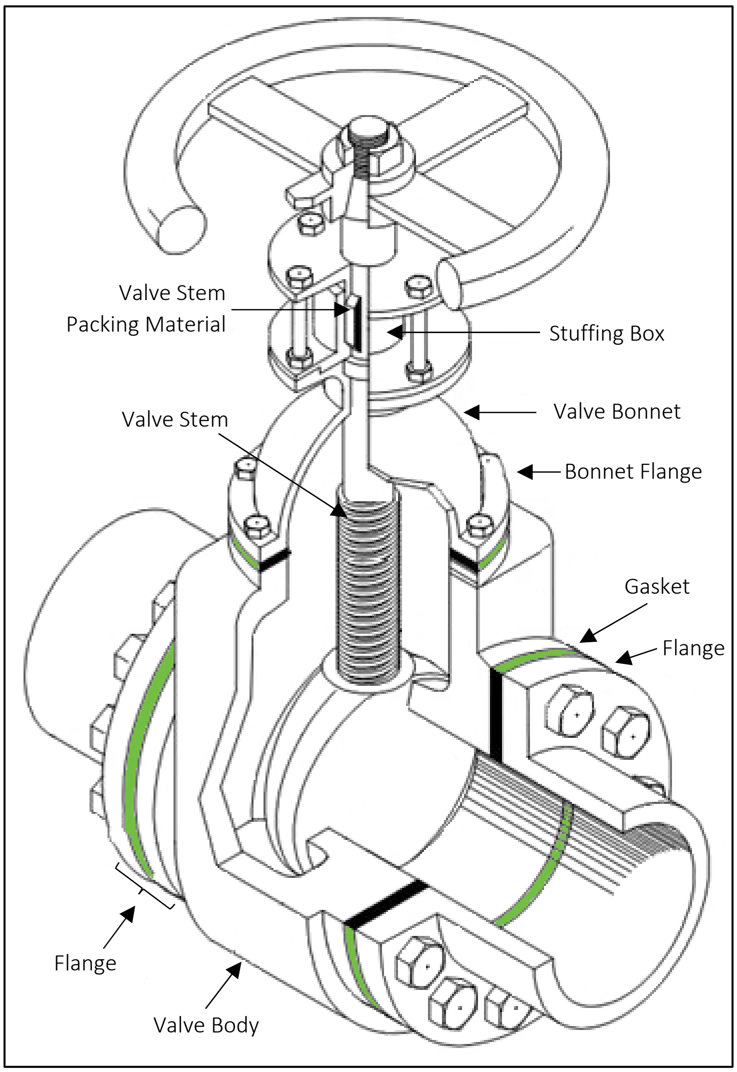


Figure II.2. Diagram of a gate valve

For regulatory compliance with Regulation 8, Rule 18, the Air District considers only the valve stem as a valve while the valve bonnet is considered a connector. This delineation was made to account for the difference in expected leak probability between a dynamic part (valve stem) and static part (valve bonnet).

Since it is difficult to isolate a valve stem from the valve bonnet for mass emissions sampling, for the purposes of the Study, both the valve bonnet and valve stem are considered a valve. However, if a valve stem were not captured in a mass emissions sample and only the valve bonnet, that sample would be considered a connector.

Pressure Relief Devices

A pressure relief device is a specialized type of device designed to protect piping and equipment from being subjected to pressures that exceed safety or design levels. When this occurs, pressure is relieved by activation of a mechanism and pressurized fluids (gas, steam, liquids, or vapors) are rerouted either to atmosphere or to separate equipment or systems (e.g., flare header).

The main types of pressure relief devices are either reclosing or non-reclosing type.

Non-reclosing-type pressure relief devices are designed to remain open once activated and include rupture disks and device pins. These devices do not have openings to the atmosphere and leaks may occur at the joint fittings, classified as connectors.

Reclosing-type pressure relief devices are designed to close after operation and include pressure safety valves and pressure relief valves and depending on the type may or may not have an opening to atmosphere. For purposes of the Study, only pressure relief valves that have an opening to the atmosphere are categorized as a pressure relief valve. A pressure relief valve that does not have an opening to the atmosphere is treated as one or more connectors because of the location (at the joint fittings rather than an opening to the atmosphere) of where equipment leaks may occur.

Pressure safety valves are designed to quickly release fluids when pressure exceeds a safety level and are opened completely once triggered.

II.i.4. Component Selection for Screening

II.i.4.1. Screening Sample Size

Previous studies have shown that equipment leaks are not normally distributed, that most equipment leaks have negligible to minor emissions while most equipment leak emissions are driven by a small minority of equipment leaks. If too small a sample size was chosen, there would be a greater probability that the study did not include a representative sample (either a large leaker was omitted, or an included large leaker would have a non-representative impact).

An appropriate sample size depended on numerous factors including a desired confidence interval, assumed leak distribution, and population size.

To determine a required sample size, the following equation, as listed in Appendix E of EPA's 1995 Protocol, was used:

$$n \geq N \, x \, [1-(1-p)^{1/D}] \qquad \text{[II-1]}$$

where:

N = total number of components in the population

D = (fraction of leaking components) x N; and

p = confidence interval (≥ 0.95)

Per EPA, the basis for selecting the sample population to be screened is the probability that at least one "leaking" component will be in the screened population. The "leaker" is used as a representation of the complete distribution of screening values for the entire class of sources.

Component Population

The population of heavy liquid service components at the five petroleum refineries included within the Study is not known. The population of such components at one petroleum refinery is known as they conducted a component inventory, identified and marked such components with physical tags, and included them within an LDAR database. However, the population of heavy liquid components at the four other petroleum refineries is not known.

The U.S. EPA published [1]a median component counts by service for process units at small and large refineries (a crude oil distillation capacity of greater than 50,000 barrels per day).

However, a review of the gas and light liquid inventories (based on actual counts) of each studied petroleum refinery indicated that the listed component counts were significantly lower than what was found through an inventory. To address this, the Air District assumed that the ratios of gas and light liquid service components to heavy liquid service components would be like the information shown in EPA's table and derived heavy liquid service component count multipliers for each listed process unit based on the number of gas and light liquid

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[1] Table 6-9 (Median Component Counts For Process Units from Large Refineries), *Locating and Estimating Air Emissions from Sources of Benzene* (U.S. EPA, 1998).

service components in each respective process unit. These multipliers were then used with the actual gas and light liquid component counts at each petroleum refinery to estimate the number of components in heavy liquid service. However, this method only works for process units identified in the EPA table as well as those process units that have gas and light liquid service components.

The total estimated population by component type is shown below.

Table II-3. Estimated Population of Components in Heavy Liquid Service by Component Type

Component Type	Estimated Population (Start of Study)	Estimated Population (End of Study)
Valves	78,163	52,595
Pumps	2,932	1,075
Connectors	287,700	184,359
PRVs	249	594
Total	**369,044**	**238,623**

Fraction Leaking

From previous studies, emissions from components with large leaks (leaks with concentrations greater than 10,000 ppmv) dwarf those from components that leak at the leak standard.

Because the distribution of leaks is unknown, the true leak rate of individual components with large leaks (leaks with concentrations greater than 10,000 ppmv) is unknown.

If it is assumed that only one component per component type in the entire population (at all five refineries) is a large leaker, the required sample sizes per component type would be prohibitively large for valves and connectors, though not for pumps and PRVs (see Table II-4).

Table II-4. Estimated Sample Size Required from Equation II-1

Component	Population	Number of "Large" Leakers	Leak Rate (%)	Calculated Sample Size [1]
Valves	78,163	1	0.001	77,639
Pumps	2,932	1	0.03	2,898
Connectors	287,700	1	0.0003	284,606
PRVs	249	1	0.4	244
Total	**369,044**			**365,387**

Note:
1. Estimated using Equation II-1, component population, leak rate, and a desired confidence interval of 0.98

The Air District identified equipment leak concentration monitoring data taken at several Washington State refineries in the API study as being the most recent data available for this class of components. Unlike the southern California refineries that were also included in the API study, the Washington refineries did not include these components as part of an LDAR program and thus represented the best information available for understanding what fraction of components may be leaking.

In the API study, a single leaking component represented between 84 percent (1995 EPA Protocol) and 95 percent (CAPCOA) of the total estimated mass emissions from all components, depending on the set of correlation equations used. This component represented 0.04 percent of all screening values.

If a similar large leaker exists at the five petroleum refineries at the same frequency, then the required sample size with a confidence interval of 0.98 per Equation II-1 was found to be 9,652 components.

From this, a sample size of 10,000 components (2,000 per petroleum refinery) was targeted for the study.

Because of the limited number of estimated components, conducting a census (sampling the entire population) of pumps and pressure relief valves was deemed feasible. The remaining samples was targeted to be split equally between connectors and valves.

Table II-5. Target Sample Size

Component	Population	Target Sample Size
Valves	78,163	3,410
Pumps	2,932	2,932
Connectors	287,700	3,409
Pressure Relief Valves	249	249
Total	369,044	10,000

The target sample size represents less than three percent of the total estimated number of components.

II.i.4.2. Identification of Components

Since all pumps and pressure relief valves at the five petroleum refineries was targeted to be included within the Study, no method for selecting them for inclusion in the study was needed apart from identifying them using PFDs and P&IDs.

However, as the targeted number of valves and connectors represented approximately four percent and one percent of the total estimated number of valves and connectors, respectively; a method for identifying and selecting them was developed with the intention of including a diversity of components such that an emissions impactful feature was not likely to be omitted while also not resulting in a biased sample.

To minimize potentially introducing bias from selecting components in the field based on observation, components were selected for inclusion through reviews of PFDs and P&IDs at Air District offices. However, as individual valves and connectors are not shown on either PFDs or P&IDs, process lines were selected, and components located on a selected process line were included within the Study.

Because the number of components on such process lines was unknown and process lines were selected without knowledge of field conditions (e.g., selected process may be inaccessible), multiple process lines were selected and ranked in order of inclusion.

Process lines were identified and ranked according to the following variables that were identified prior to starting the Study:

- Process unit
- Function
- Operating pressure
- Operating temperature
- Component size
- Cyclic vibration
- Cyclic heating
- Process stream ASTM D86 10% temperature and/or initial boiling point
- Geographic location

Each of these variables was hypothesized as potentially correlated to emissions.

Process Unit

The 1980 EPA Study found emissions (both leak frequency and leak magnitude) to vary widely with process unit type. Therefore, process units were selected to ensure a diversity of process unit types.

Function / Component Sub-Type

Although identified as possibly correlated to emissions, the sub-types of components (e.g., gate valve, globe valve) was not readily discernible on petroleum refinery submitted P&IDs and was not used for selecting components. However, component sub-type was recorded in field sheets.

Operating Pressure and Operating Temperature

As found through physical chemistry, pressure and temperature directly impact the phase (liquid, vapor, etc.) and volume of a given material. The phase and volume of material being emitted in an equipment leak were expected to affect measured emissions.

Component Size

Component size (determined by component diameter) may have a dual effect on equipment leaks. As component size would be correlated to the size of the mating surfaces of equipment where leaks may occur, mating surface size may relate to the probability of a leak occurring. Component size may also correlate with the physical size of an equipment leak, which may impact the magnitude of leaked emissions.

Neither individual components nor their sizes were identified on P&IDs, so process piping diameter was used as a surrogate for selecting components.

Cyclic Vibration

Some components were recognized as undergoing cyclic vibration as part of normal operation. Components located on or near pumps would experience cyclic vibration whenever a pump would turn on or off. Components located on a coke drum in a delayed coking unit would experience cyclic vibration when coke cutting would cycle between coke drums or when coke would drop out of a coke drum.

With cyclic vibration, oscillating components may loosen causing gaps where equipment leaks may occur.

Components likely to experience cyclic vibration were identified as those located near or on pump stands as well as those near reactor vessels.

Cyclic Heating

Some process units (crude unit, delayed coking unit, fluidized catalytic cracking unit, etc.) require heat to drive the process and components handling such process streams can undergo cyclic heating.

Thermal expansion and contraction of component mating surfaces can cause such surfaces to move closer together or further apart potentially causing gaps where equipment leaks may occur.

In addition to temperature, the type of material a component or gasket material was comprised is critical to the degree of thermal expansion and contraction a particular component or gasket material may undergo. However, obtaining information regarding the materials of each component was deemed not feasible nor even practical if such information could be obtained. However, if cyclic heating were found to be statistically significant, a smaller study focused only on material type on emissions may be warranted.

Components likely to experience cyclic heating were identified using knowledge of the process (e.g., delayed coking cycles) as well as significant differences between process stream temperatures at intersections in process lines.

Process Stream ASTM D86 10% temperature and/or Initial Boiling Point

ASTM D86 is a standard test method used in the petroleum industry for the distillation of petroleum products at atmospheric pressure. Petroleum materials are heated and the temperatures at which certain amounts of material are vaporized (initial boiling point, 10 percent, 20 percent, etc.). Distillation temperature is one of the criteria used to classify petroleum materials and is a measure of volatility. Materials with lower distillation temperatures at atmospheric temperatures are more volatile.

Neither the ASTM D86 10% temperature nor the initial boiling point of materials handled by components was known at the time components were selected. Rather, stream material type (diesel, kerosene, jet fuel, gas oil, etc.) was known and used as a surrogate for ASTM D86 10% temperature / initial boiling point.

Geographic Location

Components may be located at ground level, on a platform, in a pipe rack, on the side of a vessel, or located over 100 feet above ground level on top of a reactor. In addition to having an LDAR program where components in gas and light liquid service are routinely monitored for leaks, each of the five petroleum refineries conduct daily audio / visual / olfactory (AVO) inspections of equipment where large leaks may be identified through hearing, sight, or smell. However, such inspections are typically down at the ground level near rotating equipment (pumps) or at key platforms. Therefore, it was theorized that a leak at a component in heavy liquid service would be more likely to be identified through AVO techniques if the component were located at ground level, near gas or light liquid components monitored by LDAR, or on a platform where operational indicators are checked.

Parameters

Obtaining a statistically significant sample population for all combinations of leak correlating parameters would have required a prohibitively large number of samples. A factorial experimental design procedure was contemplated to be used for selecting components. However, such a design required additional knowledge on the process lines and components that could only be obtained within the field. Such advanced work created logistical and practical difficulties as well as may have introduced bias from field observation of components prior to selection.

A factorial design using P&IDs may have worked. However, each process unit may have over 50 P&IDs. As each petroleum refinery has several dozen process units with heavy liquid streams, the petroleum refineries were hesitant to produce hundreds of P&IDs. Rather than label thousands of process lines and enter half a dozen to a dozen parameters for each process line into a spreadsheet for selection within a factorial design, the possible ranges of each variable were identified, and each variable was divided into levels. Process lines that met these different levels were selected for screening. A potential weakness in this selection process is that selection was not truly random. Such a process could be accomplished by numbering and categorizing each process unit within a spreadsheet program and using a randomize program selection. There were two drawbacks to this approach: 1) the length of time necessary to implement, and 2) the practical consideration of the screening teams.

The following ranges for each factor were used to select individual process lines within selected process units.

Table II-6. *Variables and Variable Ranges by Component Type*

Component	Variable	Variable Ranges (1)
Valves	Operating Pressure	-10 to 4,000 psig (or entire range)
	Operating Temperature	100 to 925 °F (or entire range)
	Function	All types (control, gate, globe, etc.)
	Size	0.5 to 36 inches (or entire range)
	Cyclic Vibration	Yes/No
	Cyclic Heating	Yes/No
	ASTM D86 10% Temp.	302 to 920 °F (or entire range)
Connectors	Pressure	-14 to 4000 psig (or entire range)
	Temperature	100 to 925°F (or entire range)
	Size	1 to 54 inches
	Function	All types
	Cyclic Vibration	Yes/No
	Cyclic Heating	Yes/No
	ASTM D86 10% Temp.	302 to 920 °F (or entire range)
All	Elevation/Location	Entire range
	Maintenance Frequency/History	Never, Semi-Frequent, Frequent

Note:
1. Variable ranges will be determined by the minimum and maximum parameter ranges that component may encounter

II.i.5. Component Selection for Mass Emissions Sampling

II.i.5.1. Mass Emissions Sampling Size

Because of cost considerations and logistics, a maximum of 20 components per refinery (100 total components) was initially selected for a mass emissions sampling size.

II.i.5.2. Identification of Components

Components with screening values of 2.5 ppmv or more above background were candidates for mass emissions monitoring.

The petroleum refineries, via a third-party contractor (Tricord Consulting), was responsible for mass emissions sampling components with screening values of 10 ppmv or more above background while the Air District would sample some leaking components (either at background concentrations or below or above 10 ppmv depending on the distribution of leaks).

If there were more than 20 components at a refinery with screening values of 10 ppmv or more above background, the components with the 20 largest screening values were selected for mass emissions sampling.

II.i.6. Modifications of the Experimental Design

During the Study, multiple changes were made to the experimental design resulting from field observations and issues arising in the field. Most of the changes were made after screening concluded at the pilot refinery.

II.i.6.1. Screening

Screening Sample Size

Conditions encountered in the field along with the initial screen procedures resulted in screening delays that significantly slowed the process.

After the pilot refinery, the target screening sample size was reduced from 2,000 components per refinery to 1,000 components. However, because previous studies had found the leak distribution to be not normally distributed, there was a concern that a reduction in sample size may not result in a representative leak distribution (e.g., if there were a larger leaker, the chance of finding it within a sample size of 1,000 components versus 2,000 components was not the same).

To address this concern, a "hypothetical" leak distribution was assumed where a minimum number of components with leaks at varying leak concentrations was assumed to exist.

If the initial screening of 1,000 components found leaks for each component type at the varying leak concentrations, screening would stop. If not, screening continued until either the leak distribution criteria were met or until 2,000 components were screened, whichever occurred first.

***Table II-7**. Assumed Leak Distribution for Purposes of Screening Sample Size*

Leak Concentration (ppmv, above background)	Assumed Minimum Number of Components (Each component type)
0 – 25	3
25 – 100	2
100 – 500	2
500 – 1,000	2
1,000 – 5,000	2

Lube Oil Components

While screening at the pilot refinery, petroleum refinery personnel were concerned that emissions from lubricating oil systems (seal oil used to lubricate pump motor bearings) would not be represented within the Study and asked field screeners to incorporate these components into their monitoring.

This was done unbeknownst to the Study lead and introduced a potentially significant bias into the Study as components were selected in the field by screening personnel based on field observations.

Once this was discovered, members of the five petroleum refineries, WSPA, and the Air District discussed the issue and agreed that the Study would only include components handling process lube oil rather than non-process lubricating oils and to remove these components from the Study.

There is currently no methodology for estimating the number of components in such lubricating systems. Therefore, emissions from these components are not included in any emissions inventory. However, the petroleum refineries were concerned that Study results may be used for such components if a methodology were developed. It was decided that emissions from these components would be studied in a separate study ("Lube Oil Study").

Steam-Quench Pumps

While screening at the pilot refinery, screening personnel encountered a type of pump that prevented screening at the required screening distance. Pumps that were designed with a steam quenching system were found to be difficult to monitor. These types of pumps used steam to remove solid particles from a pump seal as well as to prevent solidification of hydrocarbon process fluids that would cause the pump to seize. In some instances, steam from these pumps billowed at and near the seal and would condense within the screening instrument, causing it to malfunction.

Tank Farm Components

Initially, only components at process units were included within the Study. The petroleum refineries were concerned that process unit components may not be representative of the universe of components handling heavy liquid streams, in particular components that handle heavy liquid streams at atmospheric pressure and ambient temperature. The petroleum refineries requested to include components at tank farms within the Study.

Because the methodology for estimating the number of components in heavy liquid service is based on process unit type and the number of gas and light liquid service components in those process units, the number of components at tank farms has not historically been estimated nor have emissions from such components been estimated and included within the emissions inventory. Therefore, a methodology for estimating the number of heavy liquid service components in tank farms and areas other than the process units must be derived.

To accommodate this request, 200 components within the tank farms at two refineries (100 components per refinery) were targeted for screening.

II.i.6.2. Mass Emissions Sampling

Sample Size

After the pilot refinery, the maximum mass emissions sample size was increased from 20 components per refinery to 30 components per refinery. The additional 10 components were to allow for sampling of tank farm components, components with low concentration leaks, as well as stratified sampling (see *Sample Selection*).

Sample Selection

After the pilot refinery, the criteria for selecting components for mass emissions sampling was revised from the top 20 components by leak concentration to a stratified sampling where components were targeted for sampling by leak concentration range. A minimum number of components within set concentration ranges was targeted.

Table II-8. Target Number of Samples

Leak Concentration (ppmv, above background)	Minimum Number of Components to Sample			
	Valves	Connectors	Pumps	Pressure Relief Valves
0 – 25	3	3	3	3
25 – 100	2	2	2	2
100 – 500	2	2	2	2
500 – 1,000	2	2	2	2
1,000 – 5,000	2	2	2	2
5,000 – 10,000	All*	All*	All*	All*
> 10,000	All*	All*	All*	All*

Notes:
*All components within these ranges were prioritized for mass emissions sampling.

If there were not enough components found leaking with leaks in a targeted concentration range, the allotted samples for that range were distributed to one or more other ranges. This was done accounting for screening results across the petroleum refineries. For example, if one petroleum refinery did not have any components leaking in a target range but another had twice the targeted number, that refinery may have twice the number of samples taken within that range.

If there were more components in each concentration range than the target number listed in the table above, then whenever possible, components were selected to prevent over representation of any given stream (diesel, kerosene, gas oil, etc.).

For example, if there were 12 valves (four in gas oil, four in diesel, and four in kerosene service) with leaks in the 25 to 100 ppm range, then one component in each stream was selected to be sampled.

However, it was not possible to select components in different streams (due to the process unit selected). In these cases, components to be sampled were selected based on what was already sampled in a leak concentration range at a previous refinery.

Components to be sampled were categorized by concentration range, component type, stream service, and any pertinent information (operating temperature / pressure, component sub-type, etc.) and then randomly selected using a computer algorithm (Microsoft Excel’s “RANDBETWEEN” function).

If a leaking component was identified through field observation, this component was a candidate for mass emissions sampling for the purposes of developing relationships between leak concentration and mass emissions.

ii. Sampling Methodology

As 10,000 components were targeted to be screened for equipment leaks while only a fraction (less than 200 components) was targeted to have mass emissions sampled, it was necessary to derive a method for estimating emissions from non-sampled components.

As leaks from less than 200 components in the study had mass emissions measured, mass emissions from most Study components had to be estimated from data collected during the field screening. Most of the field screening data that was collected included external temperatures of the components, component type, component size, process unit, component elevation in addition to leak concentration measurements.

II.ii.1. Screening Procedure

Air District field personnel (Air Quality Inspectors) monitored ("screened") components on selected process lines for equipment leaks using a flame ionization detector (FID) following the procedures outlined in U.S. EPA Method 21 (a copy has been included in Appendix A) as listed in 40 Code of Federal Regulations Part 60 Appendix A-7 with exceptions listed in this section.

The specific manufacturer and model FID instrument used was the Thermo Fisher Scientific TVA 2020 Toxic Vapor Analyzer.

Personnel were instructed to screen components at the interface whenever possible but not more than one centimeter from the interface.

As connectors typically outnumber valves between three to one and four to one, screening personnel were advised to screen every third connector encountered in a selected process line.

Screening personnel were instructed to use the following monitoring technique:

- Place the instrument probe at the surface of the component interface where leakage would occur,
- Move the probe along the interface periphery at a 90-degree angle to the interface while observing the instrument reading,
- Identify the location of maximum leakage by moving the probe around the entire interface, and
- Keep the probe at the location of maximum reading for at least three times the response time of the instrument.

Screening personnel were advised that monitoring should not be conducted faster than four seconds per component circumferential inch monitored. However, this maximum speed was originally developed for monitoring components in gas and light liquid service.

Prior to initiating screening at the pilot refinery, Air District personnel conducted several trial runs at a petroleum re-refiner to understand any potential differences that may exist between screening components handling gas and light liquid streams and those handling heavy liquid streams. In addition, one of the petroleum refineries provided samples of heavy liquid material (gas oil, etc.) where this material was heated over a Bunsen burner to varying temperatures and produced vapors were measured with an FID to understand the instrument response to such materials. Both the field experience at the re-refiner as well as observations from the heated material indicated that the instrument measurement readings increased more slowly and decayed more slowly once the probe was removed from the emissions source than when monitoring gas or light liquid materials. From this experience, screening personnel were informed that monitoring pace may be dictated by the specific streams being monitored and their operating conditions.

Standardized field sheets were utilized to capture the following information:

- Refinery
- Screening personnel name
- Date
- Windspeed / Direction
- Monitoring instrument serial number
- Entry ID
- Process Unit / Area
- Sub-Area
- Component Type
- Component Sub-Type
- Component Size (inches)
- Stream Service
- Vibration Amount (None, Low, High)
- Cyclic Vibration (Yes / No)
- Elevation
  (Ground, Platform, Top of Vessel / Column, Other)
- Operating Temperature (degrees Fahrenheit)
- Operating Pressure
  (pounds per square inch gauge)
- Screening Time
- Background Screening Measurement (ppmv)
- Component Screening
- Maximum Measurement (ppmv)
- Comments

Either a standard 6-inch ruler, 12-inch ruler, or a measuring tape were used to estimate the diameter of the process line for a connector, diameter of a valve body, or rotating shaft for a pump seal. Because of the elevated temperatures of the components, only a sight estimate was made.

In most cases, stream service was identified either by markings on the selected process line or a nearby process line that was connected to the selected process line. In some cases, a process unit operator or supervisor provided this information.

Operating temperature was difficult to ascertain without going into a process unit control room. Therefore, the external temperature of a component's part closest to the process stream was chosen as a surrogate. A portable infrared, non-contact thermometer was used to determine the external component temperature at the point closest to the process fluid. For example, for a flange, the temperature at the innermost point of the flange was targeted as it would be nearest the temperature of the process fluid (see Figure II.3). For a valve, the external temperature of the valve body was measured.

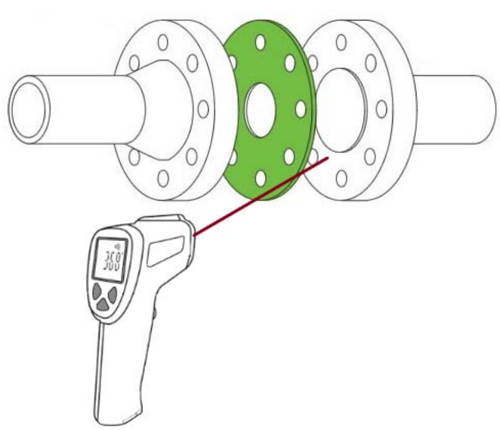


Figure II.3. Infrared temperature measurement of inner part of flange

For leaks above an applicable leak standard (100 ppmv for valves and connectors, 500 ppmv for pumps and pressure relief valves), petroleum refinery personnel verified the leak measurement using a separate FID instrument.

Each monitored component found leaking (greater than 2.5 ppmv above background) was digitally photographed for use in future locating the component (if selected for mass emissions sampling) as well as to document the state of the component at the time of component screening. A standard twelve-inch ruler was placed in the picture frame as a reference for scale. Each picture included a marker (dry-erase board) listing the component test number and maximum leak measurement value as well as a marked location of the maximum leak. A physical tag was also affixed to the component that included the component test number, date, time, and maximum screening value.

II.ii.2. Mass Emissions Sampling

Sampling for purposes of measuring mass emissions of selected components was done by enclosing ("bagging") components with Mylar® or aluminum sheets and capturing emissions in sampling media in accordance with U.S. EPA "Mass Emissions Sampling", Chapter 4.0 of the 1995 EPA "Protocol for Equipment Leak Emission Estimates". Specifically, the "vacuum method" identified in Section 4.2.1 of that chapter – with additional modifications / clarifications identified below to address components in heavy liquid service – was used. There were also further modifications made after testing at the pilot refinery was completed and the results analyzed.

Prior to mass emissions sampling, both the background (as defined in U.S. EPA Method 21) and the selected component were screened using an FID, and the maximum screening value was recorded.

If the leak concentration of the selected component was no longer within the target concentration range, another component with a screening value within the target concentration range was selected, as much as practical.

Samples were collected using sorbent tubes to capture heavier organic compounds expected to be present.

Each sorbent tube consists of multiple parts (Figure II.4) that include a primary sorbent layer (the front half), a backup sorbent layer (back half) in case of sample breakthrough, separators (wool, foam, or other material) for uniform pressure drop, and two sealing end caps that prevent sample contamination. The dimensions of the tube and the type of sorbent material vary based upon the specific model tube.

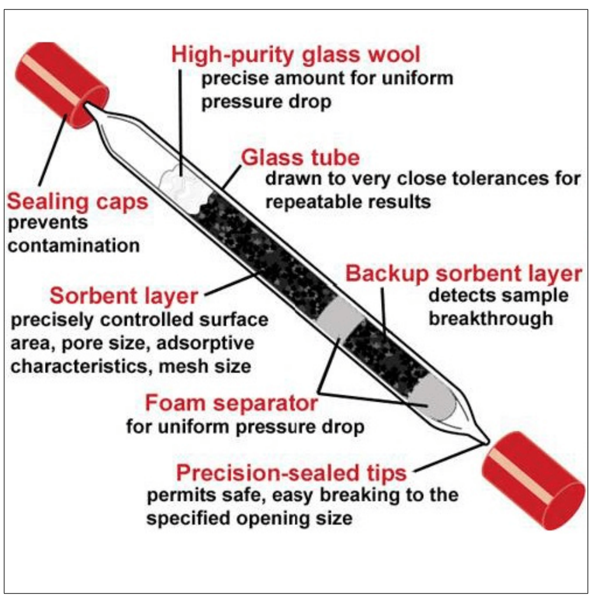


Figure II.4. Sorbent Tube Parts
(Source: SKC website: https://www.skcltd.com/products2/sorbent-tubes/charcoal-sorbent-tubes.html)

Samples were pulled through two coconut charcoal tubes in series at a sampling flowrate of approximately 1 liter per minute. Under certain conditions, a XAD-2 tube was placed in line before one to two charcoal tubes. If a XAD-2 tube was used, the sampling flowrate was reduced to 0.75 liters per minute. The third-party's sampling flowrate for sampling trains with XAD-2 tubes was limited to 0.3 liters per minute due to equipment issues. Primary and replicate samples were taken simultaneously.

The specific sorbent tubes used were the XAD-2 resin tubes (SKC catalogue number 226-30-06) and coconut charcoal tubes (SKC catalogue number 226-16).

The specific XAD-2 tube selected was 8 mm in outer diameter and 110 mm in length and had 400 mg of resin sorbent in the primary sorbent layer (front half), 200 mg of sorbent in the backup sorbent layer (back half), and glass wool separators for uniform pressure drop.

The coconut charcoal tubes were 10 mm in outer diameter and 110 mm in length with 800 mg of sorbent material in the primary sorbent layer (front half) and 200 mg of sorbent in the back half and used glass wool before the front half and foam in between layers and after the back half for uniform pressure drop.

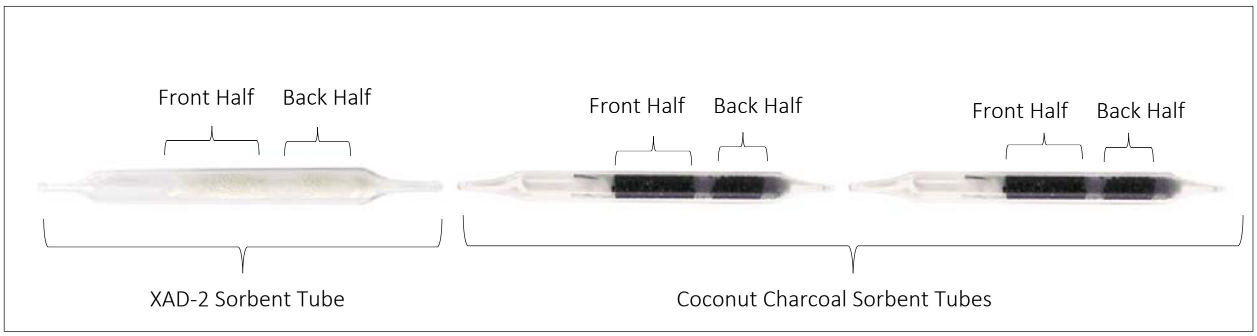


Figure II.5. *Sorbent Tubes in Series*

A total sample volume of approximately 12 liters was targeted, although some exceptions may have been made depending upon measurements taken from a continuous handheld analyzer.

For some components selected by the Air District, summa cannisters were taken for purposes of evaluating the extent to which lighter organic compounds (C_1 to C_4) and toxic organic compounds were present.

Each mass emissions sample included a sample train with sorbent tubes in line with small pumps as well as a larger pump to pull excess sample and ensure there was a vacuum in the bag around the component.

The sampling train was checked for leaks prior to testing with an allowable tolerance of ± 5 percent.

The sampling train differed from Figure 4-1 of the 1995 U.S. EPA “Protocol for Equipment Leak Emission Estimates” because heavier hydrocarbons were being targeted. In particular, the following changes were made:

- The sampling media was moved upstream of the gas meter,
- No cold trap prior to sorbent tubes, and
- Sampling bag (and sampling pump upstream of it) were replaced by sorbent tubes (and a sampling pump downstream of it).

Additionally, the following changes were optional:

- The dry gas meter replaced by a rotary gas meter,
- Digital manometers used, and
- A pump and mass flow controller used in place of personal sampling pumps.

There were also two sampling trains rather than one, to allow for one train to be used for a spike recovery study (per Section 8.4.3 of U.S. EPA Method 18).

Per page 4-8 of the 1995 U.S EPA Protocol, for each component sampled, two samples were taken using the sampling train. Spike recovery studies were targeted to be conducted on at least 15 percent of the components. The flow rate pulled through the dry gas meter was targeted to be approximately 5 liters per minute, but the operator had the ability to adjust this to keep the bag vacuum within the target range. The component bag vacuum was targeted to be 0.001 to 0.1 inches H_2O.

When canister samples were taken, cold traps were used to avoid deposition in the canisters. Flow to the 6-liter cannisters was controlled using a 0.009-inch critical orifice.

The various sampling train configurations used are shown in Figure II.6, Figure II.7, Figure II.8, and Figure II.9

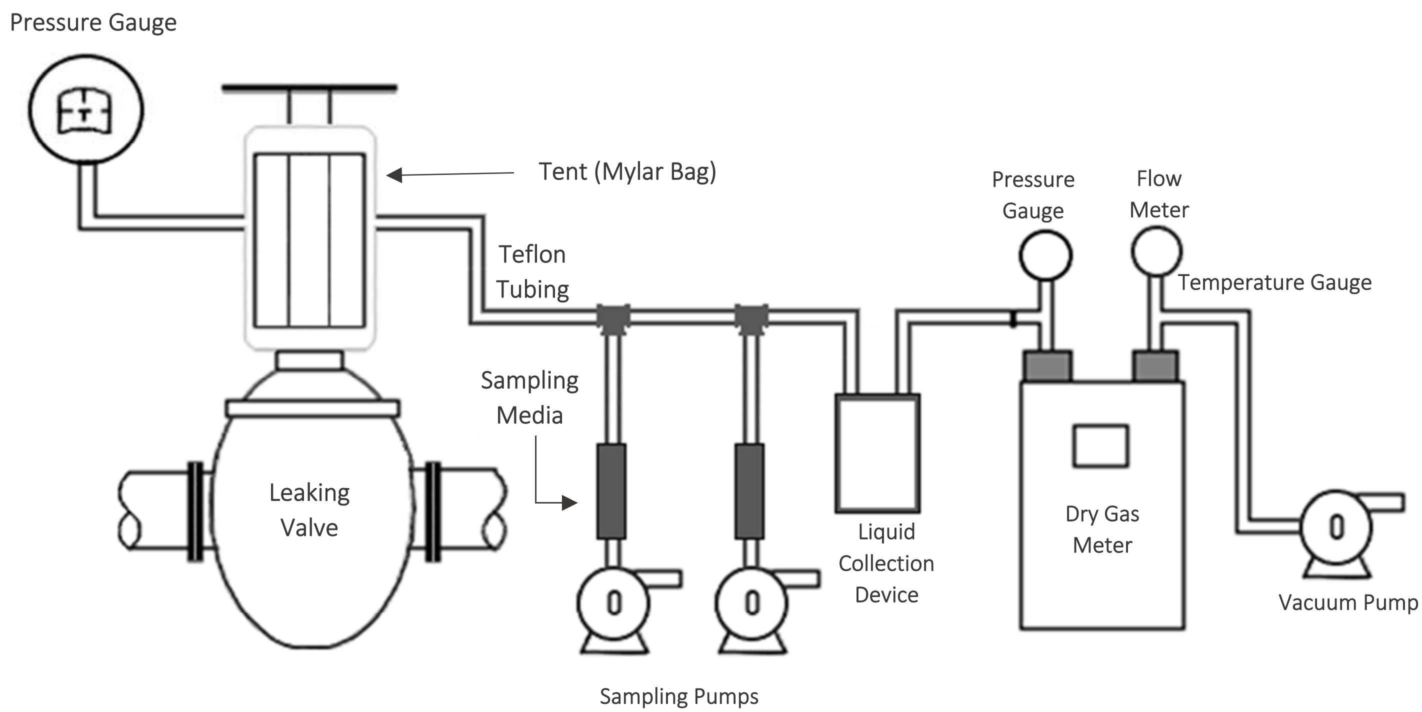


Figure II.6. Mass Emissions Sampling Train for Sorbent Tubes

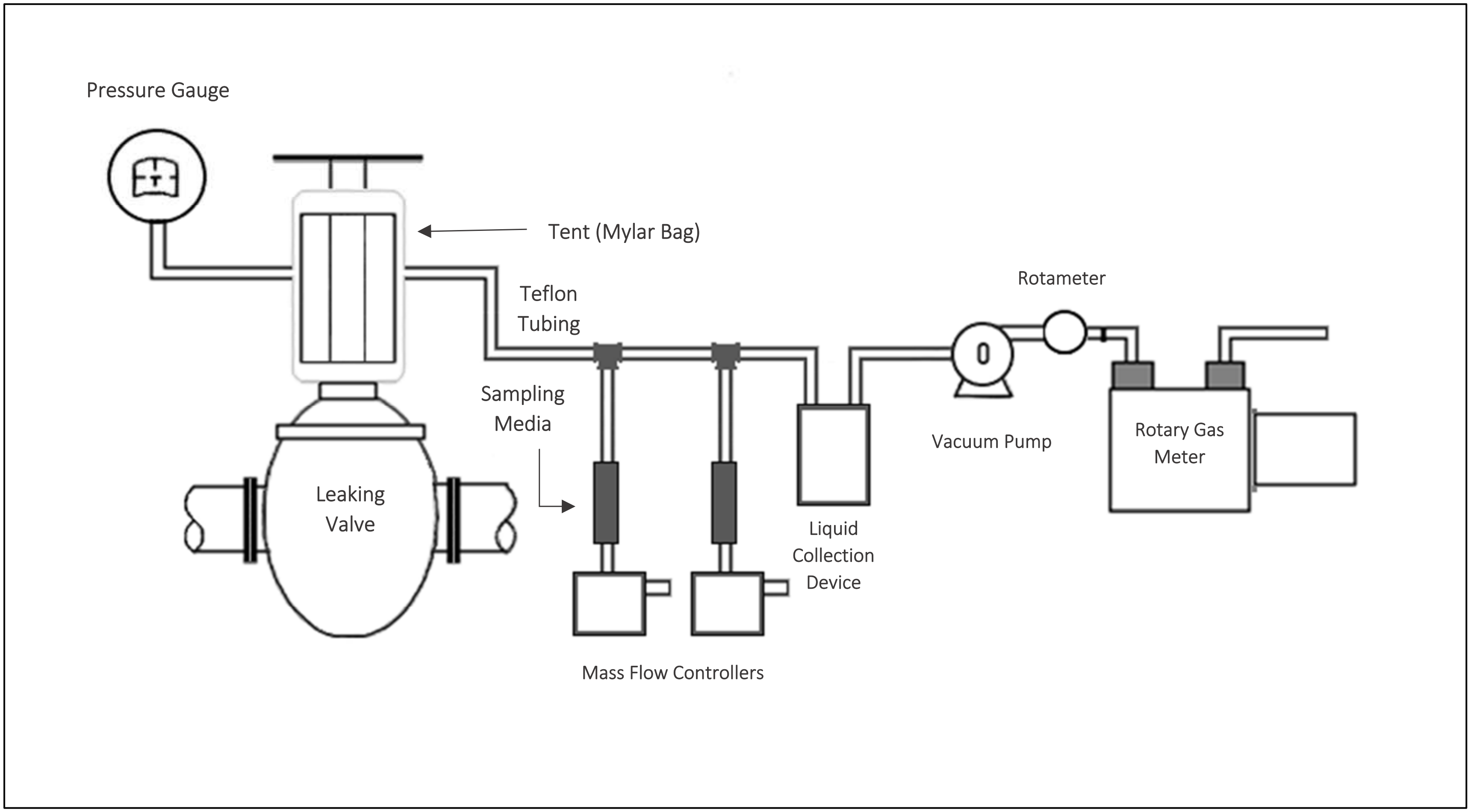


Figure II.7. Alternative Mass Emissions Sampling Train Configuration for Sorbent Tubes

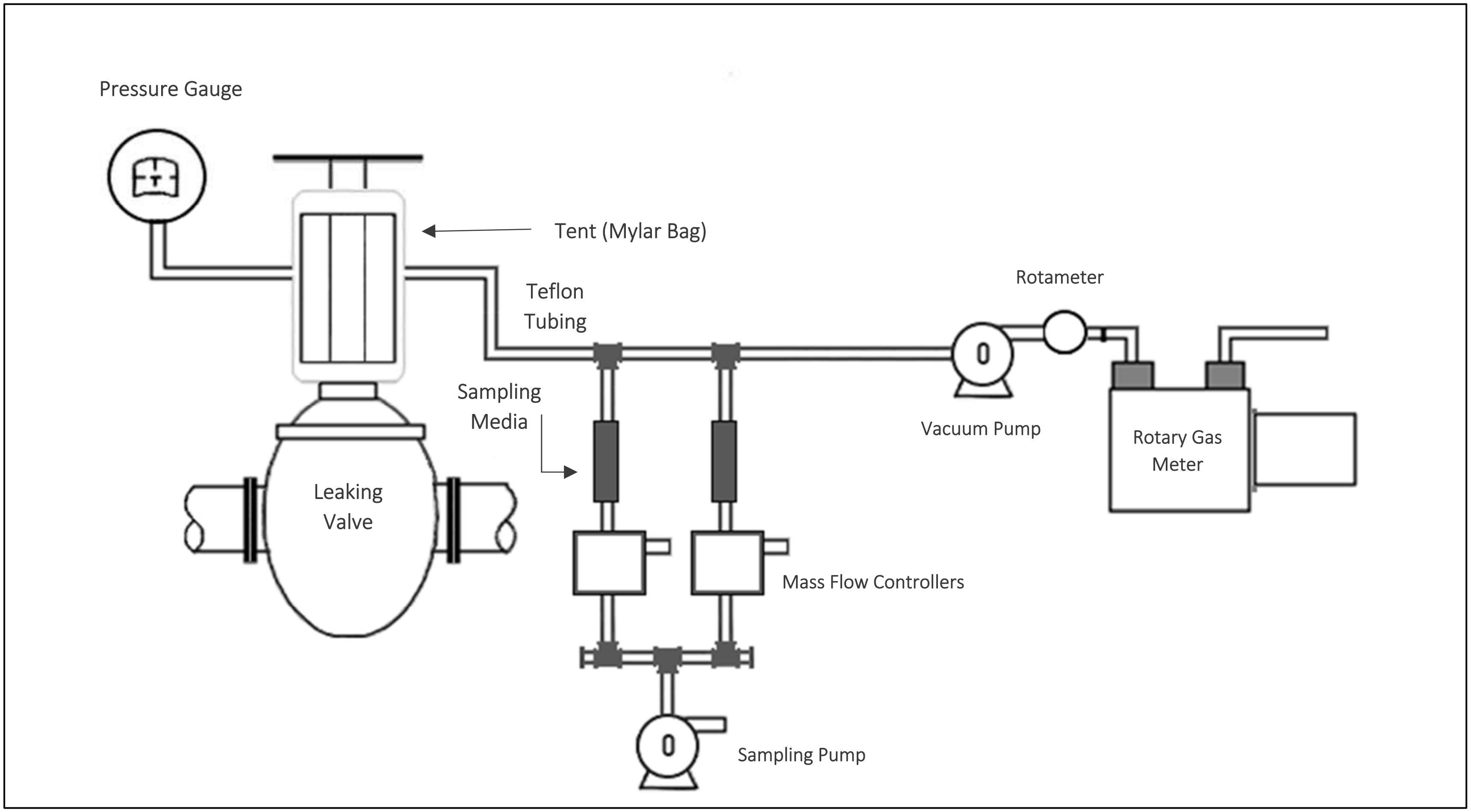


Figure II.8. Air District Sampling Train Configuration for Sorbent Tubes

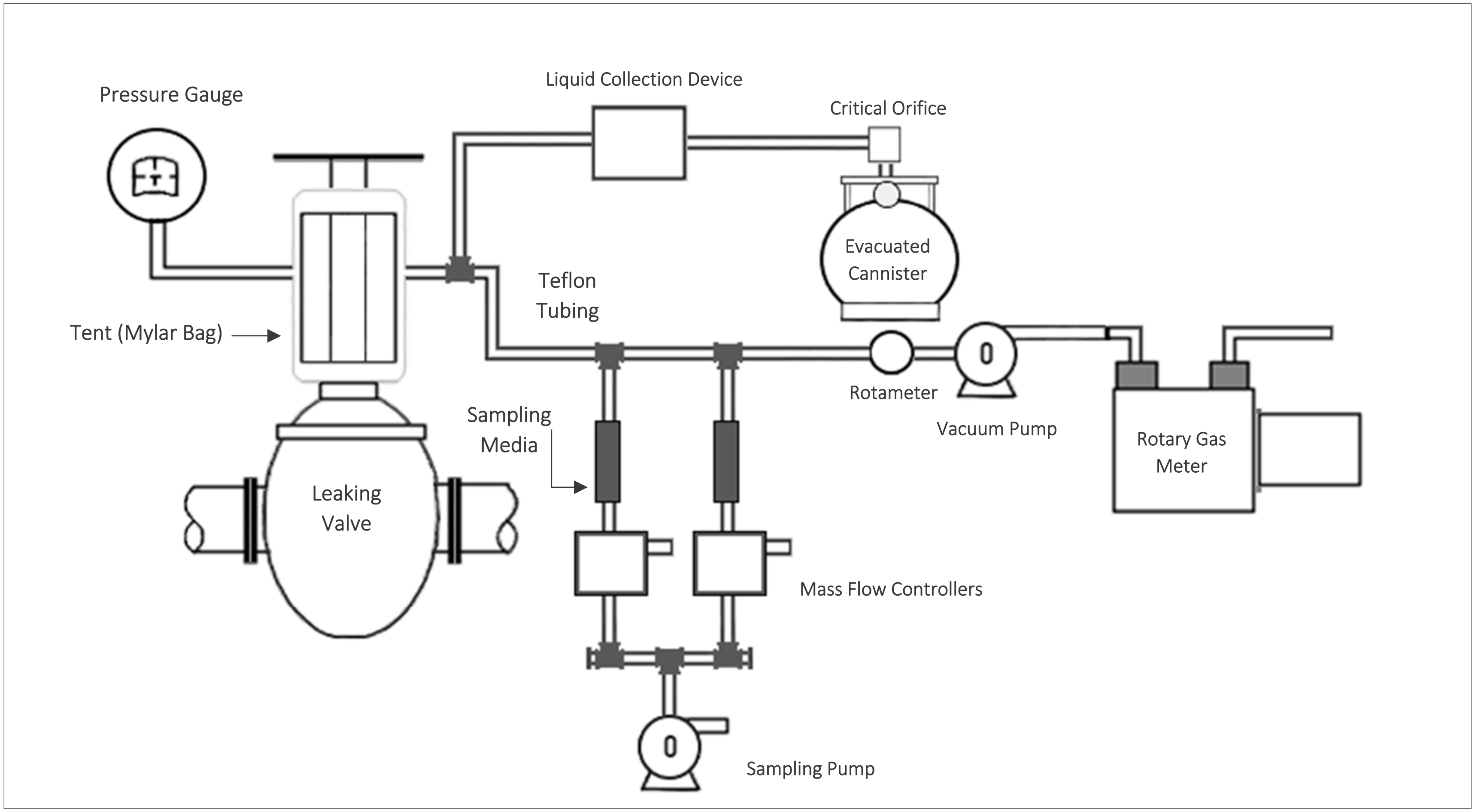


Figure II.9. Air District Sampling Train Configuration for Sorbent Tubes and Evacuated Cannisters

II.ii.3. Modification of the Experimental Design

Screening

Field personnel were initially instructed to screen every third connector encountered on selected process lines. This instruction was to provide for an equal number of valves and connectors within a variety of process units. However, once screening began at the pilot refinery, field personnel observed that selected process lines were often insulated (heavier streams typically required higher temperatures) and connectors were not accessible.

In these instances, field personnel were instructed to estimate the number of accessible connectors and determine a monitoring frequency based on the estimated number of valves and accessible connectors. If the number of accessible connectors roughly equaled the number of valves on a selected process line, then every accessible connector was to be screened. If the number of accessible connectors was double the number of valves, then every second accessible connector would be screened.

In situations where the number of accessible connectors outnumbered the number of accessible valves by more than three to one, screening personnel decided upon a periodicity (e.g., every 10th, 25th, etc. component) and followed that periodicity. This most often occurred at the ends of air-cooled heat exchangers (fin fan coolers) where there were hundreds of connectors (threaded plugs / bolts). For air-cooled heat exchangers, screening personnel were instructed to screen every 25th connector using a zig-zag pattern (**Figure II.10**) starting at either the first top or bottom connector.

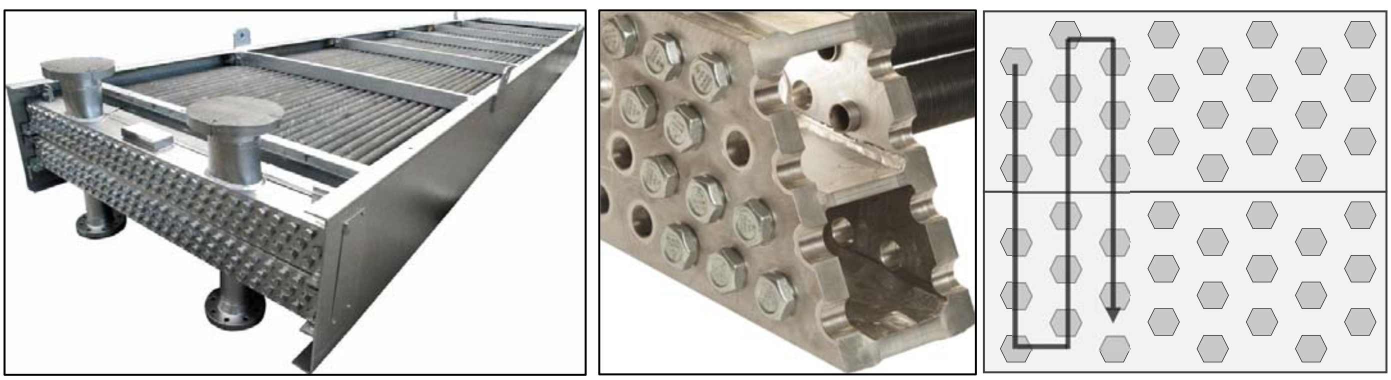


***Figure II.10**. a. Air-cooled heat exchanger, b. Close-up of threaded plugs, c. Example of screening procedure of threaded plugs*

Pulsing Leaks

While screening at the pilot refinery, multiple components were found to have pulsing leaks, where the magnitude of a screening measurement would oscillate. Potential causes of this oscillation could have been equipment vibration or operational conditions. The cause of such pulsing leaks could not be identified and was not pursued. However, as the Study protocol required recording the maximum screening measurement of each leak, care was taken to monitor the leak and identify what may be considered the maximum value. In several cases, significant time (half an hour or more) was spent on such leaks.

After the pilot refinery, specific guidance was developed for pulsing leaks. Components were screened until the screening value peaks and then for one additional minute or longer depending on the periodicity (as determined in the field) before recording the reading. Screening personnel were instructed to take consideration for pulsing leaks that increased in value (see **Figure II.11**).

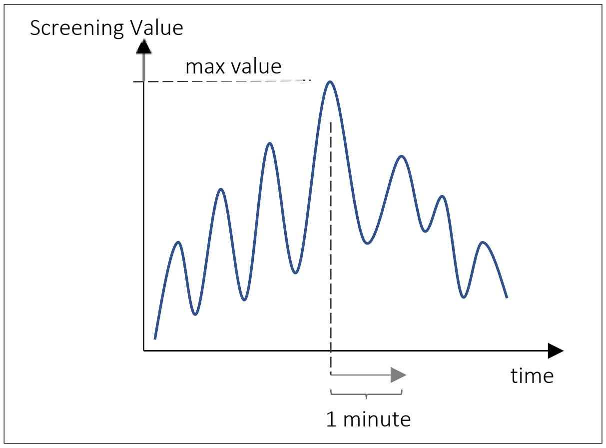


Figure II.11*. Pulsing leak*

Leak Definitions

At the pilot refinery, components with screening values of 2.5 ppmv above background were identified as "leaks" and were digitally photographed and had physical tags affixed. However, because of the volume of such components found at the pilot refinery and the amount of time this process required, only components found leaking at 25 ppmv or more above background at subsequent refineries were identified as "leaks".

Screening Personnel

In the middle of screening at the second refinery, there was a safety stand down resulting from two personal gas alarms detecting unsafe levels of carbon monoxide within a selected process unit. All screening was halted, and a review of the health and safety of the screening personnel (Air District Air Quality Inspectors) was surveyed. Several screeners told surveyors that they had been experiencing various health symptoms during screening at both the first and second refineries. Stated symptoms varied from headaches and nausea to heat exhaustion (from standing for prolonged periods near high temperature reactor vessels).

At this point, the Air District determined that it would no longer use Air District personnel to screen components and the Study could not proceed. The five petroleum refineries requested to continue the Study by using their LDAR personnel (either refinery employees or third-party contractors) who had years of experience screening gas and light liquid components and handling the hazards that are associated with such screening.

As use of different refinery personnel at each refinery for screening components could introduce an additional source of bias, third-party auditors were employed to review the screening at each petroleum refinery. One third-party auditor was a former Air District Air Quality Inspector who had retired from the Air District. However, as screening was done by petroleum refinery personnel, screening at each petroleum refinery was conducted in parallel rather than sequentially. This necessitated having multiple third-party auditors. The Air District was unable to locate an additional third-party auditor that did not have experience working for one of the five petroleum refineries. Therefore, an existing petroleum refinery LDAR third-party contractor was selected and used at the petroleum refineries for which the company had not previously been contracted.

Screening Instruments

Refinery screening personnel were instructed to ensure that screening instruments were given at least 15 minutes to warm up at the beginning of each screening day before they were calibrated.

Weather

To protect screening instruments from malfunction as well as ensure representative measurements, screening was delayed or called off when the weather forecast predicted rain.

Mass Emissions Sampling

Primary and Replicate Samples

At the pilot refinery, replicate samples were taken sequentially after primary samples. However, although the time between primary and replicate sampling was minimized as much as practical, differences between the samples could not be separated from potential operational differences nor differences in the component leak being sampled at the different times.

At the second and subsequent petroleum refineries, primary and replicate sampling were taken concurrently except when spike samples were run.

Background Samples

At the pilot refinery, a minimum of one background sample per process unit per day was taken. At subsequent refineries, one background sample was collected for every component sample.

Sampling Media and Analysis

From preliminary laboratory results of mass emissions sampling conducted at the pilot refinery, the presence of C_{25} to C_{30} hydrocarbons was not found to be moderate or significant contributors to total sample results and the use of a XAD resin tube was no longer required for every sample. Breakthrough did not appear to be an issue as well. After the pilot refinery, each sample train consisted of two series-connected charcoal tubes.

Sampling Pump Flow Rate

Because a XAD tube was no longer required after the pilot refinery, the sampling rate was increased to one liter per minute (from 0.75 liter per minute).

Condensate

Starting with Refinery B, condensate samples were collected only when liquid formed and pooled in the bottom of a sample bag. Solid matter that accumulated on the surface of the bag was not classified as “condensate”. All condensate samples were collected in VOA vials and analyzed for C_5 to C_{30} hydrocarbons.

iii. Identification of Emitted Species

Sorbent Tubes

Samples collected using sorbent tubes as well as any collected condensate were analyzed using the analytical procedures in U.S. EPA Method 18 – Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (listed in 40 CFR Part 60, Appendix A). Standards and samples were analyzed following the procedures specified in Section 8.2.4 (Adsorption Tube Procedure).

For sorbent tubes, total hydrocarbon emissions for compounds with five or more carbon atoms were targeted. At a minimum, laboratory analyses were targeted to identify C_5 to C_{24} hydrocarbons. Samples were analyzed for the C_5 to C_{24} n-alkanes and others as C_X compounds. When condensate was collected or if XAD-2 tubes were used, the laboratory was instructed to target C_5 to C_{30} hydrocarbons.

Sample tubes and collocated spike samples (see Quality Assurance and Quality Control section for discussion of spike samples) were desorbed into two fractions (the front half and the back half) where each fraction was desorbed using 2.0 mL of carbon disulfide and shaken at a speed of 450 revolutions per minute for 30 minutes. Each fraction was analyzed separately, and results summed.

For spiked samples, proportional aliquots were combined from the two fractions to permit a single analysis.

Sampling media for replicates, background, and trip blank samples were desorbed whole using 4.0 mL of carbon disulfide and shaken at a speed of 450 revolutions per minute for 30 minutes.

Samples were analyzed using an Agilent Technologies Model 7890A, Gas Chromatograph "Ralph" and the Hewlett Packard Model 5890, Series II Gas Chromatograph "Teller", each was equipped with an FID.

The choice of detector was based upon the target analytes and the potential constituents within the sample being analyzed.

Carbon number retention time windows were established and all peaks within that window were quantitated using the response factor of the associated n-alkane. To capture analytes after C_{24}, the gas chromatograph was run for an additional five minutes after the C_{24} eluted and any mass associated with peaks eluting after C_{24} were quantified using the response factor of the last calibrated peak (C_{24}).

The choice of gas chromatograph column and the range and rate of oven temperature ramping was based upon the target analytes and the potential constituents within the sample being analyzed.

The choice of oven temperature ramping rate and range was determined by considering the composition, initial boiling point, operating temperature, and operating pressure of the process stream handled by the equipment being sampled.

Evacuated Canisters

Samples collected in evacuated canisters and in liquid collection devices were analyzed per:

- U.S. EPA Method 18 – Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (listed in 40 CFR Part 60, Appendix A)
- U.S. EPA Method TO-14A – Determination of Volatile Organic Compounds (VOCs) In Ambient Air Using Specially Prepared Canisters with Subsequent Analysis by Gas Chromatography (from U.S. EPA *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition*, EPA/625-R-96/010b).
- U.S. EPA Method TO-15 – Determination of Volatile Organic Compounds (VOCs) In Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography / Mass Spectrometry (GC/MS) (from U.S. EPA *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air – Second Edition*, EPA/625-R-96/010b).

For evacuated canisters, C_1 to C_4 hydrocarbons and specific toxic air contaminants were targeted.

Limitations

U.S. EPA Method 18 was identified as having several limitations regarding compounds that:

- are polymeric (high molecular weight)
- can polymerize before analysis, or
- have very low vapor pressures at instrument conditions.

Laboratory Analysis

The laboratory ran into challenges when analyzing larger data sets and could no longer reliably break down C_{25}-C_{30} into separate C_n windows. As a result, the data sampled by the Air District at the pilot refinery was analyzed for C_5 to C_{30}, the data sampled by Tricord at the pilot refinery was analyzed for C_5 to C_{24}, and the data sampled at subsequent refineries was analyzed for C_5 to C_{24} with the sum of C_{25}-C_{30} reported as C_{24}.

During analysis of the pilot refinery samples, one of the goals was to determine whether there was an adequate amount of sampling media to prevent breakthrough. The front and back halves of the first charcoal tube were combined with the front half of the second charcoal tube to form the first fraction while the back half of the second charcoal tube was analyzed as the second fraction. As it was established that breakthrough was not occurring, later analysis involved analyzing the front and back half of the first charcoal tube separately and archiving the second tube. By doing so the laboratory was able to use less solvent and minimize detection limits.

Calculation of Sample Emission Rates

From laboratory analysis results, a total hydrocarbon emission rate for each sample was calculated where the total hydrocarbon emission rate was derived from emissions measured on sorbent tubes as well as from any condensate collected with a sample.

$$\text{Sample THC Emission Rate} = \sum_i \left(\text{Gas/Vapor Emission Rate}_{\ (i)} + \text{Liquid Emission Rate}_{(i)}\right) \qquad \text{[II-2]}$$

where:

Sample THC Emission Rate	= Sample total hydrocarbon emission rate, (kg/hour)
Gas/Vapor Emission Rate $_{(i)}$	= Emission rate of species (i) within sampling media (charcoal tube or XAD tube), (kg/hour), see Equation II-3
Liquid Emission Rate $_{(i)}$	= Emission rate of species (i) of any liquid collected during sampling, (kg/hour), see Equation II-9

$$\text{Gas/Vapor Emission Rate}_{\ (i)} = \text{Sample THC Emission Rate} = \left[\frac{\text{Sample Mass}_{(i)}}{\left(\frac{\text{Sample Run Time}}{60}\right)}\right] \times \left[\frac{1}{1{,}000{,}000{,}000}\right] \qquad \text{[II-3]}$$

where:

Gas/Vapor Emission Rate$_{(i)}$	= Emission rate of species (i) within sample, (kg/hour)
Sample Mass $_{(i)}$	= Mass of species (i) within sample, (μg)
Sample Run Time	= Amount of time sample run was conducted, (minutes)
60	= Conversion factor (minutes per hour)
1,000,000,000	= Conversion factor (micrograms per kilograms)

$$\text{Sample Mass}_{\ (i)} = \left[\frac{\text{Adjusted Sample Concentration}_{\ (i)}}{1000}\right] \times \text{Total Run Volume} \qquad \text{[II-4]}$$

where:

Adjusted Sample Concentration$_{(i)}$	= Sample concentration of species (i) adjusted for trip blank and background, (μg/m^3), see Equation II-5
Total Run Volume	= Total volume of gas during sample run, (L)
1000	= Conversion factor (liters per cubic meter)

Sample results of individual species were adjusted by subtracting any amount of that species found in both a background sample taken of the same process unit as the component sampled as well as for any amount found in a trip blank that accompanied the samples (component and background) from the field to the laboratory.

For any species that was not detected above the detection level within the sample, one-half of the detection limit for that species was assumed to be present in the sample. This assumption did not apply to either the background or trip blank samples as the species was not expected to be present in the ambient environment.

$$\text{Adjusted Sample Concentration}_{(i)} = [\text{Component Sample}_{(i)} - \text{Trip Blank}_{(i)}] - [\text{Background Sample}_{(i)} - \text{Trip Blank}_{(i)}] \qquad \text{[II-5]}$$

where:

Adjusted Sample Concentration$_{(i)}$	= Sample concentration of species (i) adjusted for trip blank and background
Component Sample$_{(i)}$	= Concentration of species (i) in component sample run
Trip Blank$_{(i)}$	= Concentration (μg/m^3) of species (i) in trip blank sample
Background Sample$_{(i)}$	= Concentration (μg/m^3) of species (i) in background sample

$$\text{Total Volume} = \text{Sample Volume} + \text{Dry Gas Meter Volume} \quad \text{[II-6]}$$

where:

Total Volume	= Volume of gas during sampling, (L)
Sample Volume	= Volume of gas pulled through sampling media, (L), see Equation II-7
Dry Gas Meter Volume	= Volume of gas pulled through dry gas meter during sampling, (L), see Equation II-8

$$\text{Sample Volume} = [\,\text{Volume}_{\text{Run A}} + \text{Volume}_{\text{Run B}}] \times \left[\frac{\text{Barometric Pressure} - \text{Vacuum}}{760}\right] \times \left[\frac{294.15}{\text{Sample Temperature}}\right] \quad \text{[II-7]}$$

where:

Sample Volume	= Total volume of gas during sample run, (L)
Volume $_{\text{Run A/B}}$	= Volume of gas pulled through sorbent media during each run, (L)
Barometric Pressure	= Pressure reading during sampling, (mm Hg)
Vacuum	= Dry gas meter vacuum, (mm Hg)
760	= Conversion factor for standard pressure, (mm Hg)
294.15	= Conversion factor for standard temperature, (Kelvin)
Sample Temperature	= Temperature of gas at outlet of sample pump A, (Kelvin)

$$\text{Dry Gas Meter Volume} = [\text{DGM Flow Rate}] \times \left[\frac{\text{Barometric Pressure} - \text{Vacuum}}{760}\right] \times \left[\frac{294.15}{\text{Sample Temperature}}\right] \times [\text{Sampling Time}] \quad \text{[II-8]}$$

where:

Dry Gas Meter Volume	= Volume of gas pulled through dry gas meter during sampling, (L)
DGM Flow Rate	= Dry gas meter flow rate, (liters/minute)
Barometric Pressure	= Pressure reading during sampling, (mm Hg)
Vacuum	= Dry gas meter vacuum, (mm Hg)
760	= Conversion factor for standard pressure, (mm Hg)
294.15	= Conversion factor for standard temperature, (Kelvin)
Sample Temperature	= Temperature of gas at outlet of sample pump A, (Kelvin)
Sampling Time	= Total sampling time, (minutes)

$$\text{Liquid Emission Rate}_{(\text{i})} = \left[\frac{\text{Sample Mass}_{(\text{i})}}{(\text{Sample Run End Time} - \text{Bag End Time})}\right] \times \left[\frac{60}{1{,}000{,}000{,}000}\right] \quad \text{[II-9]}$$

where:

Liquid Emission Rate $_{(i)}$	= Emission rate of species (i) of any liquid collected during sampling, (kg/hour)
Sample Mass $_{(i)}$	= Mass of species (i) within sample, (µg)
Sample Run End Time	= Time sample run was completed
Bag End Time	= Time that component enclosure was completed and reached equilibrium
60	= Conversion factor (minutes per hour)
1,000,000,000	= Conversion factor (micrograms per kilogram)

iv. Quality Assurance and Quality Control

Quality assurance (to prevent deficiencies from occurring) and quality control (to identify deficiencies once occurred) procedures were implemented prior to, during, and after the Study to improve the accuracy and precision of Study results.

Terms used in this section (and Study) include accuracy, precision, resolution, range, and error, which have the following meanings:

Accuracy – how close a measurement is to the "true" (actual value).

Precision – how close two or more measurements are to each other under the same conditions, regardless of whether those measurements are accurate or not. Precision is a measure of the spread of different readings and reflects the reproducibility of a measurement.

Resolution – the smallest discernible change in the parameter of interest that can be registered by a particular instrument.

Range – the extent over which an instrument can reliably function within the confines of its specification.

Error – the amount by which an assumed value deviates from its true value

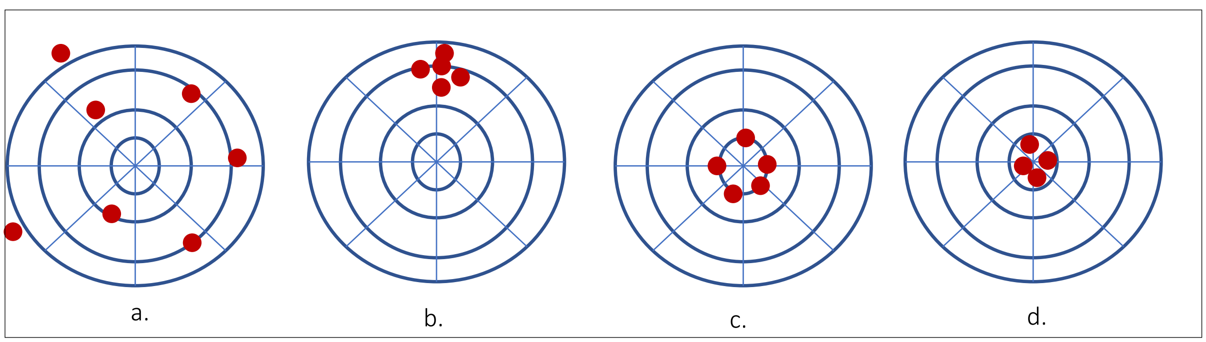


Figure II.12. Example of a. not accurate, not precise, b. not accurate, precise, c. accurate, not precise, d. accurate, precise

The specific quality assurance and quality control processes and checks varied for the different Study phases.

II.iv.1. Screening

Potential areas in component screening that may introduce errors in the Study include component selection, personnel, screening instrument, screening procedure, and information capture and recording.

Process lines were pre-selected from drawings (PFDs and P&IDs) offsite of the petroleum refineries and identified in the field with assistance from petroleum refinery process unit operators or area supervisors.

As much as practical, the same personnel were used in screening. However, as discussed above, after the pilot refinery, petroleum refinery personnel were used to screen components at their respective refineries. As such, the same personnel could not be used for all five petroleum refineries.

To address this variable, several training sessions were held for both Air District and petroleum refinery personnel to discuss and outline the established screening methodology and expected monitoring technique. A particular emphasis was placed on distinguishing the differences between LDAR monitoring gas and light liquid service components for regulatory purposes where the intention is to find and fix leaks and monitoring heavy liquid service components for the purposes of developing average emissions factors. It was explained that the instrument response time for heavy liquid service leaks would be longer than gas and light liquid leaks, so the monitoring pace was expected to be slower. In addition, unlike for regulatory compliance where it is more important to determine whether a leak is above or below a leak standard, it was important that the most accurate screening measurement be taken and that this would also be expected to result in longer monitoring times.

Instrument Specifications

Prior to initiating the Study, a survey of portable hydrocarbon equipment leak measuring devices was conducted to identify the manufacturer and model of instrument that was judged to both accurate and precise of measuring organic compound concentrations from equipment leaks. The Thermo Fisher Scientific TVA2020 Toxic Vapor Analyzer was identified as such. The Air District already had some of these instruments for auditing equipment leaks at petroleum refineries and chemical plants for regulatory compliance purposes. However, the Air District purchased additional instruments for the Study. In addition, most of the petroleum refineries were already using this model instrument in their LDAR programs.

To reduce variability attributed to screening instrument, minimum specifications (Table II-9) were established for all instruments used in screening including:

- Model type,
- Minimum instrument accuracy,
- Minimum instrument repeatability,
- Minimum detection limit,
- Minimum instrument resolution
- Instrument range,
- Instrument sampling flow rate
- Instrument response time
- Instrument calibration gas specifications, and
- Instrument probe specifications (diameters, length).

Table II-9. Specifications for Equipment Leak Screening Device

Parameter	Specification
Model Type	Flame Ionization Detector (FID)
Accuracy	± 10 percent of reading or ± 1.0 ppmv, whichever is greater from 1.0 to 10,000 ppmv
Repeatability	2 percent at 500 ppmv of methane
Minimum Detection Limit	0.5 ppmv of methane
Resolution	0.1 ppmv
Range	0 – 30,000 ppmv (methane)
Flow Rate	1 Liter/minute, nominal at sample probe inlet
Response Time	< 3.5 seconds for 90 percent of final value, using 10,000 ppmv of methane
Calibration Gas	Methane
Calibration Gas Concentrations	• Zero air (no more 0.2 ppmv hydrocarbons) • 10 ppmv (± 2 percent) • 100 ppmv (± 2 percent) • 500 ppmv (± 2 percent) • 3,000 ppmv (± 2 percent) • 10,000 ppmv (± 2 percent)
Response Factors (to methane)	Same as Thermo Fisher Scientific TVA2020 Toxic Vapor Analyzer
Probe Outer Diameter	3/16 inch
Probe Inner Diameter	1/8 inch
Probe Length	12 inches for standard probe, 16 inches for enhanced probe
Probe Hose Inner Diameter	1/8 inch
Probe Hose Length	80 inches for standard probes, 88 inches for enhanced probes (in both cases, length is from beginning of the hose to the end of the probe tip)

Instrument Performance

Screening instruments were calibrated prior to each monitoring session using six calibration gases with specified hydrocarbon (methane) concentrations. After calibrating, the instrument measurement to each calibration gas was recorded in standardized forms to use as a comparison of instrument performance after a monitoring session.

To improve the accuracy of the calibration, the standard technique of using calibration gas filled Tedlar bags for calibration was prohibited. Instead, instruments were calibrated directly from calibration gas cylinders equipped with demand flow regulators or through use of a multi-instrument calibrator.

At the end of each monitoring session, each screening instrument was challenged three times against each calibration gas standard with the resulting measurement recorded for each challenge. The difference between the average of the three instrument measurements after monitoring to a calibration gas and the instrument measurement after calibration was defined as the instrument "drift". The instrument drift was calculated by dividing the average of the three instrument readings by the instrument reading after calibration (prior to the monitoring session) converting to a percentage.

$$\mathrm{Drift}_{\mathrm{Span\ Gas}}\ (\%) = \frac{(\text{Average of three drift test readings})_{\mathrm{Span\ Gas}} - (\text{Post calibration instrument measurement})_{\mathrm{Span\ Gas}}}{(\text{Post calibration instrument measurement})_{\mathrm{Span\ Gas}}} \times 100$$

Table II-10. Example Screening Instrument Drift Test and Drift Results

Calibration Gas Target	Zero	10 ppmv	100 ppmv	500 ppmv	3,000 ppmv	10,000 ppmv
Calibration Gas Value	Zero	9.95	98.4	505	2,980	10,200
Calibration	0.2	10.9	99.4	492	3,065	10,000
Quality Assurance Target		± 25%	± 10%	± 10%	± 10%	± 10%
Drift Test						
Reading # 1	-0.4	8.0	95.0	472.0	3,087	10,100
Reading # 2	-0.1	8.7	92.0	471.0	3,047	10,200
Reading # 3	0.2	8.7	101.0	469.0	3,007	9,400
Average	*-0.1*	*8.5*	*96.0*	*470.7*	*3,047*	*9,900*
Percent Deviation		*-22.3%*	*-3.4%*	*-4.3%*	*-0.6%*	*-1.0%*

To reduce the likelihood of an instrument undergoing substantial drift, screening personnel were instructed to pre-emptively switch monitoring instruments after a significant measurement, when the instrument took a lengthy period to return to zero after a measurement (due to heavier hydrocarbons in the instrument), or after measuring a series (25 to 50 components) of particularly heavier process streams.

Screening personnel were also instructed to change probe filters whenever there was a large or significant difference in subsequent monitoring readings to prevent a clogged filter from affecting measurement readings. However, specific criteria for identifying when the filter should be changed was not set and a subjective decision made by each screener based on the components that were monitored (e.g., if components had solidified liquids or rust scaling on the monitoring surface).

Screening Technique and Monitoring Time

Apart from how well a particular screening instrument performs (due to design and calibration), the technique used to screen components was deemed most critical to screening results. Previous studies have shown screening distance to directly impact the leak concentration measured. Therefore, if an instrument probe were not placed at the interface, the measurement may be biased low. Although a third-party auditor viewed screening personnel, while monitoring generally, each measurement was not viewed by the auditor as the number of personnel screening outnumbered the number of auditors and screening personnel were not always located in the same vicinity of each other and/or an auditor.

Locating leaks comprised two parts: 1) moving the instrument probe around the entire interface of a leak location (valve stem, pump seal, flange – gasket interface, etc.) to find the location of a maximum leak, and 2) keeping the probe at the location of maximum leak until a maximum leak measurement was taken.

If screening personnel moved an instrument probe too quickly around a component leak interface, the instrument may not register a leak and results would be biased low. If personnel did not keep the instrument probe at the location of maximum leak for a sufficient time, the instrument would not measure the correct value and results would be biased low. However, the reverse (spending more time than necessary to identify and record the maximum leak concentration) would not bias results high.

A minimum screening time of four seconds per inch of component surface monitored was implemented for finding the location of a maximum leak. Once the location was found, screening instruments were to be held for at least three times the instrument response time at that location. However, the instrument response times varied by stream material.

The screening instruments were calibrated using various concentrations of methane gas. Flame ionization detectors, like the TVA 2020, respond quickly to methane as it is a low molecular gas. As such, the instrument response time to methane gas is typically less than a few seconds. U.S. EPA Method 21 requires that instruments used for screening have a response time of less than 30 seconds. However, this method was promulgated for use in screening gas and light liquid hydrocarbons.

Pre-Study preparatory work and field experience indicated that the performance of the FID instrument to heavier hydrocarbon streams to differ significantly in some cases. Instruments took longer to identify a leak, longer to reach maximum leak reading, and longer to return to background levels once a probe was removed from a source of a leak.

As screening instruments were to be calibrated with methane and the instrument response to longer chain hydrocarbons was not readily known, an attempt was made to understand and quantify the TVA 2020 instrument response and clear times to various hydrocarbons materials.

In the preliminary stages of the Study (before screening began at the pilot refinery), the Air District obtained five samples of heavy liquids (four samples of different grades of gas oil and one sample of residual oil) prepared and provided by Refinery B taken during their daily operating rounds. These samples were heated under a fume hood to three different temperatures while two TVA 2020 instruments were used to take screening measurements and the instrument response time (time it took to read 90 percent of the maximum value) and instrument clear time (time it took the instrument to drop below 2.5 ppmv after a measurement) of each instrument was measured.

***Table II-11**. Screening Instrument Response Times to Different Materials by Material Temperature*

	Screening Instrument Response Times by Material Temperatures (Maximum Screening Measurement)					
	50 Degrees Celsius		75 Degrees Celsius		100 Degrees Celsius	
Material	Instrument 1	Instrument 2	Instrument 1	Instrument 2	Instrument 1	Instrument 2
Residual	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)
Vacuum Tower Light Gas Oil	2 minutes (27.8 ppmv)	2 minutes (21.0 ppmv)	3 minutes (82.5 ppmv)	3 minutes (64 ppmv)	3 minutes (182 ppmv)	3.5 minutes (184 ppmv)
Vacuum Tower Heavy Gas Oil	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)
Cracked Gas Oil (Side Cut 1)	1 minute (9.2 ppmv)	1 minute (3.1 ppmv)	1 minute (20.0 ppmv)	1 minute (11.3 ppmv)	5 minutes (44.2 ppmv)	4 minutes (33.6 ppmv)
Cracked Gas Oil (Side Cut 2)	N/A (1)	N/A (1)	N/A (1)	N/A (1)	2 minutes (18.2 ppmv)	2 minutes (14.7 ppmv)

Note:
1. There was no instrument response to heated material and an instrument response time could not be measured.

Table II-12. Screening Instrument Clear Times to Different Materials by Material Temperature

Material	Screening Instrument Clear Times by Material Temperatures 50 Degrees Celsius		75 Degrees Celsius		100 Degrees Celsius	
	Instrument 1	Instrument 2	Instrument 1	Instrument 2	Instrument 1	Instrument 2
Residual	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)
Vacuum Tower Light Gas Oil	4 minutes	3 minutes	11 minutes	10 minutes	31 minutes	30 minutes
Vacuum Tower Heavy Gas Oil	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)	N/A (1)
Cracked Gas Oil (Side Cut 1)	< 1 minute	< 1 minute	< 1minute	< 1 minute	11 minutes	9 minutes
Cracked Gas Oil (Side Cut 2)	N/A (1)	N/A (1)	N/A (1)	N/A (1)	1 minute	1 minute

Note:
1. There was no instrument response to heated material and an instrument response time could not be measured.

The analysis validated the preliminary field experience that instrument response times varied by material and maximum screening value. However, the results indicated that the TVA 2020 may not meet the U.S. EPA Method 21 requirement for instruments to have a response time of less than 30 seconds when screening components in heavy liquid service.

This information was conveyed to all screening personnel in training sessions. Unfortunately, instrument response times for the diversity of heavy liquid streams could not be developed and used during screening as a quality assurance check.

Data Capture and Information Recording

Each of the petroleum refineries utilized an electronic LDAR program where gas and light liquid service components were given unique identifiers and screening measurements are recorded in the field by electronic handheld devices and then monitoring data uploaded to a centralized electronic database.

Such a system was explored for accurately capturing screening data during the Study. However, it was discovered that components had to be pre-programmed into the system with unique identifiers before screening data could be recorded. The Air District explored with several vendors of electronic LDAR programs the possibility of re-programming their software to allow this functionality, but it was deemed cost prohibitive. The Air District then designed, built, and programmed a portable device that worked in conjunction with the cellular phones of Air District screening staff. However, there were practical difficulties (having to removing safety gloves, small screen, etc.) of data entry into a software application on a phone glass surface. The portable handheld devices used in LDAR monitoring typically have large buttons and require a minimal of entry for screening.

Ultimately, manually writing screening measurements on field sheets was selected as the data capture method since physical field data sheets were still required to capture component information (subtype, size, operating temperature, etc.). This introduced transcription and other data entry errors but allowed for more components to be screened in each monitoring period. Some standard abbreviations were developed for use in succinctly capturing information.

II.iv.2. Mass Emissions Sampling

Multiple procedures and methodologies were employed during emissions sampling to reduce potential bias and ensure quality data.

Personnel

To minimize potential bias from sampling technique, the same personnel were used for each sampling team (Air District and third-party contractor). All personnel involved in sampling participated in training sessions prior sampling.

Data/Information Capture

Standardized field data sheets were used to capture component and sampling information including:

- Equipment type
- Equipment subtype
- Line size
- Stream phase (confirm heavy liquid)
- Barometric pressure
- Ambient temperature
- Stream temperature
- Component temperature
- Stream description
- Component Identification
- Unit Identification
- Date
- Bagging Team
- Screening Instrument Identification
- Sample Pump A Identification
- Sample Pump B Identification
- Stream Pressure

Screening Instruments

Following the U.S. EPA Method 21 screening methodology, an FID instrument was used to measure hydrocarbon concentrations of the component leak pre- and post-sampling as well as during sampling.

A Thermo Fisher Scientific TVA1000B was used at the pilot refinery (Refinery A) while a Thermo Fisher Scientific TVA2020 was used at the other refineries.

All FID instruments were calibrated prior to use as well as had a drift test performed (as described in the previous section) after each sampling session.

FID instruments used in mass emissions sampling at the pilot refinery were calibrated at a centralized location in Benicia prior to deployment each sampling day at Refinery A. FID instruments used at all subsequent refineries were calibrated onsite the refinery where sampling was occurring.

The pump flow of each FID instruments was checked for minimal flow rate.

Component Verification

Components selected for sampling were verified by cross-checking the assigned component study identification number and field sheet information against information listed on a physical tag affixed to the component. In some instances, a selected component was not sampled because of accessibility (scaffolding, component configuration, etc.), external component temperature (greater than 400 to 500 degrees Fahrenheit), the leak location could not be found, the magnitude of the leak changed, or a component was taken out of service.

Component Leak Verification

Prior to sampling, an FID instrument was used to identify the location of maximum leak as well as the magnitude of the leak concentration.

Digital Photographs

Sampled components and sampling system were photographed prior to, during, and after sampling.

Sample Lines

Each sample was taken with either new sample lines or cleaned re-used sample lines. All re-used sample lines were flushed of any sample residue overnight and then tested for hydrocarbons prior to sampling. If hydrocarbon concentrations above background were measured, the sample line was flushed briefly and remeasured. If hydrocarbon concentrations above background were still detected, new sample lines were used. A visual inspection of the sampling line was conducted for condensation and possible contamination.

Equipment Calibrations

Sample pumps, dry gas meter, and temperature gauges were calibrated before sampling at the pilot refinery.

Sample Bag Vacuum Check
The pressure of the sample bag was measured, recorded, and a minimum vacuum confirmed for each sample.

Sample Media Leak Checks
A vacuum check of the series connected sampling tubes was performed prior to each sample to confirm the connecting tubing was free of leaks.

Sample Pump Flow Rate

At the beginning of each sampling day prior to sampling and at the end of each sampling day, the sample pump flow rate of each sampling pump was measured with two dedicated series connected sampling media (charcoal tubes) using a MesaLabs Defender 510 Medium Flow portable calibrator.

Sampling Train Leak Checks

Before taking a sample, a leak check of the entire sampling line (sample line inlet to the dry gas meter outlet) was performed with results recorded.

Replicate Samples

Replicate samples (samples taken as close as possible to the same point in time and space) were taken to understand the variability in sampling technique and in case of damage and/or contamination to the primary sample.

Background Samples

Because samples were taking under vacuum, it was possible that ambient concentrations of hydrocarbons could bias sample results. Therefore, background samples were taken with results subtracted from component sample results.

Repeated (Duplicate) Samples

To understand possible temporal variations in mass emissions as well as possible variations by sampling team, a subset of components were selected for repeated sampling.

Sample Train Recovery Test

Before initiating sampling at a refinery and after completion of sampling at a refinery, a sample train recovery test was performed where a specific amount of methane-in-air gas (methane concentration of ~10,000 ppmv) was introduced into the sampling train and collected in a bag where the concentration of methane was measured using an FID instrument. The theoretical emission rate of methane introduced into the system was calculated using the measured concentrations (introduced and bag measured) and gas flow rates and compared to the calculated emission rate as collected in the bag, correcting for pressure and temperature.

Field Matrix Spike

To ascertain the performance of the laboratory methodology on the sample analytes (matrix interference or matrix effect), a subset of selected components had an additional sample taken using sampling media that had known quantities ("spike") of analytes (C_5 to C_{24} compounds) added prior to field deployment.

Trip Blanks

To determine whether sample media or samples may have been contaminated during transport (to and from each site), clean sample media were provided by the laboratory, taken to each sampling location, and maintained in a closed position until analysis after returning to the laboratory.

Quality Assurance Targets

For quality control purposes, quality assurance targets were established prior to sampling in most instances, and a few were established after sampling at the pilot refinery when changes were made in the sampling procedure (see Methodology – Mass Emissions Sampling). These targets are listed in Table II-13 and Table II-14.

***Table II-13**. Quality Assurance Action Items and Minimum Frequency for Mass Emissions Sampling*

Quality Assurance Action	Minimum Frequency
Sampling Train Recovery Test	Beginning and end of each test period
FID Screening Instrument Calibration	Beginning of each test day
FID Screening Instrument Drift Check	End of each test day
Sample Pump Flow Check	Beginning of each test day
Background Samples	At each test location
Spiked Samples	Every five tests
Trip Blank	1 per sample shipment
Duplicate Sampling	1 per refinery

Table II-14. Quality Assurance Targets for Mass Emissions Sampling

Sampling Item	Quality Assurance Item	Quality Assurance Target
Sampling Train	Prior to taking each sample, a sampling train leak check was performed	100 percent
	A sampling train leak check was performed prior (not after) to each sample	100 percent
	Maximum allowable sampling train leak percentage	± 5 percent
	Maximum allowable sampling train leak	0.5 liters per minute
	A sampling train recovery test was performed before and after each sampling period	± 20 percent of theoretical value
Equipment Calibrations	Sampling pump was calibrated prior to sampling	100 percent
	Dry gas meter was calibrated prior to sampling	100 percent
	Temperature gauge used in sampling was calibrated prior to sampling	100 percent
	Each screening instrument used was calibrated prior to a sampling session	
	Each screening instrument used was calibrated using six calibration gases	
Screening Instruments	Each screening instrument was challenged against six calibration gases for three times and the average drift was recorded	
Calibration Gas Standards	All calibration gases used in course of sampling were not expired	100 percent
Screening Instrument Calibration Gas Standards Hydrocarbon Content	Zero air (less than 0.2 ppm hydrocarbons)	± 15 percent
	10 ppmv, methane	± 2 percent
	100 ppmv, methane	± 2 percent
	500 ppmv, methane	± 2 percent
	3,0000 ppmv, methane	± 2 percent
	10,000 ppmv, methane	± 2 percent
Screening Instrument Sample Pump Flow	The internal sampling pump flow rate of each screening instrument was measured and recorded prior to screening.	
	Minimum sampling flow rate of each screening instrument	1.0 liters per minute ± 10 percent
Dry Gas Meter Flow Rate	Minimum dry gas meter flow rate	5.0 liters per minute
Sample Pump Flow Rate	Minimum sample pump flow rate	1.0 liters per minute
Sample Train Flow Rate	Minimum flow rate for samples where two coconut charcoal tubes in series was used	1.0 liters per minute
	Minimum flow rate for samples where a XAD-2 tube was used	0.75 liters per minute
Sample Volume	Minimum total sample volume	12 liters
Sample Media	XAD-2 resin tubes (SKC catalogue number 226-30-06)	
	Coconut charcoal tubes (SKC catalogue number 226-16)	
Sample Bag Vacuum	Minimum bag vacuum	0.001 – 0.1 inches H_2O

Sampling Item	Quality Assurance Item	Quality Assurance Target
Sample Lines	Sample lines were flushed or cleaned and tested for hydrocarbons with a screening instrument before reuse	100 percent
Training	All personnel involved in screening attended a preliminary training to understand the sampling protocol	100 percent
Background Samples	Minimum number of background samples were taken at each petroleum refinery	2
Repeated Sampling	Minimum number of background samples were taken at each petroleum refinery	1
Duplicate Sampling	A primary and replicate sample was taken for each selected component	100 percent
Standardized Field Data Forms	Standardized forms or field sheets were used to capture sampling information	100 percent
Sample Spike Recoveries	Minimum number of spike recovery studies as a percentage of total sampled components	15 percent
	Allowable difference in spike recovery	± 20 percent recovery
Digital Photograph	All sampled components were digitally photographed before, during, and after sampling	100 percent
Leak Verification	Prior to taking a sample, each sample component was screened using a TVA-2020 (or equivalent) and the maximum screening value was recorded.	100 percent

II.iv.3. Laboratory

Including those outlined in U.S. EPA Method 18, additional quality assurance and quality control procedures were employed during laboratory analysis of samples.

Laboratory

The same laboratory (Enthalpy Analytical LLC in Durham, North Carolina) was used to analyze all samples.

Sample Condition and Access

All samples were transported to the laboratory with ice packs to maintain temperatures below the maximum allowed by the method. A chain of custody record was used to document possession and all transfers of each sample between the field and laboratory. Once received by the laboratory, samples were kept under lock with access only to authorized laboratory personnel prior to, during, and after analysis.

Second Sampling Tube

Every sample was taken with two charcoal tubes in series and a select few were taken with a XAD tube in series with the charcoal tubes with the XAD tube closest to the component leak. The second charcoal tube was archived by the laboratory and only analyzed when breakthrough of the first charcoal tube was suspected.

Method Blanks

With each batch of samples, laboratory blanks were prepared and analyzed using the same procedures as each sample to evaluate whether there was contamination arising from the laboratory preparation and/or analytical procedure.

Matrix Spike

Prior to field deployment at a refinery, the laboratory prepared 21 charcoal sampling tubes where a primary stock solution with specific amounts of certain compounds was added to all 21 tubes. Additional amounts of either low, medium, or high quantities were added to seven tubes each (see Table II-15).

Table II-15. *Matrix Spike Compounds and Amounts*

Compound	Primary Stock Spike (µg)	Low Spike Amount (µg)	Medium Spike Amount (µg)	High Spike Amount (µg)
n-Pentane (C_5)	50.4	N/A	N/A	N/A
n-Hexane (C_6)	49.7	N/A	N/A	N/A
n-Heptane (C_7)	49.8	N/A	50.9	170
n-Octane (C_8)	49.6	N/A	105	456
n-Nonane (C_9)	50.0	N/A	303	2,140
n-Decane (C_{10})	50.4	54.4	798	1,706
n-Undecane (C_{11})	50.3	129	1,142	958
n-Dodecane (C_{12})	50.0	103	936	412
n-Tridecane (C_{13})	50.1	150	449	105
n-Tetradecane (C_{14})	50.0	95.1	47.5	N/A
n-Pentadecane (C_{15})	50.3	47.9	N/A	N/A
n-Hexadecane (C_{16})	50.0	N/A	N/A	N/A
n-Heptadecane (C_{17})	49.4	N/A	N/A	N/A
n-Octadecane (C_{18})	50.0	N/A	N/A	N/A
n-Nonadecane (C_{19})	50.1	N/A	N/A	N/A
n-Eicosane (C_{20})	50.0	N/A	N/A	N/A
n-Heneicosane (C_{21})	50.4	N/A	N/A	N/A
n-Docosane (C_{22})	49.9	N/A	N/A	N/A
n-Tricosane (C_{23})	50.1	N/A	N/A	N/A
n-Tetracosane (C_{24})	50.2	N/A	N/A	N/A
Note: "N/A" = not applicable				

Five sample tubes of each spike amount (low, medium, and high) were provided to the sampling team for use in the field. These spiked tubes were used to determine if the sample matrix had an interference or effect on the target analytes (whether anything in the sample interfered with the analysis).

Two tubes of each spike amount were held by the laboratory for use as laboratory control samples.

Laboratory Control Sample

As discussed above, when matrix spikes were prepared for field deployment at one of the petroleum refineries, two spikes were retained for laboratory control samples and kept at the appropriate temperature conditions.

One or more laboratory control samples were prepared and analyzed with each batch of samples to determine that an analyte within a matrix spike may be recovered from the media and were used to assess the performance of the laboratory's analytical system.

Laboratory Duplicate

For every batch of samples analyzed, one sample was chosen to where an additional aliquot of the sample was prepared for testing. The results of the duplicate were then compared to the results of the sample to determine the precision of the laboratory analytical procedures.

Quality Assurance Targets

Quality assurance targets established for quality control associated with laboratory analyses are listed in Table II-16.

Table II-16. Quality Assurance Targets for Laboratory Analyses

Item	Quality Assurance Item	Quality Assurance Target
Laboratory Methodologies	Samples collected using sorbent tubes as well as any collected condensate were analyzed using EPA Method 18	100 percent
	Samples collected using evacuated canisters were analyzed using EPA Method 18, EPA TO-14A, and EPA TO-15.	100 percent
	Samples that contained compounds that were polymeric (high molecular weight), could polymerize before analysis, or had very low vapor pressure at instrument conditions were analyzed to determine whether a method other than EPA Method 18 should be used.	N/A
Target Analytes	Minimum analyte target range for samples taken with an evacuated cannister	C_1 to C_4
	Minimum analyte target range for samples taken with a sorbent tube	C_5 to C_{24}
	Minimum analyte target range for samples where condensate was present.	C_5 to C_{30}
Detector	Where samples were collected on sorbent tubes, gas chromatography (GC) was used (percentage of total such samples)	100 percent
Carbon Number Retention Time Windows	Where samples were collected on sorbent tubes, carbon number retention time windows were established.	100 percent
Quantitation	All peaks within established carbon number retention time windows were quantitated using the response factor of the associated n-alkane.	100 percent
	All late eluting peaks (after C_{24}) were quantitated using the response factor of the last calibrated peak (e.g., C_{25+} using C_{24})	100 percent
Limit of Detection	All samples that had measured values below the limit of detection were reported at the limit of detection (percentage of total such samples)	100 percent
Column Choice	Gas chromatograph column based upon the target analytes and potential constituents within the sample being analyzed.	100 percent
Oven Temperature Ramp	Range and rate of temperature ramping based upon the target analytes and potential constituents within the sample being analyzed.	
Training	All personnel involved in sampling attended a preliminary training to understand sampling protocol (percentage of total such personnel)	100 percent
EPA QA/QC	All quality assurance and quality control measures were followed as prescribed in any applicable EPA analytical or sampling method used.	
Blank Media	Analytes of interest were not identified in analyses of laboratory blanks	100 percent
Laboratory Duplicates	Maximum allowable difference between a sample and a laboratory duplicate	± 10 percent
Laboratory Control Samples	Minimum number of laboratory control samples per refinery	2

II.iv.4. Analysis

Although not as readily apparent as field screening and sampling, data analysis could introduce errors producing bias in results and therefore, required quality assurance and quality control procedures.

Data Entry Errors and Blank Entries

Data collected on various physical, standardized field data sheets (screening, mass emissions sampling, instrument calibrations and drift checks, etc.) was manually entered into electronic spreadsheets for analyses. Manually entry of data created an additional source of error and required the following verifications:

- Background Verification – all spreadsheet entries of background screening measurements that were greater than 5 ppmv were cross-checked against screening field data sheets.
- Leak Verification – all spreadsheet entries of component screening measurements that were greater than 2.5 ppmv (for the pilot refinery) or 25 ppmv (for the other four refineries) were cross-checked against screening field data sheets and digital photographs taken of the component.
- Text entry – all spreadsheet entries of numerical values were inspected for values entered as "text" and converted to numerical values.
- Blank Entries – blank entries in the spreadsheet for multiple parameters were verified as missing from field data sheets. If missing, "Blank" was entered in the electronic spreadsheet. If not missing, value listed in the field data sheet was entered. Parameters checked for blank entries included component size, vibration amount, cyclic vibration, elevation, external component temperature, operating pressure, monitoring start / stop times, background screening measurements, component screening measurements, component screening instrument number, ambient temperature, and windspeed/direction.

Component Classifications

The digital photographs of all components that were digitally photographed were reviewed for component classification.

- Pumps - Only the pump seal of a pump was classified as a pump.
- Valves – If a screening measurement or mass emissions sample did not include the valve stem, the component was not classified a valve but rather a connector.
- Pressure Relief Valves – If the pressure relief valve did not have an opening to atmosphere (either a horn or a weep hole), it was not deemed a pressure relief valve but rather a connector.

The petroleum refineries were surveyed for all entries for pressure relief valves to confirm whether the pressure relief valve had an opening to atmosphere.

Material Classification

The petroleum refineries were asked to confirm stream materials listed in field data sheets as well as to provide generalized process stream categories for each listed material. Components handling materials that were deemed not to meet the definition of "heavy liquid" were excluded from the Study.

Duplicate Entries

All entries using the same measurement identification number was reviewed and cross-checked against field data sheets to determine if the same identification number was used for two (or more) different components or whether the same component was screened multiple times.

Atypical Entries

Atypical entries were cross-checked against field data sheets and confirmed with relevant petroleum refinery.

Missing Quality Assurance Checks / Transcription Errors

Where quality control checks were missing (e.g., missing calibration and drift checks for an instrument listed on a field sheet), reviewed field data sheets, 3rd-party auditor forms, calibration gas and drift field sheets, and other information to determine if an obvious transcription error occurred.

Missing Components / Extrapolation

Lab results of lighter organic compounds were extrapolated to the entire sample population when the concentration of lighter organic compounds exceeded five percent of the total concentration.

III. Results

The results of component screening, mass emissions sampling, statistical analyses, and quality control activities are summarized in this section. A discussion of these results is provided in Section IV Discussion.

i. Components

III.i.1. Petroleum Refinery

All five petroleum refineries were included in the Study. Between 1,000 to 2,000 components per petroleum refinery and between 6,000 to 10,000 components at all five refineries were targeted for inclusion within the Study. The total number of components and the total number of components with screening measurements by refinery are shown in Table III-1.

Table III-1. Number of Study Components by Petroleum Refinery

Petroleum Refinery	Number of Components	Number of Components with Measurements
A	2,076	2,069
B	2,084	2,081
C	2,189	2,186
D	2,412	2,293
E	2,195	2,194
Total	10,956	10,823

Both targets (number of components per petroleum refinery and total number across all five petroleum refineries) were met.

III.i.2. Process Units

As each petroleum refinery had their own naming convention for their process units, selected process units were categorized by general process unit category (see Table III-2. Petroleum Refinery Process Units Included in the Study for general process units included in the Study).

Table III-2. Petroleum Refinery Process Units Included in the Study

	Refinery				
Process Unit Category	A	B	C	D	E
Crude Unit	X	X	X	X	X
Fluidized Catalytic Cracking Unit	X		X	X	X
Hydrocracking	X	X	X	X	X
Hydrotreating					
Diesel	X	X	X	X	
Jet			X		
Gas Oil				X	
Naphtha		X			
Coker					
Delayed Coker	X	X		X	
Fluid Coker					X
Flexicoker				X	

Process Unit Category	A	B	Refinery C	D	E
Aromatics Saturation		X			
Catalytic Reformer		X			X
Isomerization		X			
Polymerization			X	X	
Separation				X	
Solvent Deasphalting			X		
Sulfur Recovery		X		X	X
Gas Recovery / Fuel Gas Treatment		X	X	X	X
Marine Terminal		X			X
Blending / Tank Farm	X	X	X	X	X
Hydrogen Production			X	X	
Utilities			X		
Asphalt Plant					X

The distribution of Study components by both refinery and general process unit category are presented in Table III-3 and by general process unit / area category only in Table III-4.

Table III-3. Distribution of Study Components by Petroleum Refinery Process Units Included in the Study

Process Unit Category	A	B	Refinery C	D	E
Crude Unit	468	560	29	39	41
Fluidized Catalytic Cracking Unit	780	0	46	36	28
Hydrocracking	6	549	898	13	448
Hydrotreating	775	394	922	1,966	422
Coker	18	528	0	120	999
Delayed Coker	18	528	0	30	0
Fluid Coker	0	0	0	0	999
Flexicoker	0	0	0	90	0
Catalytic Reformer	0	2	0	0	17
Aromatic Saturation	0	8	0	0	0
Isomerization	0	1	0	0	0
Polymerization	0	0	9	2	0
Separation	0	0	0	10	0
Solvent Deasphalting	0	0	26	0	0
Sulfur Recovery	0	2	0	104	17
Gas Recovery / Fuel Gas Treatment	0	8	22	28	19
Marine Terminal	0	8	0	0	2
Blending / Tank Farm	22	23	216	79	113
Hydrogen Production	0	0	19	15	0
Utilities	0	0	2	0	0
Asphalt Plant	0	0	0	0	71
Other	7	1	0	0	17
Total	2,076	2,084	2,189	2,412	2,194

Table III-4. Distribution of Study Components by General Process Unit / Area Category

General Process Unit/Area Category	Number of Entries	Number of Entries with Measurements
Aromatic Saturation	8	8
Asphalt Plant	71	71
Atmospheric Distillation Unit	4	4
Blending / Tank Farm	8	8
Catalytic Cracking	890	875
Catalytic Reformer	2	2
Coker	1,507	1,450
Crude Unit	1,120	1,106
Crude Unit / Coker	159	159
Distillation	10	10
Fractionation	1	1
Fuel Gas Treatment	55	53
Gas Recovery	22	22
Hydrocracker	1,080	1,074
Hydrogen Production	34	32
Hydrotreater	4,479	4,464
Hydrotreater and Hydrocracker	834	834
Isomerization	1	1
Marine Terminal	10	10
Other	14	14
Polymerization	11	11
Reformulation	17	17
Separation	10	9
Solvent Deasphalting	26	26
Sulfur Recovery	123	114
Tank Farm	445	433
Utilities	2	2
Vacuum Distillation Unit	13	13
Total	10,956	10,823

III.i.3. Component Types and Sub-Types

Study components were classified by four types (pump seals, connectors, valves, or pressure relief device). The number of Study components by component type are presented in Table III-5.

Table III-5. Number of Study Components by Component Type

Component Type	Number of Entries	Number of Entries with Measurements
Pump Seals	797	734
Connectors	4,779	4,710
Valves	5,350	5,349
Pressure Relief Devices	30	30
Total	10,956	10,823

Component subtype categories were identified for connectors, valves, and pressure relief devices. Because of the number and diversity of component subtypes, a standardized listing of subtypes was not identified or provided to field personnel and subtype categorizations were left to the field personnel completing the standardized field data sheets. Identification and categorization of a component subtype depended upon the familiarity and knowledge of field personnel.

The number of Study components by component subtype are listed in Table III-6.

Table III-6. Distribution of Study Components by Component Type and Component Subtype

Component Type	General Component Subtype	Number of Entries	Number of Entries with Measurements
Pumps	All	797	734
Connectors	Coupling	13	13
	Elbow	52	52
	End Cap	12	12
	Flange	1,501	1,499
	Gate	15	15
	Hatch	13	13
	Manway	9	9
	Other	3	3
	Plug	1,356	1,354
	Pressure Gauge	19	19
	Pump Housing	320	319
	Reducer	10	10
	Sight Glass	4	4
	Tee	40	40
	Threaded Connector	413	412
	Union	95	95
	Unknown	904	840
Valves	Ball Valve	98	98
	Bellow Seal Valve	29	29
	Butterfly Valve	2	2
	Check Valve	51	51
	Control Valve	228	228
	Elbow	1	1
	Gate Valve	4,247	4,247
	Globe Valve	143	143
	Hex Valve	1	1
	Needle Valve	228	228
	Orbit Valve	1	1
	Plug	6	6
	Regulator	3	3
	Safety Valve	14	14
	Unknown	298	298
Pressure Relief Devices	Pressure Relief Valve	6	6
	Rupture Disc	1	1
	Safety Valve	9	9
	Unknown	14	14
	Total	10,956	10,823

III.i.4. Materials

There were several hundred unique designations of process stream materials identified by field personnel in completed field data sheets. These names were identified either on process line piping or pumps (via stenciled lettering), from process flow diagrams, or from piping & instrumentation diagrams.

For comparison and analysis purposes, these streams were categorized into general streams with input from the petroleum refineries.

The process stream for approximately 300 components could not be categorized due to either blank entries, unknown abbreviations, or other reasons. These components were categorized as “Unknown”.

The process stream for another several hundred components were categorized as “Other”.

Table III-7. Distribution of Study Components by General Stream Service

General Stream Service	Number of Components	Number with Measurements
Amine	153	153
Asphalt	349	349
Asphalt/Resid	90	90
Atmospheric Tower Bottoms	57	57
Cetane Improver	36	36
Coke	22	22
Condensate	7	7
Crude Oil	75	30
Cycle Oil	37	37
Deasphalted Oil	99	99
Decant Oil	80	80
Diesel	1,171	1,164
Diesel - Light Gas Oil	28	28
Flushing Oil	174	174
Fuel Oil	30	30
Gas Oil	3,696	3,655
Gas Oil (Cracked)	10	10
Heating Oil	62	62
Heavy Cycle Oil	22	22
Heavy Gas Oil	28	28
Hot Oil	22	22
Hydraulic Oil	24	24
Hydrocracked Distillates, Heavy	8	8
Jet	1,345	1,341
Kerosene	159	157
Light Cycle Oil	211	210
Light Gas Oil	349	347
Light Gas Oil/Heavy Gas Oil	10	10
Lube Oil	781	779
Medium Cycle Oil	24	24
Other	245	245
Recycled Gas Oil	82	82
Resid	516	489
Seal Oil	38	38
Slop Oil / Recovered Oil	25	25
Sludge	185	185
Slurry	80	78
Tar	18	18
Tetramer	14	14
Unknown	290	290
Vacuum Gas Oil	17	17
Vacuum Tower Bottoms	287	287
Total	10,956	10,823

III.i.5. Other

Other than component type, subtype, process unit, and process stream; additional variables were investigated to determine if there were a correlation with measured leak rates.

Component Size

Most components screened were less than one inch in diameter as shown in **Figure III.1** and **Table III-8**. This was not by design but rather a function of the disparity in the number of such components on process lines as compared to larger process lines.

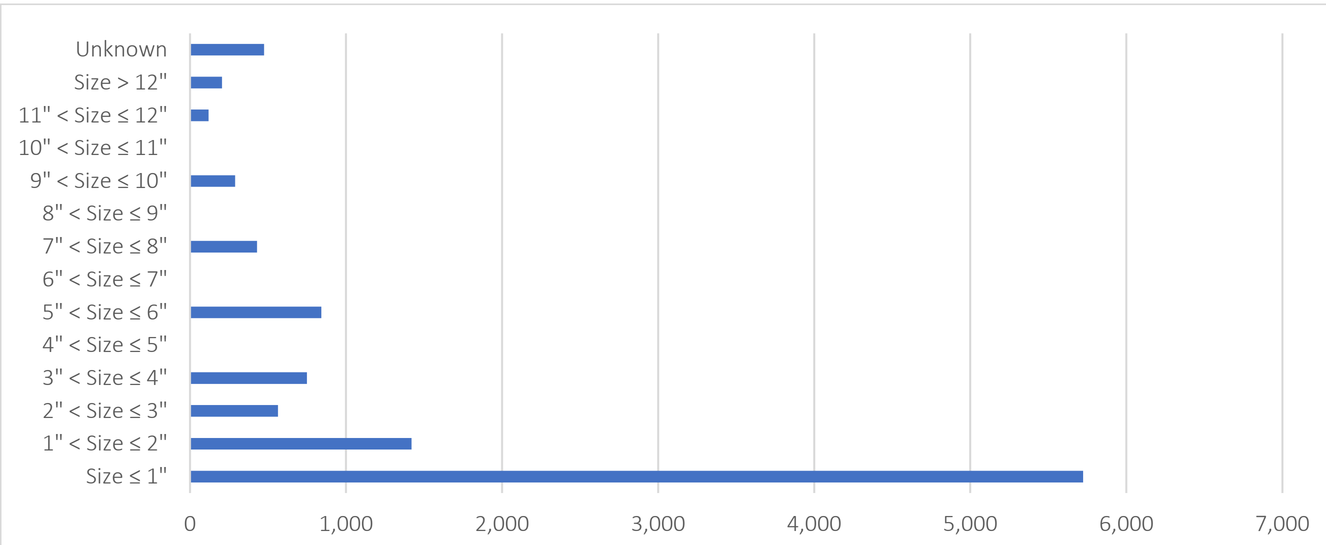


Figure III.1. Count of Study Components Screened by Component Size (Process Line Diameter)

Table III-8. Distribution of Study Components Screened by Component Size

Size (inches)	Number Screened	Number Screened as Percentage of Total Screened (%)
Size ≤ 1"	5,723	52.9
1" < Size ≤ 2"	1,420	13.1
2" < Size ≤ 3"	564	5.2
3" < Size ≤ 4"	748	6.9
4" < Size ≤ 5"	5	0.05
5" < Size ≤ 6"	842	7.8
6" < Size ≤ 7"	0	0
7" < Size ≤ 8"	430	4.0
8" < Size ≤ 9"	3	0.03
9" < Size ≤ 10"	289	2.7
10" < Size ≤ 11"	0	0
11" < Size ≤ 12"	119	1.1
Size > 12"	205	1.9
Unknown	475	4.4
Total	**10,823**	**100**

Component Operating Pressure

Component operating temperature was difficult to ascertain as not every process line had a readily available pressure gauge or pressure indicator to view. In some cases where a pressure indicator was not present, field personnel were able to obtain this information from process unit operators. However, the operating pressure of approximately 28 percent of components with screening measurements could not be identified (Figure III.2, Table III-9).

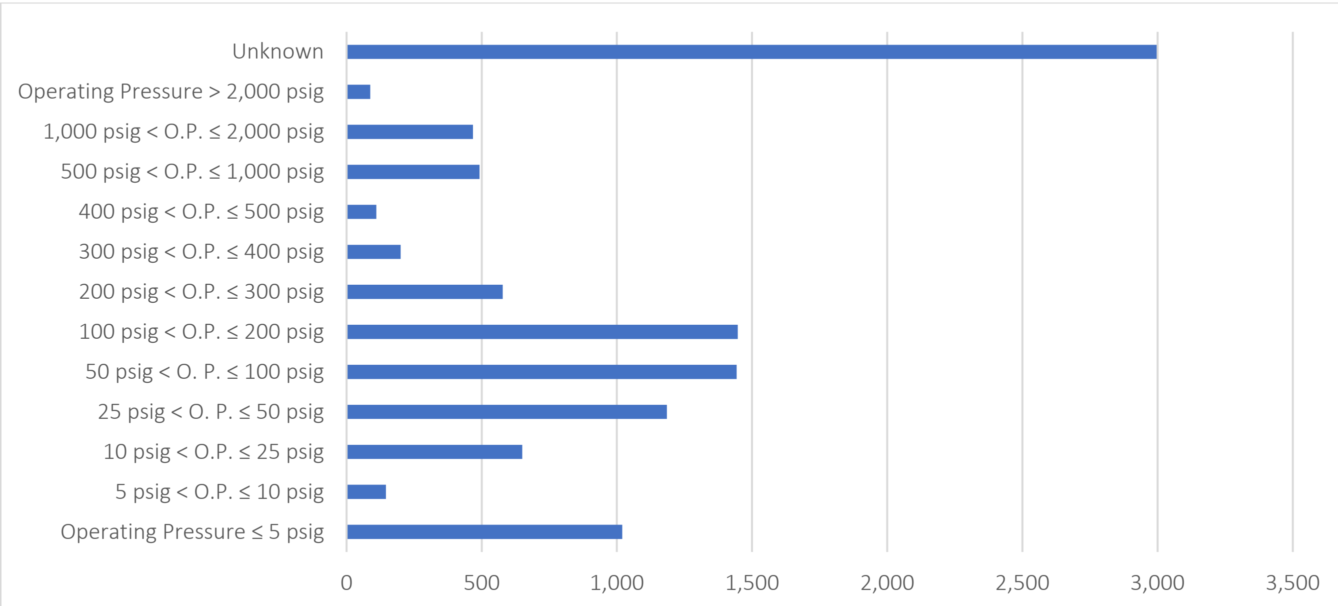


Figure III.2. Count of Study Components Screened by Component Operating Pressure

Table III-9. Distribution of Study Components Screened by Component Operating Pressure

Operating Pressure (psig)	Number Screened	Number Screened as Percentage of Total Screened (%)
Operating Pressure ≤ 5 psig	1,020	9.4
5 psig < Operating Pressure ≤ 10 psig	146	1.3
10 psig < Operating Pressure ≤ 25 psig	650	6.0
25 psig < Operating Pressure ≤ 50 psig	1,184	10.9
50 psig < Operating Pressure ≤ 100 psig	1,443	13.3
100 psig < Operating Pressure ≤ 200 psig	1,447	13.4
200 psig < Operating Pressure ≤ 300 psig	578	5.3
300 psig < Operating Pressure ≤ 400 psig	200	1.8
400 psig < Operating Pressure ≤ 500 psig	110	1.0
500 psig < Operating Pressure ≤ 1,000 psig	492	4.5
1,000 psig < Operating Pressure ≤ 2,000 psig	468	4.3
Operating Pressure > 2,000 psig	88	0.8
Unknown	2,997	27.7
Total	10,823	100

Component External Temperature

In lieu of obtaining process material operating temperature that was not readily available (there were less temperature indicators than pressure indicators present in the field), a component's external temperature was obtained using a portable infrared temperature instrument. Care was taken to select a location on the component that was closest to the process fluid. Although external temperatures would be expected to be lower than the process fluid due to heat transfer (conduction, convection, and radiation), the external temperature should still be a valid surrogate. Most components screened (Figure III.3, Table III-10) had external temperatures above ambient temperatures (greater than 100 degrees Fahrenheit) as would be expected with heavy liquid streams. However, a significant portion (approximately 41 percent) had external temperatures at or near ambient temperature.

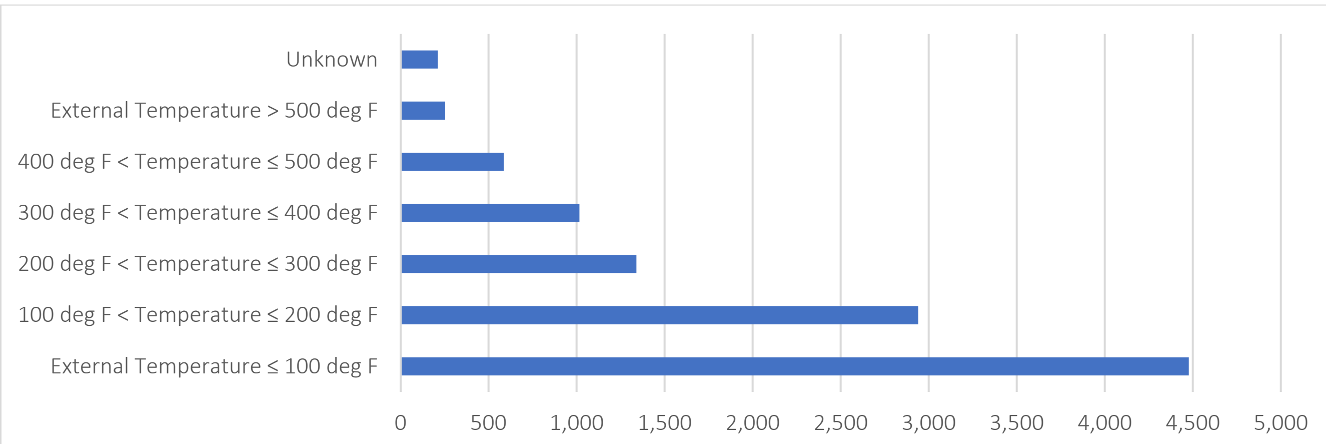


Figure III.3. Count of Study Components Screened by Component External Temperature

Table III-10. Distribution of Study Components Screened by Component External Temperature

External Temperature (Degrees Fahrenheit)	Number Screened	Number Screened as Percentage of Total Screened (%)
External Temperature ≤ 100 deg F	4,476	41.4
100 deg F < Temperature ≤ 200 deg F	2,941	27.2
200 deg F < Temperature ≤ 300 deg F	1,340	12.4
300 deg F < Temperature ≤ 400 deg F	1,016	9.4
400 deg F < Temperature ≤ 500 deg F	586	5.4
External Temperature > 500 deg F	253	2.3
Unknown	211	1.9
Total	10,823	100

Component Vibration

During training and listed on field data sheets, field screening personnel were instructed to identify if a component were vibrating and if so, to make a subjective determination on the degree of vibration. Personnel were provided three options: none, low, or high. However, some field personnel entered "medium" on field data sheets, and these were left as is.

A more objective measurement of vibration could have been obtained using a portable vibration monitor with pre-established values for "none", "low", and "high". However, there were several concerns with this approach:

- Safety concerns: a portable vibration monitor would require being in closer contact with a component than either the screening instrument probe or infrared temperature instrument,
- Personnel: additional personnel may have been needed for vibration monitoring. Component screening already required two personnel, one to screen and one to record information and take temperature measurements, and
- Timing: use of a portable vibration monitor was likely to significantly extend the amount of time spent screening.

Because of the above reasons, more precise vibration monitoring was not conducted. Most screened components were found to have low or no vibration (Figure III.4, Table III-11).

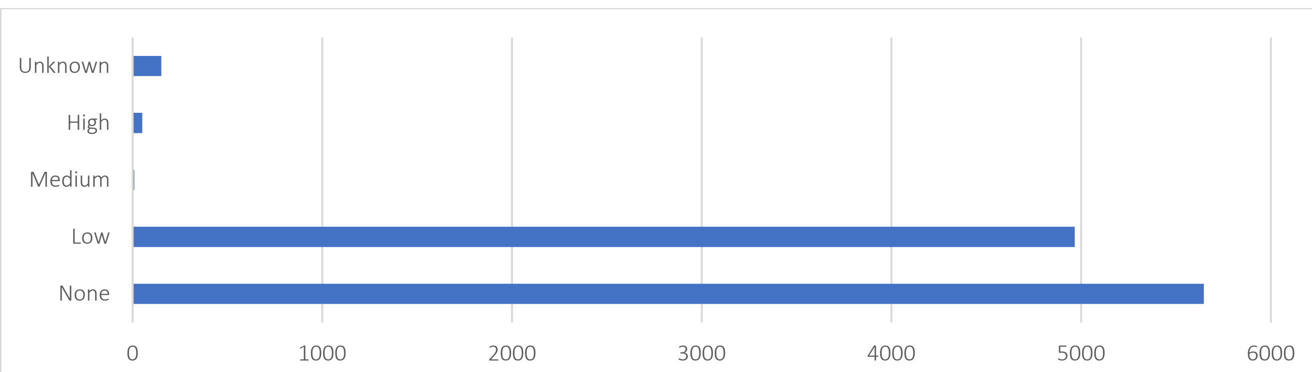


Figure III.4. *Count of Study Components Screened by Component Vibration Amount*

Table III-11*. Distribution of Study Components Screened by Component Vibration Amount*

Vibration Amount	Number Screened	Number Screened as Percentage of Total Screened (%)
None	5,646	52.2
Low	4,966	45.9
Medium	9	0.1
High	51	0.5
Unknown	151	1.4
Total	10,823	100

Component Cyclic Vibration

Separate from whether a component was vibrating at the time of screening, field personnel were instructed to determine whether a component experienced or was expected to experience cyclic vibration. Field personnel were provided the example of components located on a pump that periodically operated (frequent starts and stops) as well as on reactors or vessels that underwent periodic operation cycles such as a coke drum. The experience of field personnel was relied upon to make this determination as pre-determining from submitted drawings was not practical and/or difficult to accomplish.

Less than one percent of screened components was identified as subject to cyclic vibration as shown in Figure III.5 and Table III-12.

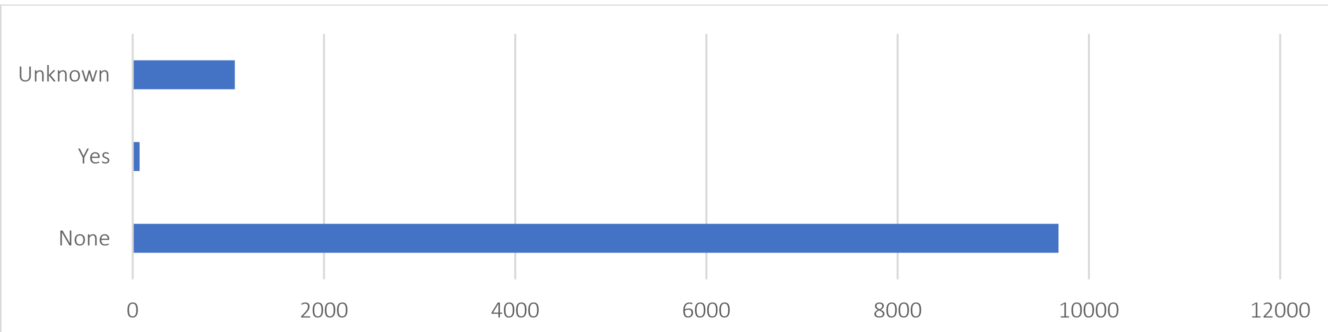


Figure III.5. *Count of Study Components Screened by Component Cyclic Vibration*

Table III-12. Distribution of Study Components Screened by Component Cyclic Vibration

Cyclic Vibration	Number Screened	Number Screened as Percentage of Total Screened (%)
None	9,681	89.4
Yes	73	0.7
Unknown	1,069	9.9
Total	**10,823**	**100**

Component Elevation / Location

Petroleum refinery personnel (process unit operators, area supervisors, maintenance, etc.) conduct periodic (once a shift, daily, weekly, monthly, etc.) visual inspections of equipment (e.g., check instrument gauges, the functionality of rotating equipment). However, not all equipment (such as the top of a column) may be visually checked regularly.

Leaks from components that are not included in a regular leak monitoring program such as heavy liquid service may or may not be discovered by audio, olfactory, or visual means depending upon how frequent refinery personnel are in proximity to such equipment. As such, the location of a component may influence found leak rates.

Ideally, the locations of components that are routinely inspected, either through periodic rounds or in LDAR monitoring, would be mapped and compared to the location of Study components. However, this would entail a significant amount of time, effort, and ultimately may not be possible.

Rather, four options were provided to screening personnel and listed on field data sheets: “ground”, “platform”, “top of column”, and “other”.

A deliberate intent was made to incorporate process lines at various elevations to ascertain the potential impact of component location / elevation. However, most screened components (Figure III.6, Table III-13) were found at ground level.

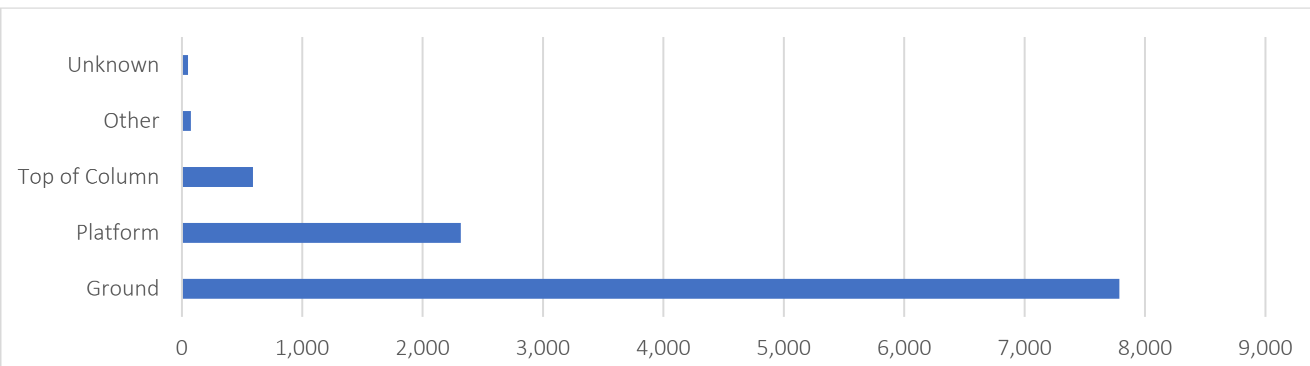


***Figure III.6**. Count of Study Components Screened by Component Elevation / Location*

***Table III-13**. Distribution of Study Components Screened by Component Elevation / Location*

Component Location	Number Screened	Number Screened as Percentage of Total Screened (%)
Ground	7,786	71.9
Platform	2,318	21.4
Top of Column	591	5.5
Other	76	0.7
Unknown	52	0.5
Total	**10,823**	**100**

Component Monitoring Time / Pace

The amount of time screening a component may influence whether a leak was identified, the location of a maximum leak (where a component leaked in more than location), as well as the magnitude of the leak measured. More than half of the components were screened at one minute or less (Figure III.7, Table III-14).

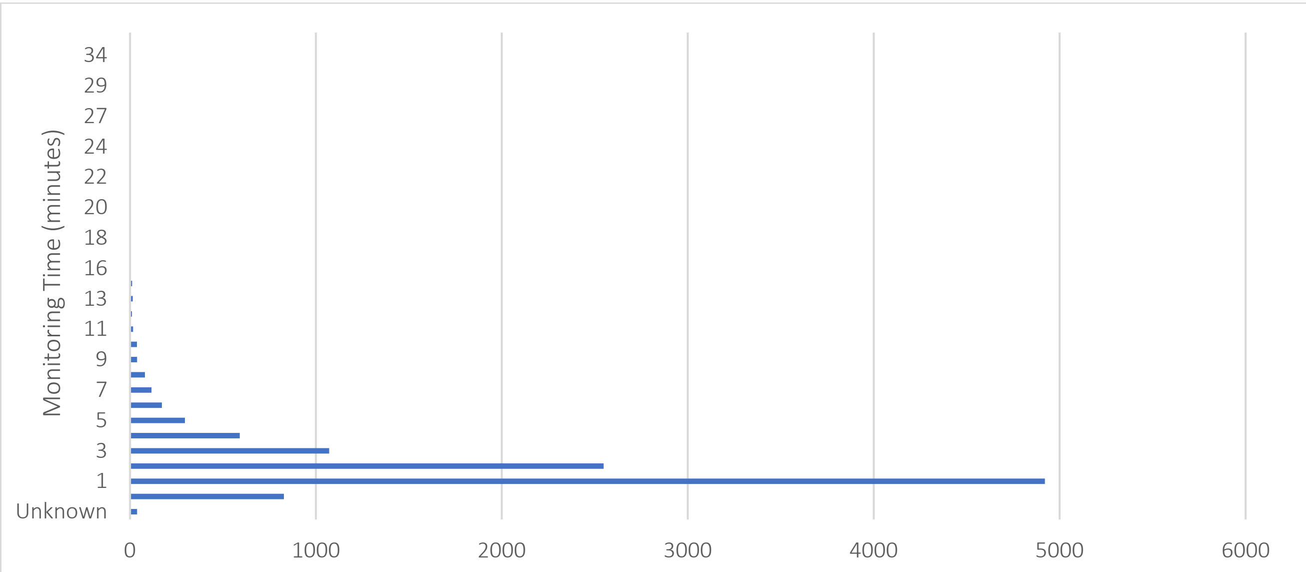


Figure III.7. Count of Study Components Screened by Component Monitoring Time

Table III-14. Distribution of Study Components Screened by Component Monitoring Time

Screening Time (minutes)	Number Screened	Number Screened as Percentage of Total Screened (%)
Unknown	30	0.3
≤ 1	5,749	53.1
2	2,547	23.5
3	1,072	9.9
4	591	5.5
5	296	2.7
6	172	1.6
7	116	1.1
8	81	0.7
9	39	0.4
10	38	0.4
11 – 15	64	0.6
16 – 20	14	0.1
21 – 25	7	0.1
26 – 30	5	0.05
31 – 36	2	0.02
Total	10,823	100

However, as shown in Table III-8, most screened components were small (process line diameter less than one inch). Smaller components should have less potential leak interfaces that require less time to screen as compared to larger components, all else being equal. To account for this, an estimated monitoring pace for each component was derived using the following equation:

$$\text{Pace} = \left[\frac{\text{Measurement Time}}{\left(2\times\pi\times\left(\frac{\text{Process line diameter}}{2}\right)\right)}\right] \times \left[\frac{60 \text{ seconds}}{1 \text{ minute}}\right] \qquad \text{[III-1]}$$

where:

Pace	= Component monitoring pace (seconds/inch)
Measurement Time	= Component measurement time (minutes)
Process line diameter	= Diameter of process line associated with the component (inches)

This equation assumes that a component's total potential leak interface requiring to be screened is equal to the circumference of the component (line size). For flanges and pump seals, this assumption should be reasonably approximate. However, this assumption may or may not be approximate for valves depending upon the valve type and whether a valve bonnet flange was bolted (potential leak interface) or welded (not screened). The measurement time includes both the time to identify the location of maximum leak as well as the time spent measuring the leak at that location. Using this equation, an estimated monitoring pace was derived for each component with totals counts and counts by refinery shown in Figure III.8, Figure III.9, Table III-15, and Table III-16.

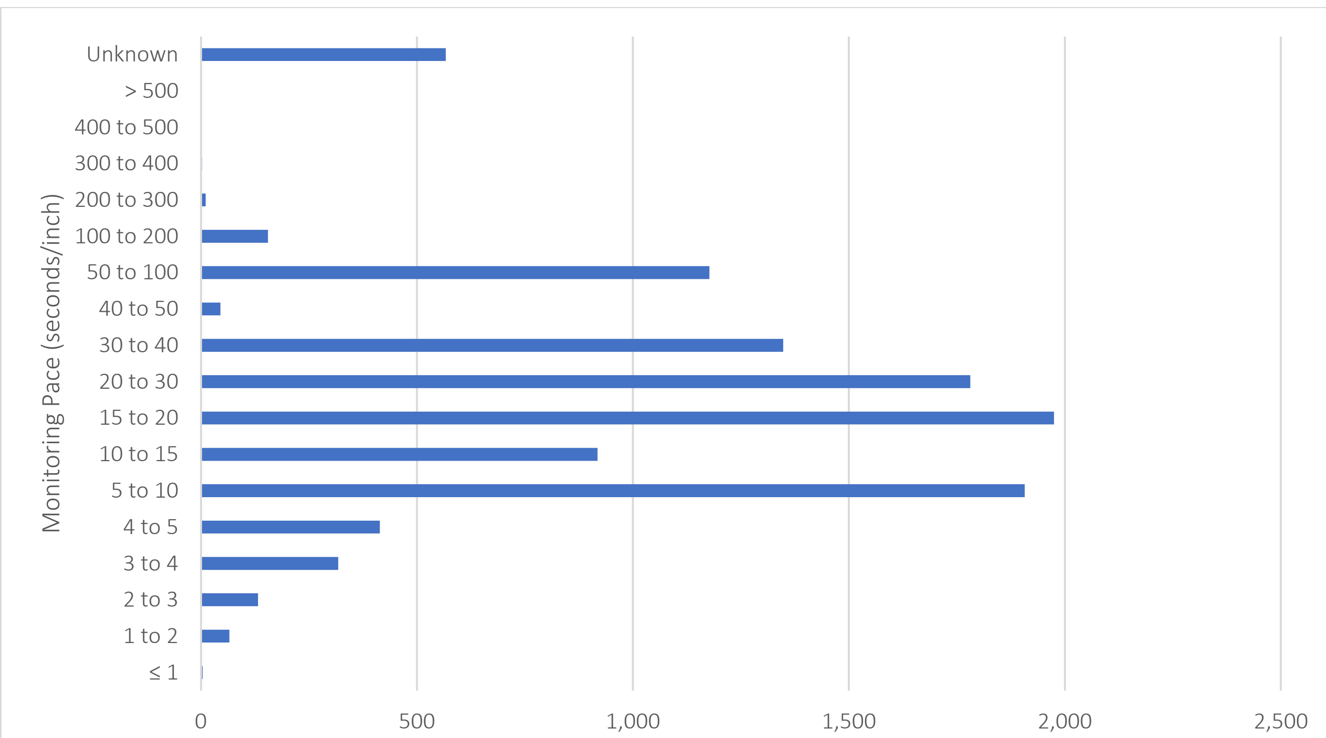


Figure III.8. Count of Study Components by Estimated Monitoring Pace

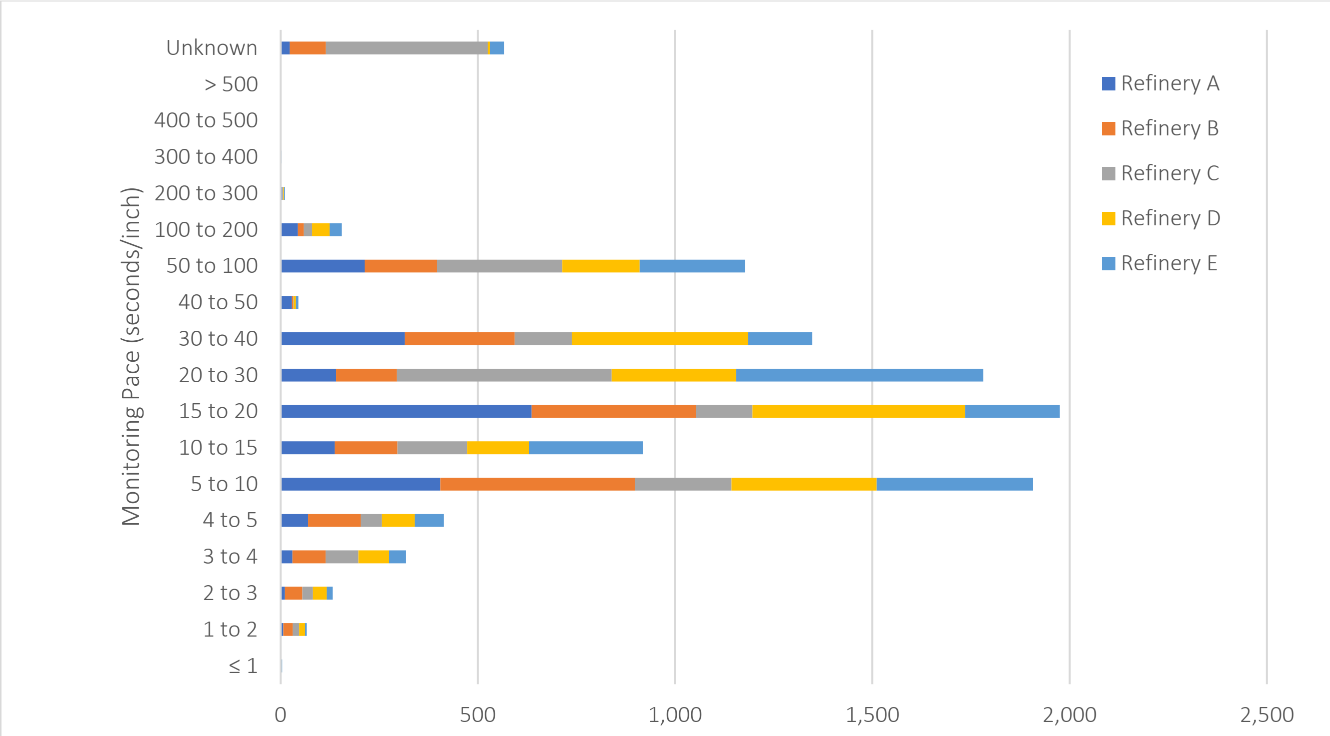


Figure III.9. Count of Study Components by Estimated Monitoring Pace and Petroleum Refinery

Table III-15. Distribution of Study Components by Estimated Monitoring Pace

Screening Pace (seconds/inch)	Number Screened	Number Screened as Percentage of Total Screened (%)
≤ 1	4	0.04
1 to 2	66	0.6
2 to 3	132	1.2
3 to 4	318	2.9
4 to 5	414	3.8
5 to 10	1,906	17.6
10 to 15	918	8.5
15 to 20	1,975	18.2
20 to 30	1,781	16.5
30 to 40	1,348	12.5
40 to 50	45	0.4
50 to 100	1,177	10.9
100 to 200	155	1.4
200 to 300	11	0.1
300 to 400	3	0.03
400 to 500	1	0.01
> 500	2	0.02
Unknown	567	5.2
Total	10,823	100

Table III-16. Distribution of Study Components by Estimated Monitoring Pace and Petroleum Refinery

Screening Pace (seconds/inch)	Number Screened				
	Refinery A	**Refinery B**	**Refinery C**	Refinery D	Refinery E
≤ 1	1	1	0	1	1
1 to 2	7	24	16	15	4
2 to 3	11	44	27	35	15
3 to 4	30	84	83	78	43
4 to 5	70	133	54	83	74
5 to 10	405	493	245	368	395
10 to 15	137	159	177	157	288
15 to 20	636	417	143	539	240
20 to 30	141	154	544	316	626
30 to 40	315	278	145	447	163
40 to 50	29	3	1	6	6
50 to 100	213	184	317	196	267
100 to 200	44	15	21	44	31
200 to 300	4	0	3	2	2
300 to 400	1	0	0	0	2
400 to 500	1	0	0	0	0
> 500	1	0	0	0	1
Unknown	23	92	410	6	36
Total	2,069	2,081	2,186	2,293	2,194

ii. Screening

Field screening began at the pilot refinery (Refinery A) in November 2016 and was completed at the last refinery (Refinery E) in May 2018. The number of actual screening days totaled 95. Field screening was interrupted several times for a variety of reasons.

There was an approximately four-month interval between the end of screening at Refinery A and the beginning of screening at Refinery B where preliminary observations were used to modify the study methodology.

There was an approximately eight-month period in the middle of screening at Refinery B because of a safety stand down that necessitated a change in screening methodology where the Air District no longer conducted field screening but rather petroleum refinery personnel or petroleum refinery contractors. The switch in personnel required the Air District to contract with third-party auditors to oversee screening done by the petroleum refinery personnel and/or their contractors.

III.ii.1. Field Observations

Screening personnel identified numerous differences when screening components in heavy liquid for the Study as compared to screening components in gas or light liquid service, which are routinely screened for regulatory compliance. Some of the differences that were noted included:

- Slower instrument response to leaks, which necessitated longer screening times to reach the peak screening value and a slower monitoring pace,
- Longer times for instruments to return to background concentration levels after measuring a leak,
- Higher component temperatures (some over 900 degrees Fahrenheit), causing safety concerns of inadvertently touching an uninsulated surface as well as heat stress / exhaustion from prolonged exposure to screening of hot components,
- Components under insulation preventing and or limiting access,
- Pressure relief valves venting to atmosphere were minimal with most venting to process or flare relief systems,
- More likely to encounter components with solidified or liquid material from previous or existing liquid leaks,
- Because of the age of insulation, there was a concern regarding potential asbestos exposure (an encounter with crumbling insulation caused screening to stop until the material was sampled), and
- Certain pumps handling heavier, more viscous process streams utilized a hot oil or steam quenching system where billowing vapor / steam prevented screening at the required screening distance and/or caused screening instruments to malfunction.

One pump at Refinery A that had a steam injection quench system was found to leak at 760 ppmv at a foot or more distance with liquid hydrocarbons dripping and pooling at the base of the pump. This pump had steam /

vapor billowing around the seal that prevented monitoring closer to the seal. Because of the magnitude of the leak a distance and the liquid leaks, this pump was viewed as having a leak greater than 10,000 ppmv.

In addition to differences with screening of heavy liquid service components, the following observations were also found:

- Some pumps at each of the five refineries could not be screened at the required distance because of grates, guards, or metal plates surrounding the rotating shaft,
- Some components in heavy liquid service were included in a petroleum refinery's leak detection and repair program and were being routinely monitored, and
- Some pumps had multiple seals. In these cases, separate entries were made for each seal.

There were various reasons for why components in heavy liquid service were included in a petroleum refinery's leak detection and repair (LDAR) program. In some instances, these components were required to do so because of a Best Available Control Technology determination. In other cases, components switched between light liquid and heavy liquid service dependent upon the operation. And in others, it was the result of a corporate policy regarding a certain class or stream service.

At Refinery A, pre-selected process lines that had components found to be included in an LDAR program were screened if they were handling a heavy liquid process stream.

As the intention of routine monitoring within an LDAR program is to find and repair leaks, components in an LDAR program are likely to emit less than those not in such a program. Thus, emissions from such components may underestimate (bias low) average emissions from components not monitored. Consequently, after Refinery A, it was determined to exclude such components from screening at the four other refineries.

III.ii.2. Measurements

With each component screening measurement, a screening measurement of the ambient background near the component was taken as well. To account for background influences, a component's background screening measurement was subtracted from a component's screening measurement to produce a net measurement ("above background"). Although screening instruments had the capability of and did show concentrations greater than 10,000 ppmv, because instruments were not calibrated with a standard gas above 10,000 ppmv, the maximum screening value shown in results is 10,000 ppmv. However, there were instances where leaks caused an instrument to "flame out". This typically occurs with leaks of 100,000 ppmv or more. Components with leaks above 10,000 ppmv are listed as "> 10,000 ppmv".

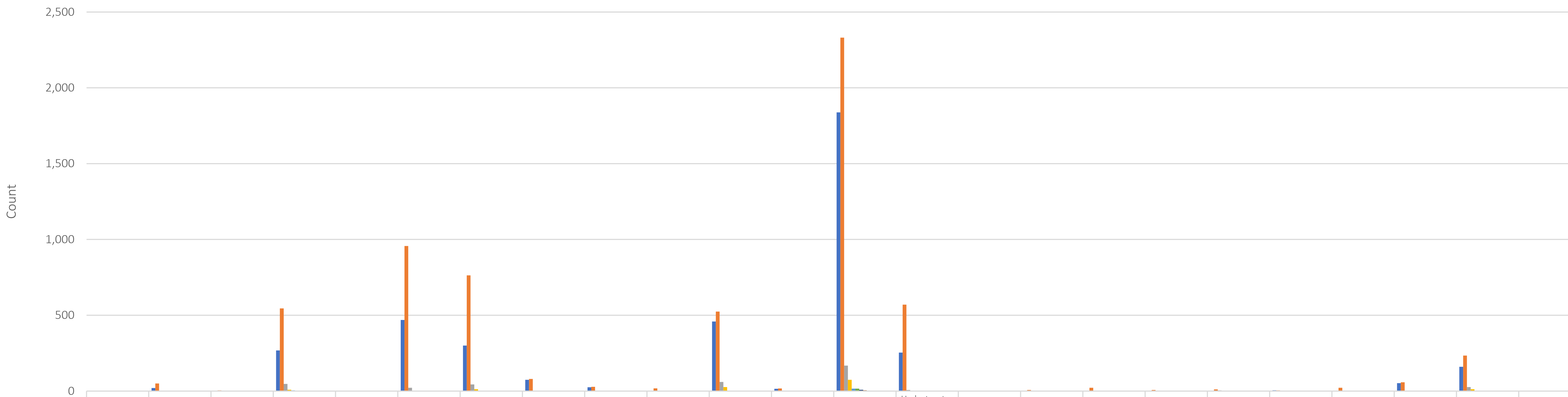
The results of these net measurements by process units, component types and subtypes, stream materials, and other categories are presented in the following sections.

III.ii.2.1. Process Units

Net screening measurements by screening general process unit or area category and concentration range are present in both tabular (Table III-17) and graphical forms (Figure III.10).

Table III-17. *Number of Screening Measurements by General Process Unit / Area Category and Screening Measurement Range (Above Background)*

General Process Unit / Area Category	Component Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Aromatic Saturation	1	3	3	1	0	0	0	0	0	0	0	0	0	0	0	8
Asphalt Plant	20	50	1	0	0	0	0	0	0	0	0	0	0	0	0	71
Blending / Tank Farm	1	4	1	2	0	0	0	0	0	0	0	0	0	0	0	8
Catalytic Cracking	268	545	47	9	4	1	0	1	0	0	0	0	0	0	0	875
Catalytic Reformer	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Coker	469	957	22	2	0	1	0	0	0	0	0	0	0	0	0	1,450
Crude Unit	300	763	44	12	1	1	0	0	0	1	0	0	0	0	1	1,123
Crude Unit / Coker	74	80	3	2	0	0	0	0	0	0	0	0	0	0	0	159
Fuel Gas Treatment	25	28	0	0	0	0	0	0	0	0	0	0	0	0	0	53
Gas Recovery	3	18	1	0	0	0	0	0	0	0	0	0	0	0	0	22
Hydrocracker	459	524	60	26	2	1	0	0	1	1	0	0	0	0	0	1,074
Hydrogen Production	15	17	0	0	0	0	0	0	0	0	0	0	0	0	0	32
Hydrotreater	1,838	2,331	168	74	16	16	8	5	1	0	0	3	0	1	3	4,464
Hydrotreater and Hydrocracker	254	570	7	1	1	0	0	0	0	1	0	0	0	0	0	834
Isomerization	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Marine Terminal	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Other	2	22	1	0	0	0	0	0	0	0	0	0	0	0	0	25
Polymerization	1	7	3	0	0	0	0	0	0	0	0	0	0	0	0	11
Reformulation	1	11	4	0	0	1	0	0	0	0	0	0	0	0	0	17
Separation	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Solvent Deasphalting	2	22	2	0	0	0	0	0	0	0	0	0	0	0	0	26
Sulfur Recovery	52	58	3	1	0	0	0	0	0	0	0	0	0	0	0	114
Tank Farm	160	234	26	12	1	0	0	0	0	0	0	0	0	0	0	433
Utilities	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	3,954	6,259	396	142	25	21	8	6	2	3	0	3	0	1	4	10,823



	Aromatic Saturation	Asphalt Plant	Blending / Tank Farm	Catalytic Cracking	Catalytic Reformer	Coker	Crude Unit	Crude Unit / Coker	Fuel Gas Treatment	Gas Recovery	Hydrocracker	Hydrogen Production	Hydrotreater	Hydrotreater and Hydrocracker	Isomerization	Marine Terminal	Other	Polymerizatio n	Reformulation	Separation	Solvent Deasphalting	Sulfur Recovery	Tank Farm	Utilities
0 ppmv	1	20	1	268	0	469	300	74	25	3	459	15	1,838	254	1	3	2	1	1	5	2	52	160	0
<= 10 ppmv	3	50	4	545	2	957	763	80	28	18	524	17	2,331	570	0	7	22	7	11	4	22	58	234	2
<= 100 ppmv	3	1	1	47	0	22	44	3	0	1	60	0	168	7	0	0	1	3	4	0	2	3	26	0
<= 500 ppmv	1	0	2	9	0	2	12	2	0	0	26	0	74	1	0	0	0	0	0	0	0	1	12	0
<= 1,000 ppmv	0	0	0	4	0	0	1	0	0	0	2	0	16	1	0	0	0	0	0	0	0	0	1	0
<= 2,000 ppmv	0	0	0	1	0	1	1	0	0	0	1	0	16	0	0	0	0	0	1	0	0	0	0	0
<= 3,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
<= 4,000 ppmv	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
<=5,000 ppmv	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
<= 6,000 ppmv	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
<= 7,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 8,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
<= 9,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<=10,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
> 10,000 ppmv	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0

Figure III.10. Distribution of Screening Measurements (above background) by General Process Unit / Area Category

III.ii.2.2. Component Types and Sub-Types

Every component that was screened was categorized by component type. Screening results for four categories of component type are presented: pump seals, connectors, valves, and pressure relief devices. However, not every pressure relief device was a pressure relief valve that vented to atmosphere.

The distribution of net screening measurements by screening range and component type is shown in Table III-18 as well as plotted (Figure III.11, Figure III.12, Figure III.13, Figure III.14, Figure III.15, Figure III.16, Figure III.17) with frequency on the original and log scale.

Table III-18. Number of Screening Measurements by Component Type and Screening Measurement Range (Above Background)

Net Screening Range	Pump Seals	Connectors	Valves	Pressure Relief Devices	All
Total	797	4,779	5,350	30	10,956
Total with No Measurements	63	69	1	0	132
Total with Measurements	734	4,710	5,349	30	10,823
Net PPMV = 0	199	1,885	1,860	10	3,954
0 < Net PPMV ≤ 10	432	2,662	3,145	20	6,259
10 < Net PPMV ≤ 100	71	112	213	0	396
100 < Net PPMV ≤ 500	25	33	84	0	142
500 < Net PPMV ≤ 1,000	3 (1)	8	14	0	26
1,000 < Net PPMV ≤ 2,000	1	6	14	0	21
2,000 < Net PPMV ≤ 3,000	1	2	5	0	8
3,000 < Net PPMV ≤ 4,000	0	1	5	0	6
4,000 < Net PPMV ≤ 5,000	1	0	1	0	2
5,000 < Net PPMV ≤ 6,000	0	1	2	0	3
6,000 < Net PPMV ≤ 7,000	0	0	0	0	0
7,000 < Net PPMV ≤ 8,000	0	0	3	0	3
8,000 < Net PPMV ≤ 9,000	0	0	0	0	0
9,000 < Net PPMV ≤ 10,000	0	0	1	0	1
Net PPMV > 10,000	1 (1)	0	3	0	3
ALL	734	4,710	5,349	30	10,823

Notes:

1. One pump could not be screened at the required monitoring distance due to steam interference but had a screening measurement of 760 ppmv at a foot or more and had liquid hydrocarbons spewing out of the seal. This pump was assumed to be leaking over 10,000 ppmv at the interface.

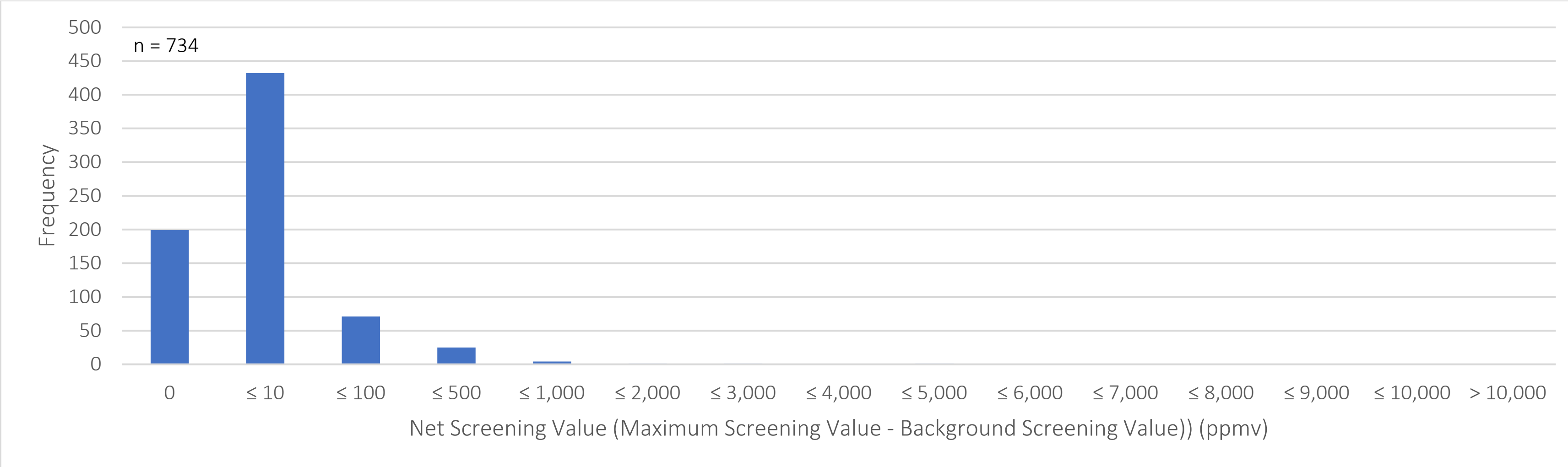


Figure III.11. Distribution of Pump Seal Screening Measurements by Net Screening Value (original scale)

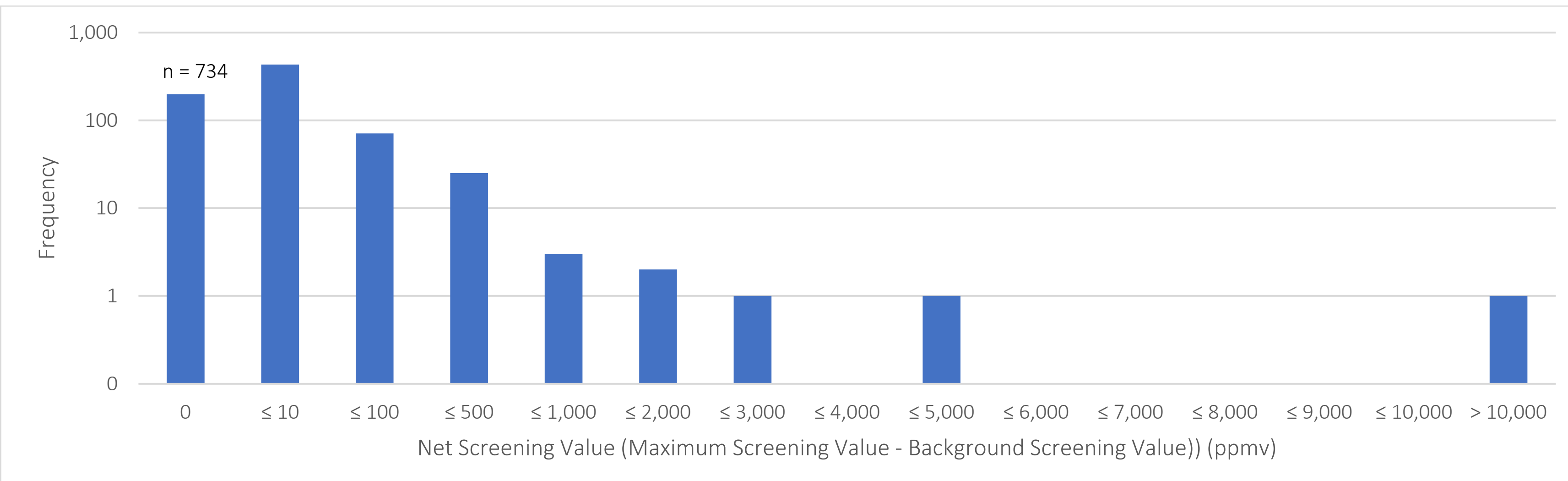


Figure III.12. Distribution of Pump Seal Screening Measurements by Net Screening Value (log scale)

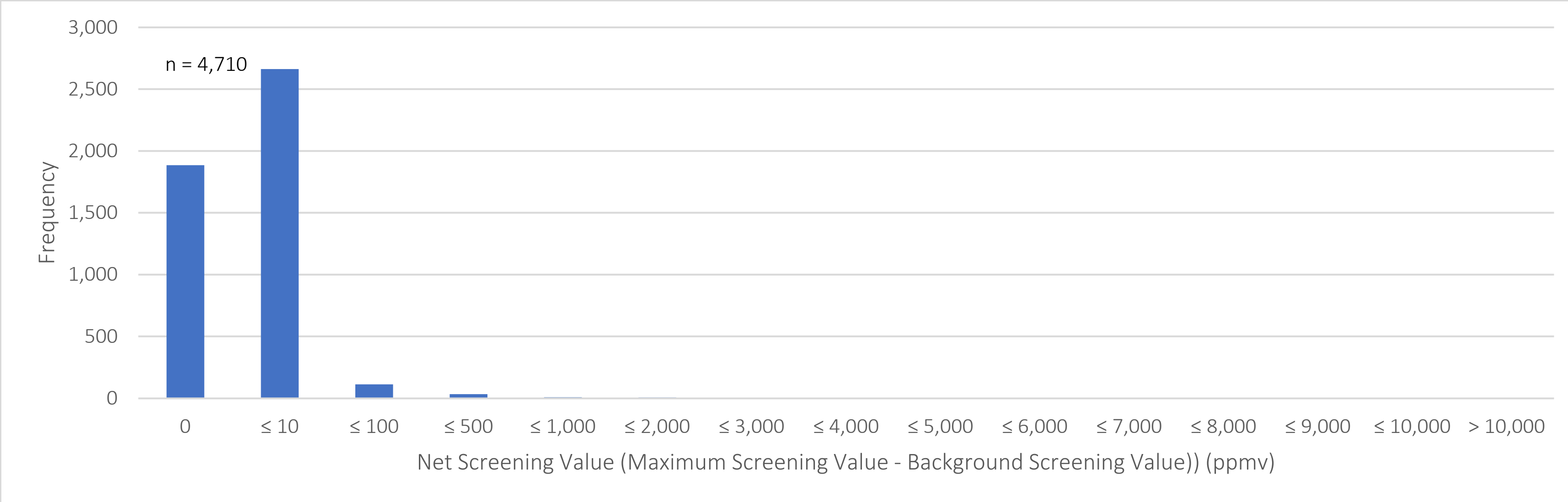


Figure III.13. Distribution of Connector Screening Measurements by Net Screening Value (original scale)

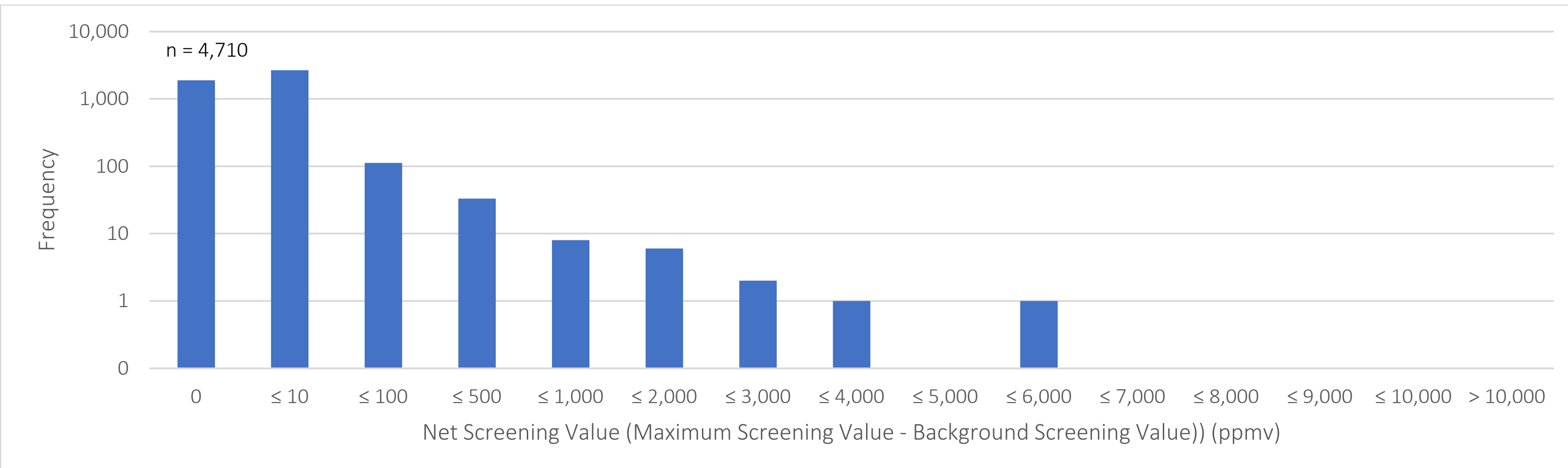


Figure III.14. Distribution of Connector Screening Measurements by Net Screening Value (log scale)

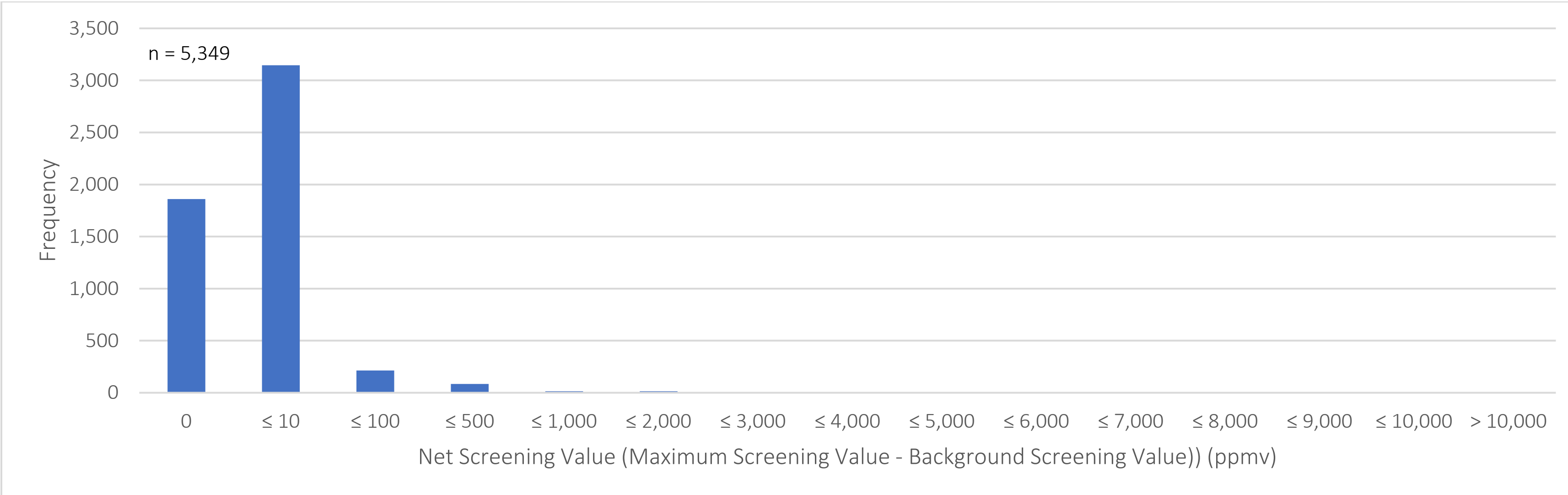


Figure III.15. Distribution of Valve Screening Measurements by Net Screening Value (original scale)

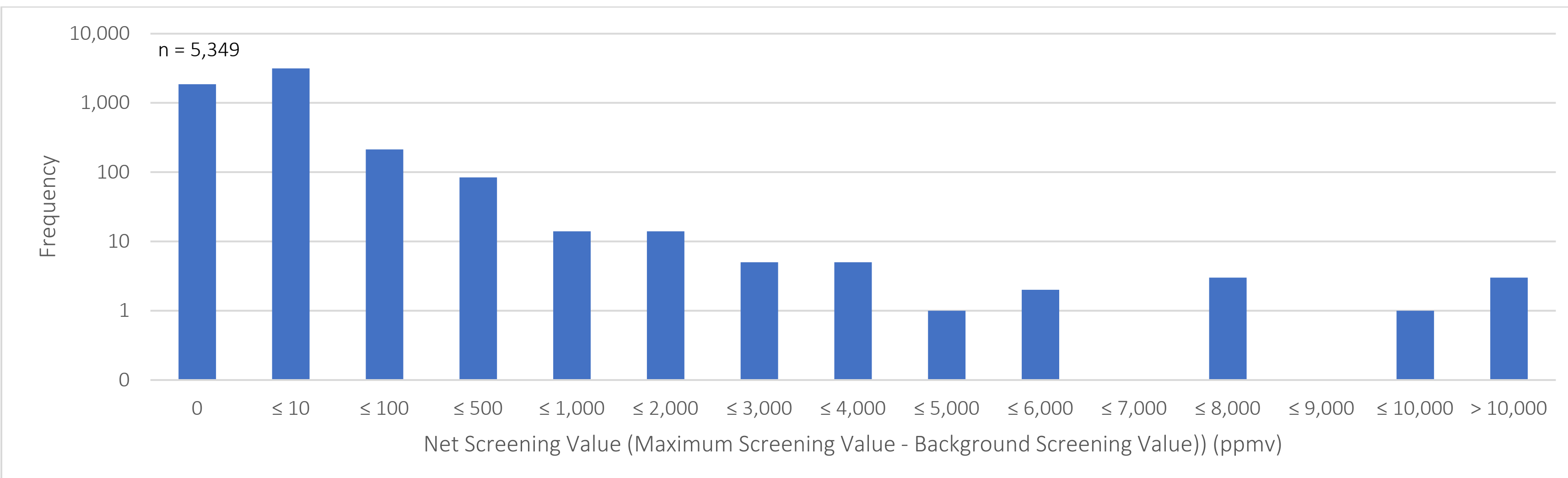


Figure III.16. Distribution of Valve Screening Measurements by Net Screening Value (log scale)

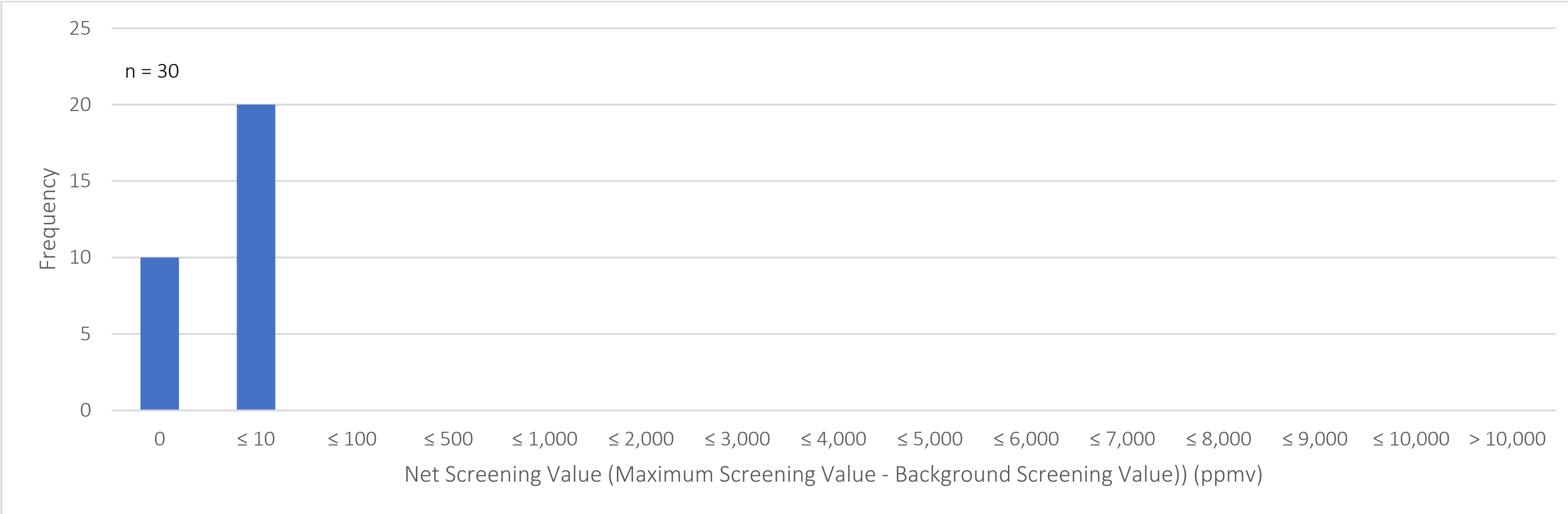


Figure III.17. Distribution of Pressure Relief Device Screening Measurements by Net Screening Value

Component Subtypes

In addition to component type, an attempt was made to document and classify component subtypes. However, not all screened components had entries for component subtype on completed field data sheets or an abbreviation was used that could not be deciphered. Most pumps were found to have pump type missing. Therefore, results by pump type are not presented.

The number of component subtypes varied by component type:

- connectors: 19 subtypes,
- valves: 17 subtypes, and
- pressure relief devices: 4 subtypes.

The distribution of net screening measurements by count and percentage of totals and by component subtype for connectors, valves, and pressure relief devices are presented in the following tables and figures.

Table III-19*. Connector Subtype Counts by Net Screening Measurement*

	Component Subtype Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
General Subtype	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Block Off Plate	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Coupling	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	13
Cover	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Elbow	15	32	4	1	0	0	0	0	0	0	0	0	0	0	0	52
End Cap	0	10	2	0	0	0	0	0	0	0	0	0	0	0	0	12
Flange	576	889	26	6	0	1	2	0	0	0	0	0	0	0	0	1,500
Gate	6	9	0	0	0	0	0	0	0	0	0	0	0	0	0	15
Hatch	0	12	0	1	0	0	0	0	0	0	0	0	0	0	0	13
Manway	3	6	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Other	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Plug	575	738	25	11	2	2	0	0	0	1	0	0	0	0	0	1,354
Pressure Gauge	8	9	2	0	0	0	0	0	0	0	0	0	0	0	0	19
Pump Housing	49	251	13	4	1	1	0	0	0	0	0	0	0	0	0	319
Reducer	2	8	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Sight Glass	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	4
Tee	14	25	1	0	0	0	0	0	0	0	0	0	0	0	0	40
Threaded	162	237	6	5	1	0	0	1	0	0	0	0	0	0	0	412
Union	32	55	4	1	1	2	0	0	0	0	0	0	0	0	0	95
Unknown	436	370	28	4	2	0	0	0	0	0	0	0	0	0	0	840

Table III-20. Percentages of Total Connector Subtypes Measurements by Net Screening Measurement

General Subtype	Percentage of Total Component Subtype Measurements by Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Block Off Plate	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Coupling	38	62	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Cover	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Elbow	29	62	8	2	0	0	0	0	0	0	0	0	0	0	0	100
End Cap	0	83	17	0	0	0	0	0	0	0	0	0	0	0	0	100
Flange	38	59	2	0.4	0	0.1	0.1	0	0	0	0	0	0	0	0	100
Gate	40	60	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Hatch	0	92	0	8	0	0	0	0	0	0	0	0	0	0	0	100
Manway	33	67	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Other	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	100
Plug	42	55	2	1	0.1	0	0	0	0	0.1	0	0	0	0	0	100
Pressure Gauge	42	47	11	0	0	0	0	0	0	0	0	0	0	0	0	100
Pump Housing	15	79	4	1	0.3	0.3	0	0	0	0	0	0	0	0	0	100
Reducer	20	80	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Sight Glass	0	75	25	0	0	0	0	0	0	0	0	0	0	0	0	100
Tee	35	63	3	0	0	0	0	0	0	0	0	0	0	0	0	100
Threaded	39	58	1	1	0.2	0	0	0.2	0	0	0	0	0	0	0	100
Union	34	58	4	1	1	2	0	0	0	0	0	0	0	0	0	100
Unknown	52	44	3	0.5	0.2	0	0	0	0	0	0	0	0	0	0	100

	Flange	Union	Plug	Threaded Connector	Gate	Pressure Gauge	Unknown	Hatch	Elbow	Block Off Plate	Sight Glass	Tee	Pump Housing	Coupling	End Cap	Cover	Reducer	Manway	Other
0 ppmv	576	32	575	162	6	8	436	0	15	1	0	14	49	5	0	1	2	3	0
<= 10 ppmv	889	55	738	237	9	9	370	12	32	0	3	25	251	8	10	0	8	6	0
<= 100 ppmv	26	4	25	6	0	2	28	0	4	0	1	1	13	0	2	0	0	0	0
<= 500 ppmv	6	1	11	5	0	0	4	1	1	0	0	0	4	0	0	0	0	0	0
<= 1,000 ppmv	0	1	2	1	0	0	2	0	0	0	0	0	1	0	0	0	0	0	1
<= 2,000 ppmv	1	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
<= 3,000 ppmv	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 4,000 ppmv	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<=5,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 6,000 ppmv	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 7,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 8,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 9,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<=10,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure III.18. Count of Screening Measurements by Connector Subtype and Screening Measurement Range (Above Background)

Table III-21. Valve Subtype Counts by Net Screening Measurement

General Subtype	Component Subtype Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Gate	1,418	2,510	165	72	12	12	4	4	1	1	0	2	0	1	3	4,205
Control Valve	75	130	18	2	0	1	0	1	0	1	0	0	0	0	0	228
Unknown	156	128	11	1	1	1	0	0	0	0	0	0	0	0	0	298
Gate Valve	11	28	3	0	0	0	0	0	0	0	0	0	0	0	0	42
Globe	5	5	2	1	0	0	0	0	0	0	0	0	0	0	0	13
Ball Valve	39	52	6	1	0	0	0	0	0	0	0	0	0	0	0	98
Needle Valve	92	135	1	0	0	0	0	0	0	0	0	0	0	0	0	228
Check Valve	14	37	0	0	0	0	0	0	0	0	0	0	0	0	0	51
Plug	4	1	0	0	0	0	1	0	0	0	0	0	0	0	0	6
Elbow	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Butterfly Valve	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Orbit Valve	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Globe Valve	34	81	7	6	1	0	0	0	0	0	0	1	0	0	0	130
Hex Valve	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Regulator	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Bellow Seal Valve	6	23	0	0	0	0	0	0	0	0	0	0	0	0	0	29
Safety Valve	4	10	0	0	0	0	0	0	0	0	0	0	0	0	0	14

Table III-22. Percentages of Total Valve Subtype Measurements by Net Screening Measurement

General Subtype	Percentage of Total Component Subtype Measurements by Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Gate	34	60	4	2	0	0.3	0.1	0.1	0.02	0.02	0	0	0	0	0.1	100
Control Valve	33	57	8	1	0	0.4	0	0.4	0	0.4	0	0	0	0	0	100
Unknown	52	43	4	0	0	0.3	0	0.	0.	0.0	0	0	0	0	0	100
Gate Valve	26	67	7	0	0	0	0	0	0	0	0	0	0	0	0	100
Globe	38	38	15	8	0	0	0	0	0	0	0	0	0	0	0	100
Ball Valve	40	53	6	1	0	0	0	0	0	0	0	0	0	0	0	100
Needle Valve	40	59	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Check Valve	27	73	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Plug	67	17	0	0	0	0	16.7	0	0	0	0	0	0	0	0	100
Elbow	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Butterfly Valve	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Orbit Valve	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	100
Globe Valve	26	62	5	5	1	0	0	0	0	0	0	0.8	0	0	0	100
Hex Valve	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Regulator	67	33	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Bellow Seal Valve	21	79	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Safety Valve	29	71	0	0	0	0	0	0	0	0	0	0	0	0	0	100

	Gate	Control Valve	Unknown	Gate Valve	Globe	Ball Valve	Needle Valve	Check Valve	Plug	Elbow	Butterfly Valve	Orbit Valve	Globe Valve	Hex Valve	Regulator	Bellow Seal Valve	Safety Valve
0 ppmv	1,418	75	156	11	5	39	92	14	4	0	0	0	34	0	2	6	4
<= 10 ppmv	2,510	130	128	28	5	52	135	37	1	1	2	0	81	1	1	23	10
<= 100 ppmv	165	18	11	3	2	6	1	0	0	0	0	0	7	0	0	0	0
<= 500 ppmv	72	2	1	0	1	1	0	0	0	0	0	1	6	0	0	0	0
<= 1,000 ppmv	12	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
<= 2,000 ppmv	12	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 3,000 ppmv	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
<= 4,000 ppmv	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 5,000 ppmv	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 6,000 ppmv	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 7,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 8,000 ppmv	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
<= 9,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 10,000 ppmv	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10,000 ppmv	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

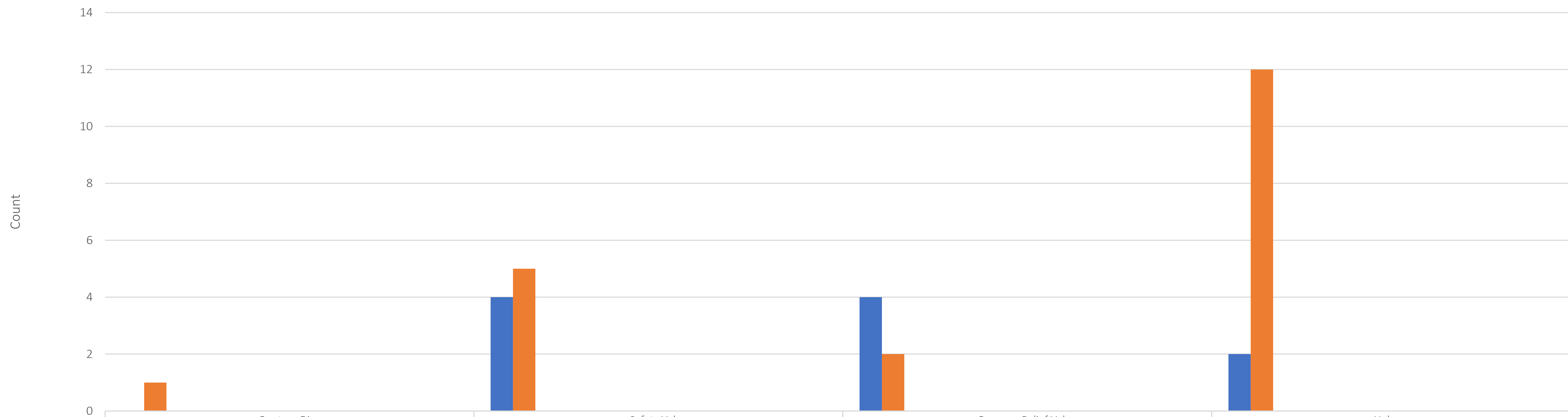
Figure III.19. Count of Screening Measurements by Valve Subtype and Screening Measurement Range (Above Background)

Table III-23. Pressure Relief Device Subtype Counts by Net Screening Measurement

General Subtype	Component Subtype Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Rupture Disc	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Safety Valve	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Pressure Relief Valve	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Unknown	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0	14

Table III-24. Percentages of Total Pressure Relief Device Subtype Measurements by Net Screening Measurement

General Subtype	Percentage of Total Component Subtype Measurements by Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Rupture Disc	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Safety Valve	44	56	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Pressure Relief Valve	67	33	0	0	0	0	0	0	0	0	0	0	0	0	0	100
Unknown	14	86	0	0	0	0	0	0	0	0	0	0	0	0	0	100



	Rupture Disc	Safety Valve	Pressure Relief Valve	Unknown
0 ppmv	0	4	4	2
<= 10 ppmv	1	5	2	12
<= 100 ppmv	0	0	0	0
<= 500 ppmv	0	0	0	0
<= 1,000 ppmv	0	0	0	0
<= 2,000 ppmv	0	0	0	0
<= 3,000 ppmv	0	0	0	0
<= 4,000 ppmv	0	0	0	0
<= 5,000 ppmv	0	0	0	0
<= 6,000 ppmv	0	0	0	0
<= 7,000 ppmv	0	0	0	0
<= 8,000 ppmv	0	0	0	0
<= 9,000 ppmv	0	0	0	0
<= 10,000 ppmv	0	0	0	0
> 10,000 ppmv	0	0	0	0

Figure III.20. Count of Screening Measurements by Pressure Relief Device Subtype and Screening Measurement Range (Above Background)

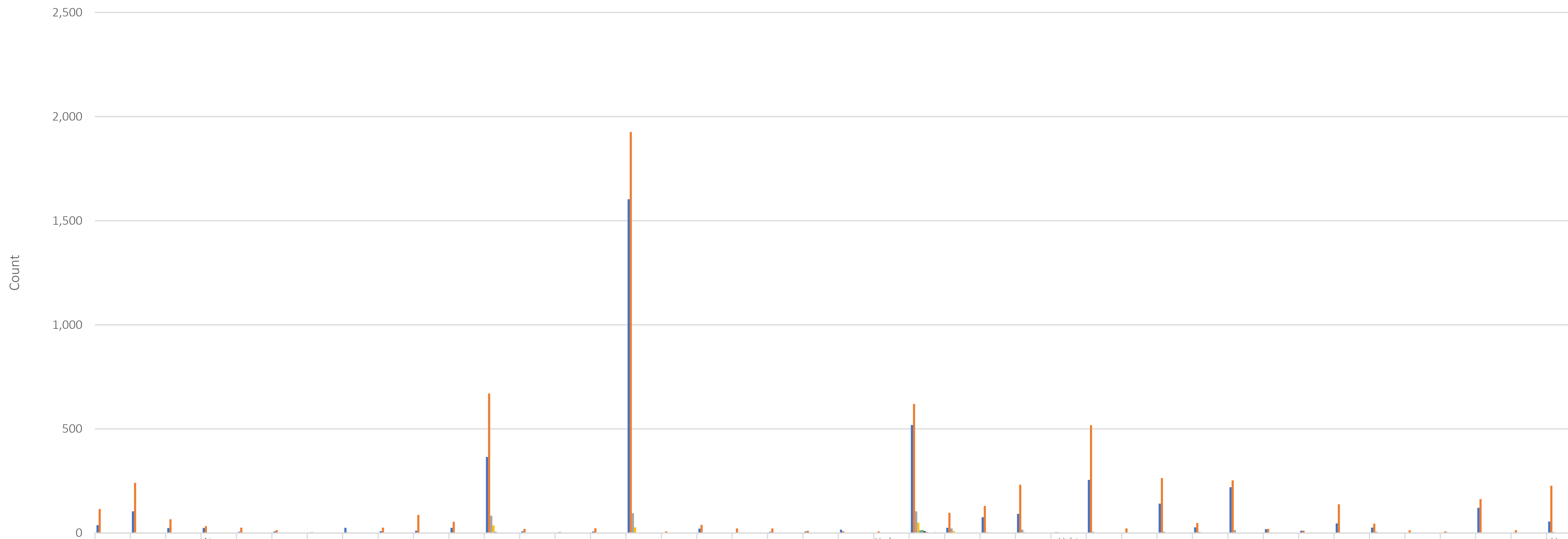
III.ii.2.3. Materials

There were over 300 unique entries for stream material entered in screening field sheets. Most of these could be readily categorized into general process streams. Some required consultation with the petroleum refineries. However, not all could be categorized because of blank entries, difficulty interpreting field sheet entries, and/or mixed streams not readily classified.

Although not by design, components in some process streams were screened more than others dependent upon the process units selected for inclusion, process lines, and number of components attached to those process lines.

Table III-25. Distribution of Screening Measurements by General Stream Service and Net Screening Measurement

General Stream Service	Component Screening Net Measurement (Maximum Measurement - Background) (ppmv) 0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Amine	38	115	0	0	0	0	0	0	0	0	0	0	0	0	0	153
Asphalt	104	241	1	1	1	0	0	0	0	1	0	0	0	0	0	349
Asphalt/Resid	24	66	0	0	0	0	0	0	0	0	0	0	0	0	0	90
Atmospheric Tower Bottoms	24	33	0	0	0	0	0	0	0	0	0	0	0	0	0	57
Cetane Improver	6	26	3	1	0	0	0	0	0	0	0	0	0	0	0	36
Coke	7	14	0	0	0	1	0	0	0	0	0	0	0	0	0	22
Condensate	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Crude	25	3	1	0	0	0	0	0	0	0	0	0	0	0	1	30
Cycle Oil	9	26	2	0	0	0	0	0	0	0	0	0	0	0	0	37
Deasphalted Oil	11	87	1	0	0	0	0	0	0	0	0	0	0	0	0	99
Decant Oil	25	54	1	0	0	0	0	0	0	0	0	0	0	0	0	80
Diesel	365	670	83	37	6	2	0	1	0	0	0	0	0	0	0	1,164
Diesel - Light Gas Oil	8	20	0	0	0	0	0	0	0	0	0	0	0	0	0	28
Flushing Oil	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Fuel Oil	7	23	0	0	0	0	0	0	0	0	0	0	0	0	0	30
Gas Oil	1,602	1,926	95	27	1	2	0	0	1	1	0	0	0	0	0	3,655
Gas Oil (Cracked)	0	8	2	0	0	0	0	0	0	0	0	0	0	0	0	10
Heating Oil	21	39	2	0	0	0	0	0	0	0	0	0	0	0	0	62
Heavy Cycle Oil	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	22
Heavy Gas Oil	6	22	0	0	0	0	0	0	0	0	0	0	0	0	0	28
Hot Oil	7	11	3	1	0	0	0	0	0	0	0	0	0	0	0	22
Hydraulic Oil	16	8	0	0	0	0	0	0	0	0	0	0	0	0	0	24
Hydrocracked Distillates, Heavy	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Jet	519	620	104	50	13	15	8	4	1	0	0	3	0	1	3	1,341
Kerosene	25	97	22	10	1	1	0	0	0	1	0	0	0	0	0	157
Light Cycle Oil	76	130	4	0	0	0	0	0	0	0	0	0	0	0	0	210
Light Gas Oil	92	232	16	4	2	0	0	1	0	0	0	0	0	0	0	347
Light Gas Oil/Heavy Gas Oil	1	4	4	1	0	0	0	0	0	0	0	0	0	0	0	10
Lube Oil	255	518	6	0	0	0	0	0	0	0	0	0	0	0	0	779
Medium Cycle Oil	2	22	0	0	0	0	0	0	0	0	0	0	0	0	0	24
Other	141	264	6	0	0	0	0	0	0	0	0	0	0	0	0	411
Recycled Gas Oil	27	48	5	2	0	0	0	0	0	0	0	0	0	0	0	82
Resid	220	253	14	2	0	0	0	0	0	0	0	0	0	0	0	489
Seal Oil	18	20	0	0	0	0	0	0	0	0	0	0	0	0	0	38
Slop Oil	11	12	1	1	0	0	0	0	0	0	0	0	0	0	0	25
Sludge	46	138	1	0	0	0	0	0	0	0	0	0	0	0	0	185
Slurry	26	45	6	0	1	0	0	0	0	0	0	0	0	0	0	78
Tar	2	13	1	2	0	0	0	0	0	0	0	0	0	0	0	18
Tetramer	2	8	4	0	0	0	0	0	0	0	0	0	0	0	0	14
Unknown	121	163	3	3	0	0	0	0	0	0	0	0	0	0	0	290
Vacuum Gas Oil	3	14	0	0	0	0	0	0	0	0	0	0	0	0	0	17
Vacuum Tower Bottoms	55	227	5	0	0	0	0	0	0	0	0	0	0	0	0	287
Total	3,954	6,259	396	142	25	21	8	6	2	3	0	3	0	1	4	10,823



	Amine	Asphalt	Asphalt/Resid	Atmospheric Tower Bottoms	Cetane Improver	Coke	Condensate	Crude	Cycle Oil	Deasphalted Oil	Decant Oil	Diesel	Diesel - Light Gas Oil	Flushing Oil	Fuel Oil	Gas Oil	Gas Oil (Cracked)	Heating Oil	Heavy Cycle Oil	Heavy Gas Oil	Hot Oil
0 ppmv	38	104	24	24	6	7	3	25	9	11	25	365	8	3	7	1,603	0	21	0	6	7
<= 10 ppmv	115	241	66	33	26	14	4	3	26	87	54	670	20	5	23	1,926	8	39	22	22	11
<= 100 ppmv	0	1	0	0	3	0	0	1	2	1	1	83	0	0	0	95	2	2	0	0	3
<= 500 ppmv	0	1	0	0	1	0	0	0	0	0	0	37	0	0	0	27	0	0	0	0	1
<= 1,000 ppmv	0	1	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0
<= 2,000 ppmv	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0
<= 3,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 4,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
<= 5,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
<= 6,000 ppmv	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
<= 7,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 8,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 9,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 10,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10,000 ppmv	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

	Hydraulic Oil	Hydrocracked Distillates, Heavy	Jet	Kerosene	Light Cycle Oil	Light Gas Oil	Light Gas Oil/Heavy Gas Oil	Lube Oil	Medium Cycle Oil	Other	Recycled Gas Oil	Resid	Seal Oil	Slop Oil	Sludge	Slurry	Tar	Tetramer	Unknown	Vacuum Gas Oil	Vacuum Tower Bottoms
0 ppmv	16	0	519	25	76	92	1	255	2	141	27	220	18	11	46	26	2	2	121	3	55
<= 10 ppmv	8	8	620	97	130	232	4	518	22	264	48	253	20	12	138	45	13	8	163	14	227
<= 100 ppmv	0	0	104	22	4	16	4	6	0	6	5	14	0	1	1	6	1	4	3	0	5
<= 500 ppmv	0	0	50	10	0	4	1	0	0	0	2	2	0	1	0	0	2	0	3	0	0
<= 1,000 ppmv	0	0	13	1	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
<= 2,000 ppmv	0	0	15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 3,000 ppmv	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 4,000 ppmv	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 5,000 ppmv	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 6,000 ppmv	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 7,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 8,000 ppmv	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 9,000 ppmv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<= 10,000 ppmv	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
> 10,000 ppmv	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure III.21. *Count of Screening Measurements by General Process Stream Material and Net Screening Measurement Range*

III.ii.2.4. Other

Component Size

Screened components varied in size from ¼ inch in diameter to 100 inches in diameter. There were 45 unique entries for component size. Screened components were grouped into one of 14 size categories. Approximately four percent (475 components) of screened components did not have entries for size on field data sheets. Of these, 97 percent (459 components) were either pump seals or pump housing.

The distribution of component counts by size (process line diameter) and screening net measurement is shown in Table III-26.

The percentage of components in each size category by screening net measurement range are shown in Table III-27.

Table III-26. Distribution of Components by Component Size and Screening Net Measurement

Line Diameter (inches)	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Size ≤ 1"	2,406	3,096	149	47	10	8	1	2	0	1	0	1	0	0	2	5,723
1" < Size ≤ 2"	532	809	50	18	2	3	3	1	0	0	0	1	0	0	1	1,420
2" < Size ≤ 3"	178	337	29	11	3	3	0	2	1	0	0	0	0	0	0	564
3" < Size ≤ 4"	224	453	44	20	5	0	2	0	0	0	0	0	0	0	0	748
4" < Size ≤ 5"	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5
5" < Size ≤ 6"	218	549	47	16	2	4	2	1	1	0	0	1	0	1	0	842
6" < Size ≤ 7"	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7" < Size ≤ 8"	114	282	25	7	0	0	0	0	0	1	0	0	0	0	1	430
8" < Size ≤ 9"	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3
9" < Size ≤ 10"	65	197	14	9	2	1	0	0	0	1	0	0	0	0	0	289
10" < Size ≤ 11"	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11" < Size ≤ 12"	49	63	5	2	0	0	0	0	0	0	0	0	0	0	0	119
Size > 12"	70	115	10	7	1	2	0	0	0	0	0	0	0	0	0	205
Unknown	93	354	23	5	0	0	0	0	0	0	0	0	0	0	0	475
Total	3,954	6,259	396	142	26	21	8	6	2	3	0	3	0	1	3	10,823

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-27. Percentage of Screened Components by Component Size and Screening Net Measurement

Line Diameter (inches)	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Size ≤ 1"	42.0	54.1	2.6	0.8	0.2	0.1	0.02	0.03	0.0	0.02	0.0	0.02	0.0	0.0	0.03	100.0
1" < Size ≤ 2"	37.5	57.0	3.5	1.3	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.07	100.0
2" < Size ≤ 3"	31.6	59.8	5.1	2.0	0.5	0.5	0.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	100.0
3" < Size ≤ 4"	30.0	60.5	5.9	2.7	0.7	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
4" < Size ≤ 5"	40.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
5" < Size ≤ 6"	25.9	65.2	5.6	1.9	0.2	0.5	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	100.0
6" < Size ≤ 7"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7" < Size ≤ 8"	26.5	65.6	5.8	1.6	0.0 (1)	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.2 (2)	100.0
8" < Size ≤ 9"	50.0	25.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
9" < Size ≤ 10"	22.5	68.2	4.8	3.1	0.7%	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	100.0
10" < Size ≤ 11"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11" < Size ≤ 12"	41.2	52.9	4.2	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Size > 12"	34.1	56.1	4.9	3.4	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Unknown	19.6	74.5	4.8	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Component Operating Pressure

Operating pressure of screened components noted on field data sheets varied between -27 psig to 3,900 psig and there were 245 unique entries. The operating pressure of approximately 10 percent (1,100 components) of screened components was unknown.

Screened components were grouped into one of the 13 operating pressure categories:

- Operating pressure ≤ 5 psig,
- 5 psig < Operating Pressure ≤ 10 psig,
- 10 psig < Operating Pressure ≤ 25 psig,
- 25 psig < Operating Pressure ≤ 50 psig,
- 100 psig < Operating Pressure ≤ 200 psig,
- 300 psig < Operating Pressure ≤ 400 psig,
- 500 psig < Operating Pressure ≤ 1,000 psig,
- 1,000 psig < Operating Pressure ≤ 2,000 psig,
- Operating Pressure > 2,000 psig, and
- Unknown.

The distribution of component counts by these categories is shown in Table III-28.

Within each category, the percentages of components by screening net measurement are shown in Table III-29.

Table III-28. Distribution of Screened Components by Operating Pressure and Screening Net Measurement

Operating Pressure (psig)	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	401 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Operating Pressure ≤ 5 psig	386	592	36	6	0	0	0	0	0	0	0	0	0	0	0	386
5 psig < Operating Pressure ≤ 10 psig	67	51	7	9	2	5	1	1	0	0	0	0	0	1	1	145
10 psig < Operating Pressure ≤ 25 psig	217	404	11	12	1	2	1	1	0	0	0	1	0	0	0	217
25 psig < Operating Pressure ≤ 50 psig	472	642	49	19	2	1	0	0	0	0	0	0	0	0	0	472
50 psig < Operating Pressure ≤ 100 psig	584	804	38	12	1	2	0	1	0	1	0	0	0	0	0	584
100 psig < Operating Pressure ≤ 200 psig	404	934	74	17	9	5	2	1	1	0	0	0	0	0	0	404
200 psig < Operating Pressure ≤ 300 psig	206	345	23	3	0	0	1	0	0	0	0	0	0	0	0	206
300 psig < Operating Pressure ≤ 400 psig	55	141	1	2	1	0	0	0	0	0	0	0	0	0	0	55
400 psig < Operating Pressure ≤ 500 psig	30	76	2	2	0	0	0	0	0	0	0	0	0	0	0	30
500 psig < Operating Pressure ≤ 1,000 psig	222	218	30	10	4	2	2	1	0	0	0	1	0	0	2	222
1,000 psig < Operating Pressure ≤ 2,000 psig	179	255	17	12	0	1	1	0	1	1	0	1	0	0	0	179
Operating Pressure > 2,000 psig	31	31	19	7	0	0	0	0	0	0	0	0	0	0	0	31
Unknown	1,100	1,766	89	31	5 (1)	3	0	1	0	1	0	0	0	0	1 (2)	1,100
Total	3,954	6,259	396	142	25	21	8	6	2	3	0	3	0	1	4	10,823

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-29. Percentage of Screened Components by Operating Pressure and Screening Net Measurement

Operating Pressure (psig)	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	401 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Operating Pressure ≤ 5 psig	37.8	58.0	3.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
5 psig < Operating Pressure ≤ 10 psig	46.6	34.9	4.8	6.2	1.4	3.4	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.7	100.0
10 psig < Operating Pressure ≤ 25 psig	33.4	62.2	1.7	1.8	0.2	0.3	0.2	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	100.0
25 psig < Operating Pressure ≤ 50 psig	39.8	54.2	4.1	1.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
50 psig < Operating Pressure ≤ 100 psig	40.5	55.7	2.6	0.8	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	100.0
100 psig < Operating Pressure ≤ 200 psig	27.9	64.5	5.1	1.2	0.6	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	100.0
200 psig < Operating Pressure ≤ 300 psig	35.6	59.7	4.0	0.5	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
300 psig < Operating Pressure ≤ 400 psig	27.5	70.5	0.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
400 psig < Operating Pressure ≤ 500 psig	27.3	69.1	1.8	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
500 psig < Operating Pressure ≤ 1,000 psig	45.1	44.3	6.1	2.0	0.8	0.4	0.4	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.4	100.0
1,000 psig < Operating Pressure ≤ 2,000 psig	38.2	54.5	3.6	2.6	0.0	0.2	0.2	0.0	0.2	0.2	0.0	0.2	0.0	0.0	0.0	100.0
Operating Pressure > 2,000 psig	35.2	35.2	21.6	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Unknown	36.7	58.9	3.0	1.0	0.2 (1)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03 (2)	100.0

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Component External Temperature

There were 1,482 unique entries for “temperature” listed on screening field data sheets. In some instances, a range (“150 – 250”, “500 – 600”, etc.) or minimum threshold (“>300”) was listed. These were classified as unknown and grouped with entries where an entry was left blank or value not provided (e.g., “Insulated”).

Temperature entries varied from 0 degrees Fahrenheit (an amine pump) to 920 degrees Fahrenheit (crude unit components handling light vacuum gas oil).

Screened components were sorted into one of seven temperature categories:

- External Temperature ≤ 100 deg F,
- 100 deg F < Temperature ≤ 200 deg F,
- 300 deg F < Temperature ≤ 400 deg F,
- 400 deg F < Temperature ≤ 500 deg F,
- External Temperature > 500 deg F, and
- Unknown.

An increment of 100 degrees Fahrenheit was chosen as the threshold for delineating categories because smaller differences in external temperature could be attributed to heat transfer differences rather than stream operating temperature differences. Two components with a difference in external temperatures of 100 degrees or more is more likely to be attributed to a difference in stream operating temperature rather than simply a result in differences in heat transfer.

The distribution of component counts by screening net measurement within each of these categories is provided in Table III-30.

Within each category, the percentages of total components within each screening net measurement range are listed in Table III-31.

Table III-30. Distribution of Screened Components by External Temperature and Screening Net Measurement

External Temperature (Degrees Fahrenheit)	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	401 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
External Temperature ≤ 100 deg F	1,944	2,336	136	45	7	3	1	1	0	0	0	1	0	0	2	4,476
100 deg F < Temperature ≤ 200 deg F	1,052	1,728	87	32	10	6	1	1	0	2	0	1	0	0	0	2,920
200 deg F < Temperature ≤ 300 deg F	416	833	51	24	2	6	3	1	2	1	0	0	0	0	1	1,340
300 deg F < Temperature ≤ 400 deg F	253	663	55	28	4 (1)	4	2	2	0	0	0	1	0	1	1 (2)	1,014
400 deg F < Temperature ≤ 500 deg F	156	376	41	9	1	1	1	1	0	0	0	0	0	0	0	586
External Temperature > 500 deg F	67	167	13	3	1	1	0	0	0	0	0	0	0	0	0	252
Unknown	65	156	13	1	0	0	0	0	0	0	0	0	0	0	0	235
Total	3,954	6,259	396	142	25	21	8	6	2	3	0	3	0	1	4	10,823

Notes:
1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-31. Percentage of Screened Components by External Temperature and Screening Net Measurement

External Temperature (Degrees Fahrenheit)	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	401 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
External Temperature ≤ 100 deg F	43.4	52.2	3.0	1.0	0.2	0.1	0.02	0.02	0.0	0.0	0.0	0.02	0.0	0.0	0.04	100.0
100 deg F < Temperature ≤ 200 deg F	36.0	59.2	3.0	1.1	0.3	0.2	0.03	0.03	0.0	0.1	0.0	0.03	0.0	0.0	0.0	100.0
200 deg F < Temperature ≤ 300 deg F	31.0	62.2	3.8	1.8	0.1	0.4	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	100.0
300 deg F < Temperature ≤ 400 deg F	25.0	65.4	5.4	2.8	0.4 (1)	0.4	0.2	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.1 (2)	100.0
400 deg F < Temperature ≤ 500 deg F	26.6	64.2	7.0	1.5	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
External Temperature > 500 deg F	26.6	66.3	5.2	1.2	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Unknown	27.7	66.4	5.5	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Notes:
1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Component Vibration

Approximately 46 percent of screened components were identified as vibrating at the time of screening. Of these components, 98.8 percent were identified as vibrating at a low amount, 1.0 percent were identified as vibrating at a high amount, and the remainder at a medium level. The vibration amount of 1.4 percent of the screened components was unknown.

The distribution of screened components by identified vibration amount and screening net measurement as well as the percentage of components within each category by screening net measurement are shown in the following tables (Table III-32, Table III-33).

Table III-32. *Distribution of Screened Components by Vibration Amount and Screening Net Measurement*

Vibration Amount	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
None	2,182	3,202	174	66	7	5	3	2	0	2	0	1	0	0	2	5,646
Low	1,699	2,933	213	73	18 (1)	15	5	4	2	0	0	2	0	1	2 (2)	4,967
Medium	0	7	2	0	0	0	0	0	0	0	0	0	0	0	0	9
High	16	23	6	3	0	2	0	0	0	1	0	0	0	0	0	51
Unknown	56	94	1	0	0	0	0	0	0	0	0	0	0	0	0	151
Total	**3,954**	**6,259**	**396**	**142**	**25**	**21**	**8**	**6**	**2**	**3**	**0**	**3**	**0**	**1**	**4**	**10,823**

Notes:
1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-33. *Percentage of Screened Components by Vibration Amount and Screening Net Measurement*

Vibration Amount	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
None	38.7	56.7	3.1	1.2	0.1	0.1	0.1	0.04	0.0	0.04	0.0	0.02	0.0	0.0	0.04	100.0
Low	34.2	59.0	4.3	1.5	0.4	0.3	0.1	0.1	0.04	0.0	0.0	0.04	0.0	0.02	0.04	100.0
Medium	0.0	77.8	22.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
High	31.4	45.1	11.8	5.9	0.0	3.9	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	100.0
Unknown	37.1	62.3	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Notes:
1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Component Cyclic Vibration

Less than 0.7 percent of screened components were identified by screening personnel as undergoing cyclic vibration while the field sheet entries for 9.9 percent of components was left blank. Except for Refinery C, components at each of the petroleum refineries was identified as undergoing cyclic vibration.

The number and percentage of screened components by cyclic vibration category and screening net measurement (maximum screening measurement minus background screening measurement) are shown in Table III-34 and Table III-35.

The table listed values are also shown in figures encompassing the entire screening value range (0 ppmv to > 10,000 ppmv) as well as figures split by screening range (0 ppm to 500 ppmv and 501 ppmv to > 10,000 ppmv) in Figure III.22, Figure III.23, Figure III.24, Figure III.25, Figure III.26, and Figure III.27.

The cumulative percentage of screened components by cyclic vibration category (yes, no, unknown) and screening net measurement range is provided in Figure III.28.

Table III-34. Distribution of Screened Components by Cyclic Vibration and Screening Net Measurement

Cyclic Vibration	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
No	3,347	5,811	342	121	22 (1)	16	7	5	2	3	0	2	0	0	3 (1)	9,681
Yes	19	35	6	6	2	3	1	0	0	0	0	0	0	1	0	73
Unknown	587	413	48	15	1	2	0	1	0	0	0	1	0	0	1	1,069
Total	**3,954**	**6,259**	**396**	**142**	**25**	**21**	**8**	**6**	**2**	**3**	**0**	**3**	**0**	**1**	**4**	**10,823**

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-35. Percentage of Screened Components by Cyclic Vibration and Screening Net Measurement

Cyclic Vibration	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
No	34.6	60.0	3.5	1.2	0.2 (1)	0.2	0.1	0.1	0.02	0.03	0.0	0.02	0.0	0.0	0.03 (2)	34.6
Yes	26.0	47.9	8.2	8.2	2.7	4.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	26.0
Unknown	54.9	38.6	4.5	1.4	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.1	54.9

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

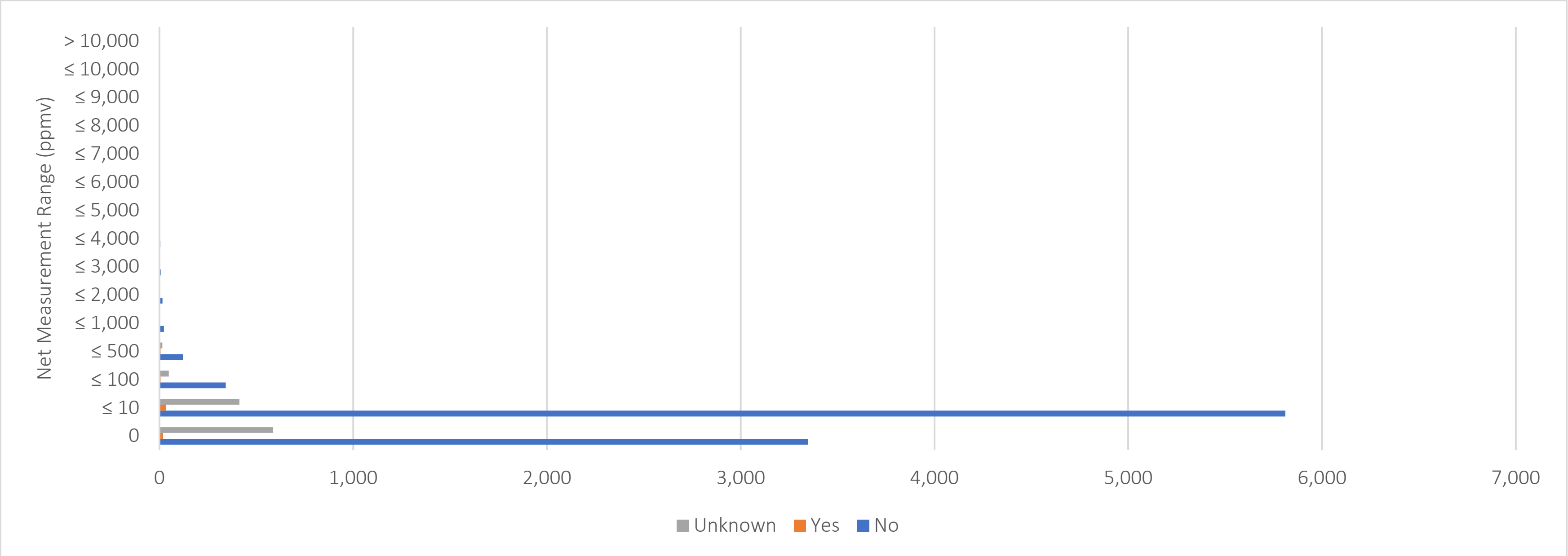


Figure III.22. Counts of Screened Components by Cyclic Vibration and Screening Net Measurement

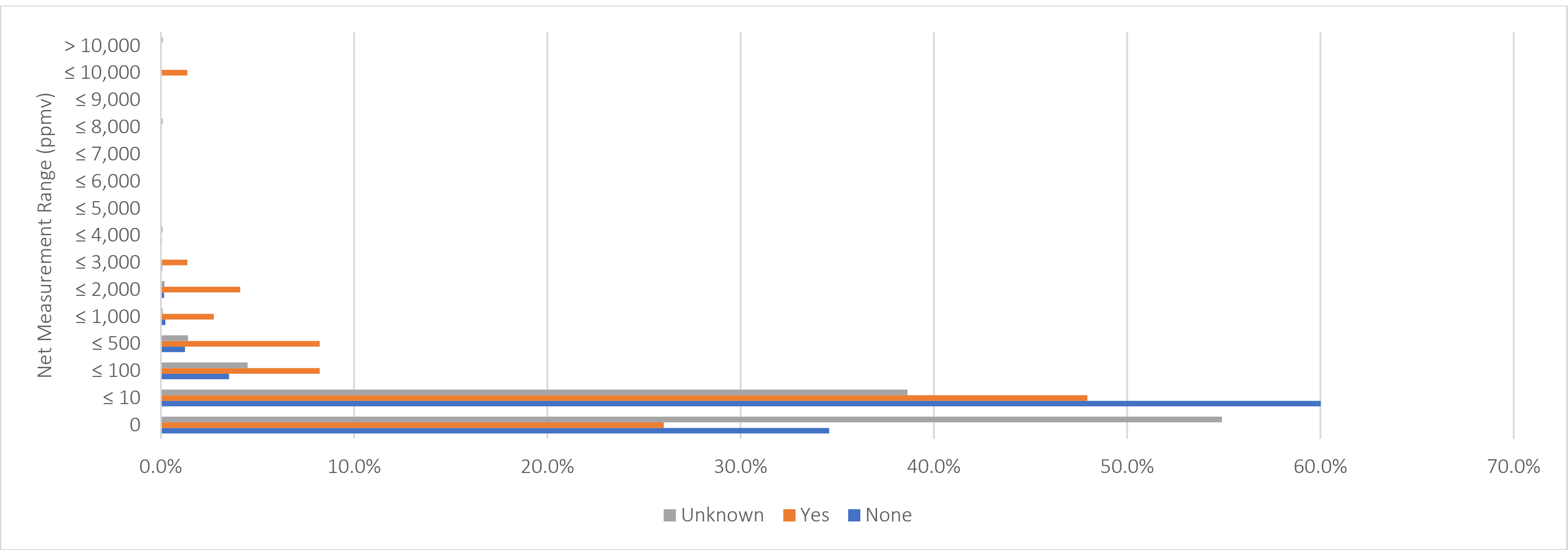


Figure III.23. Percentage of Screened Components by Cyclic Vibration and Screening Net Measurement

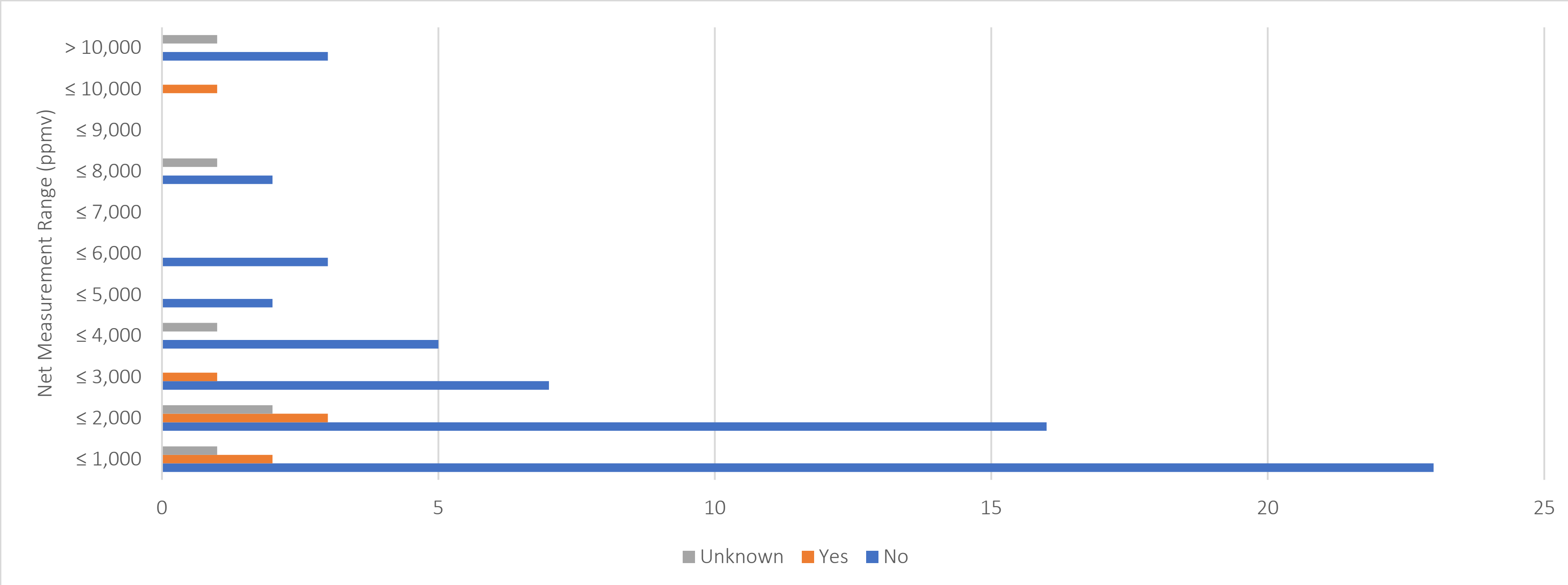


Figure III.24. Counts of Screened Components by Cyclic Vibration and Screening Net Measurement (501 ppmv to > 10,000 ppmv)

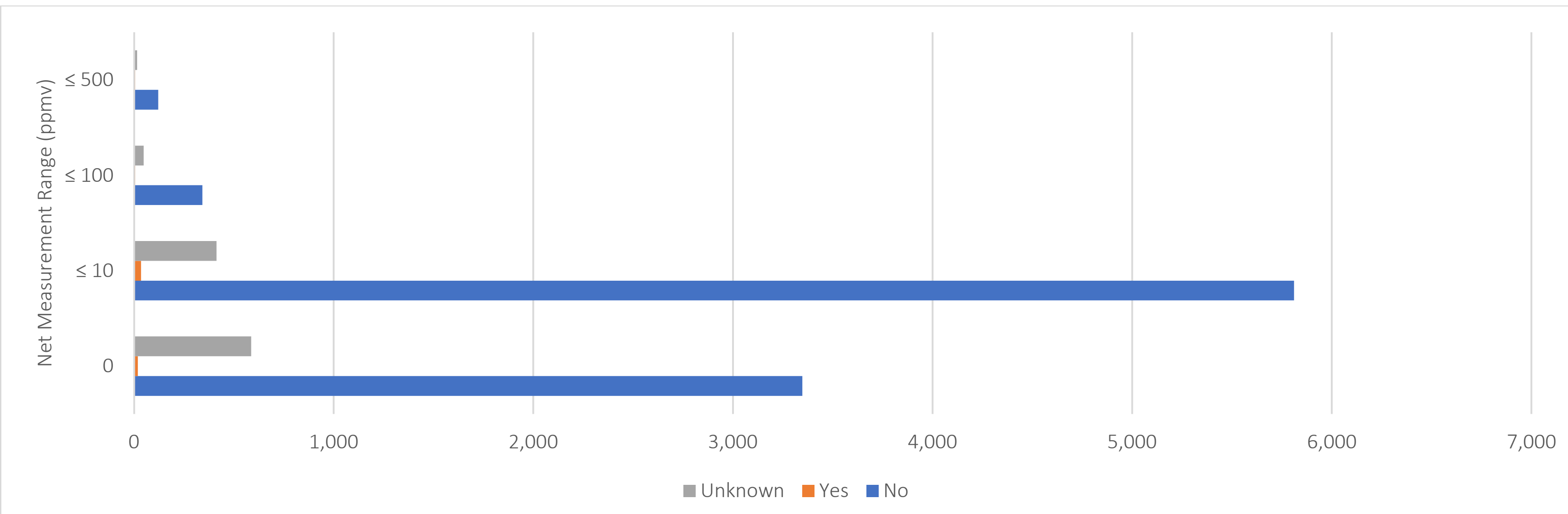


Figure III.25. Counts of Screened Components by Cyclic Vibration and Screening Net Measurement (0 ppmv to 500 ppmv)

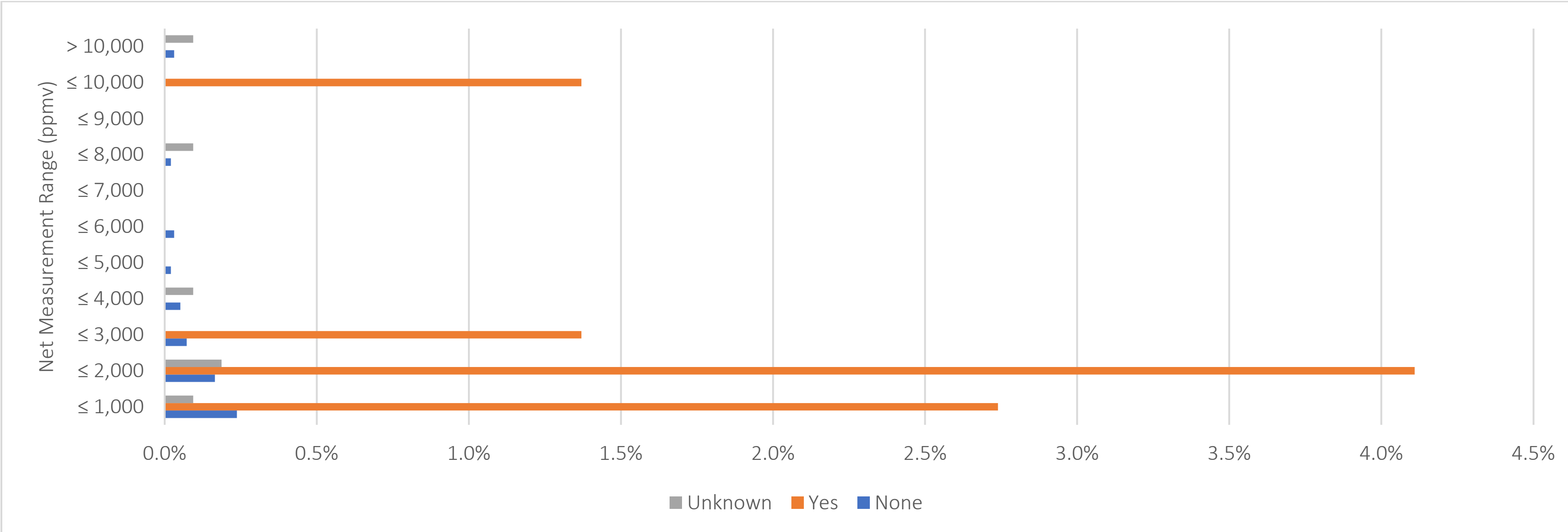


Figure III.26. Percentage of Screened Components by Cyclic Vibration and Screening Net Measurement (501 ppmv to > 10,000 ppmv)

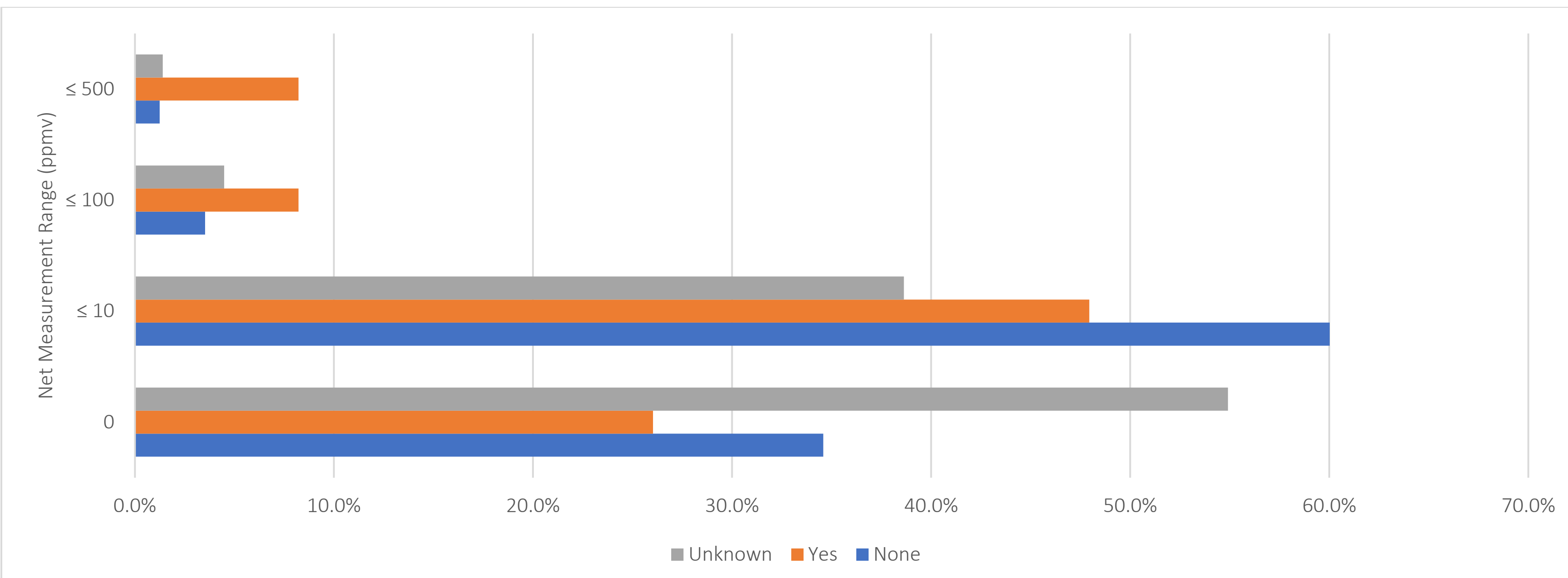


Figure III.27. Percentage of Screened Components by Cyclic Vibration and Screening Net Measurement (0 ppmv to 500 ppmv)

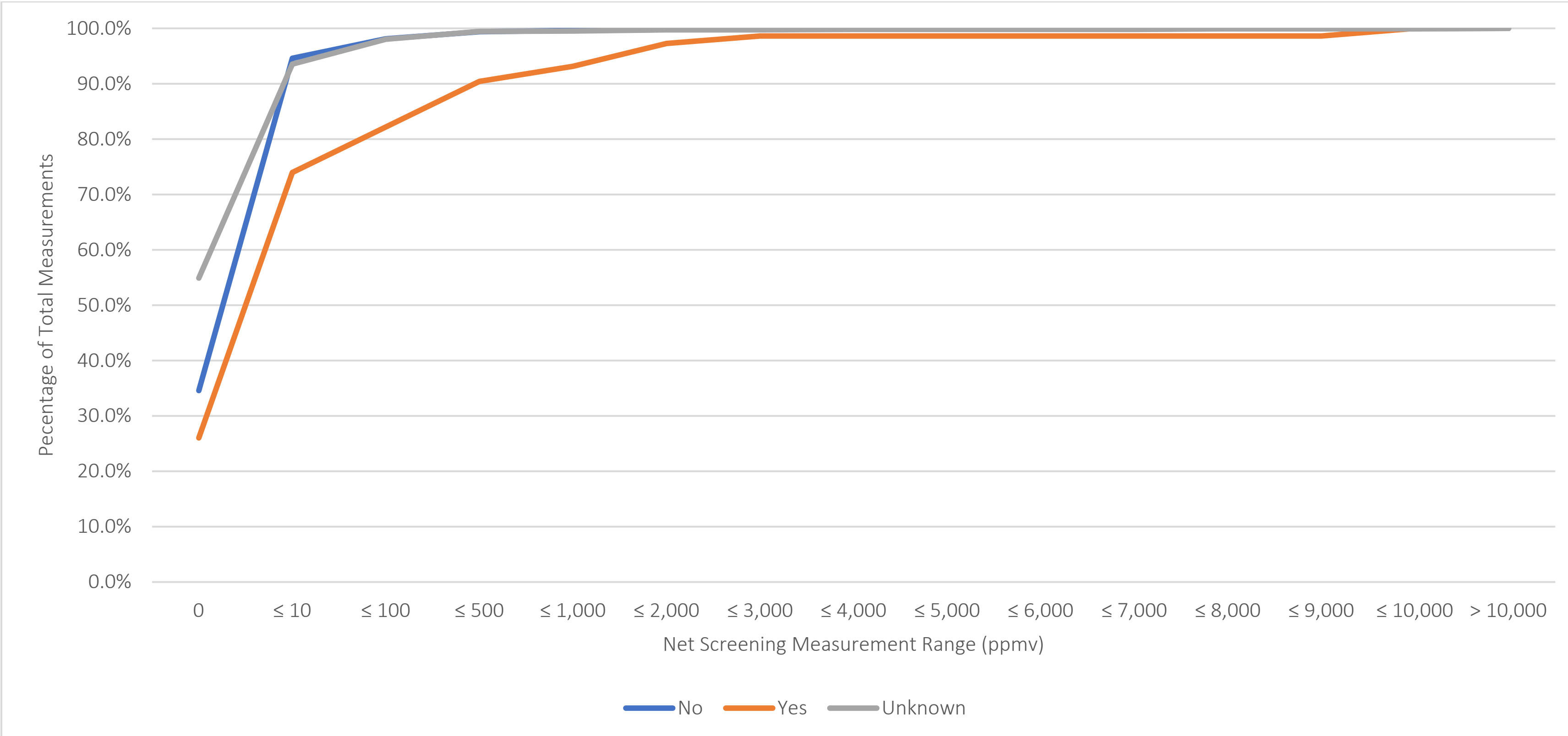


Figure III.28. Cumulative Percentage of Screened Components by Cyclic Vibration and Screening Net Measurement Range

Component Location

Most (72 percent) screened components were at the ground level while only five percent were located at the top of a column (presumably the furthest away from ground level).

The distribution of screened components by component location and screening net measurement range is listed in Table III-36 and shown in Figure III.29.

Three figures are provided for the percentage of screened components within each component location category by screening net measurement range:

- one providing the full scale of screening values (0 ppmv to > 10,000 ppmv, Figure III.30),
- one only showing percentage distribution for components with screening net measurements between 501 ppmv to > 10,000 ppmv (Figure III.31), and
- one only showing the percentage distribution for components with screening net measurements between 0 ppmv and 500 ppmv (Figure III.31).

Table III-36. Distribution of Screened Components by Location / Elevation and Screening Net Measurement

Location / Elevation	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Ground	2,821	4,475	327	107	18 (1)	17	8	4	2	2	0	2	0	1	1 (2)	7,785
Platform	847	1,377	46	32	6	4	0	2	0	1	0	1	0	0	2	2,318
Top of Column	245	323	19	2	1	0	0	0	0	0	0	0	0	0	1	591
Other	17	55	3	1	0	0	0	0	0	0	0	0	0	0	0	76
Unknown	23	29	0	0	0	0	0	0	0	0	0	0	0	0	0	52
Total	3,954	6,259	395	142	25	21	8	6	2	3	0	3	0	1	4	10,823

Notes:
1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-37. Percentage of Screened Components by Location / Elevation and Screening Net Measurement

Location / Elevation	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Ground	36.2	57.5	4.2	1.4	0.2 (1)	0.2	0.1	0.1	0.03	0.03	0.0	0.03	0.0	0.01	0.01 (2)	100.0
Platform	36.5	59.4	2.0	1.4	0.3	0.2	0.0	0.1	0.0	0.04	0.0	0.04	0.0	0.0	0.1	100.0
Top of Column	41.5	54.7	3.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	100.0
Other	22.4	72.4	3.9	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Unknown	44.2	55.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Total	36.5	57.8	3.6	1.3	0.2	0.2	0.1	0.1	0.02	0.03	0.0	0.03	0.0	0.01	0.03	100.0

Notes:
1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

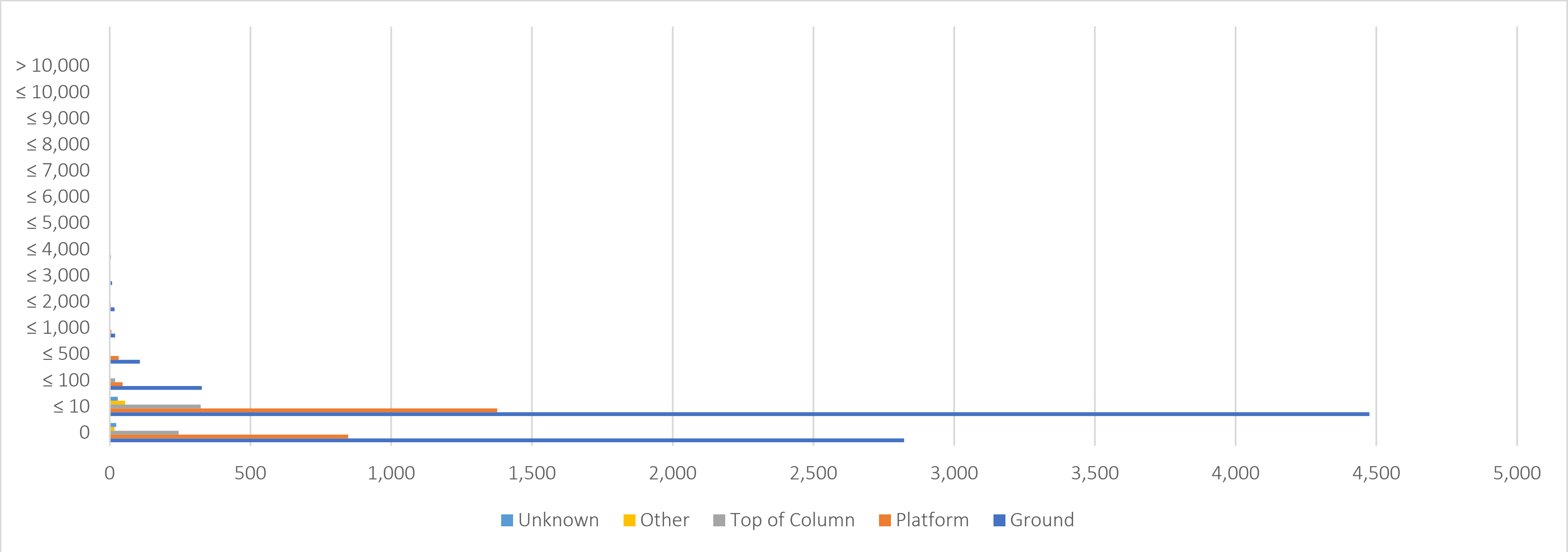


Figure III.29. Counts of Screened Components by Component Location and Screening Net Measurement

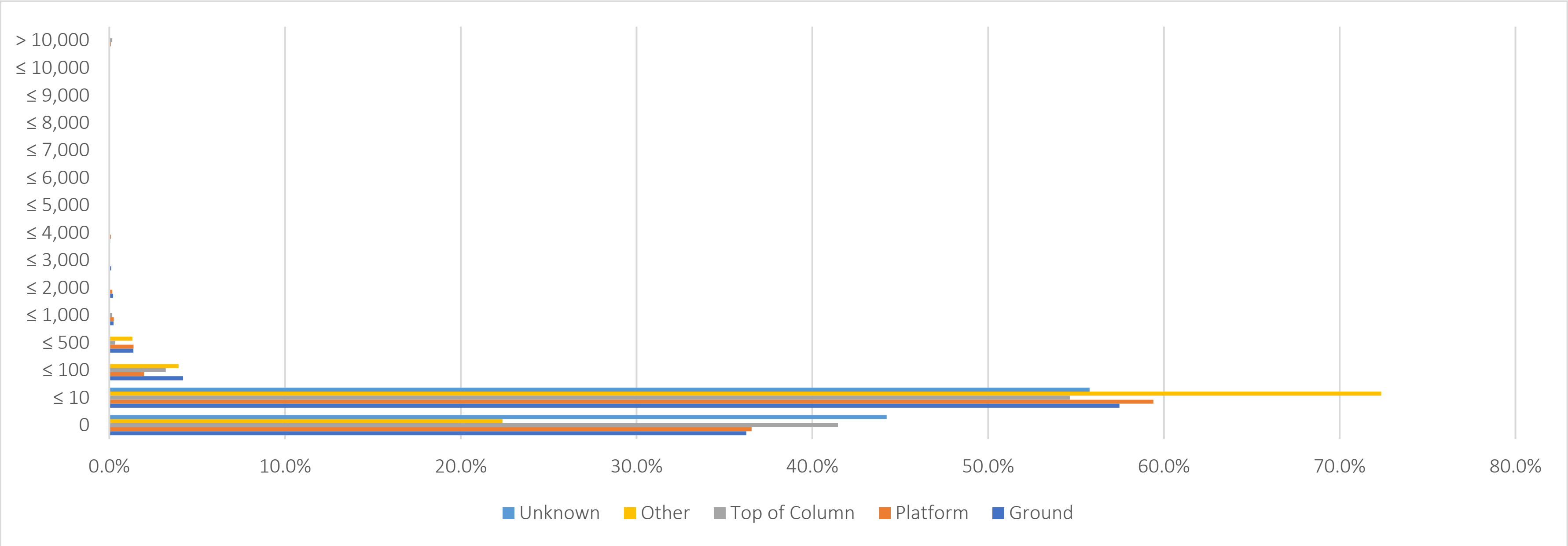


Figure III.30. Percentage of Screened Components by Component Location and Screening Net Measurement

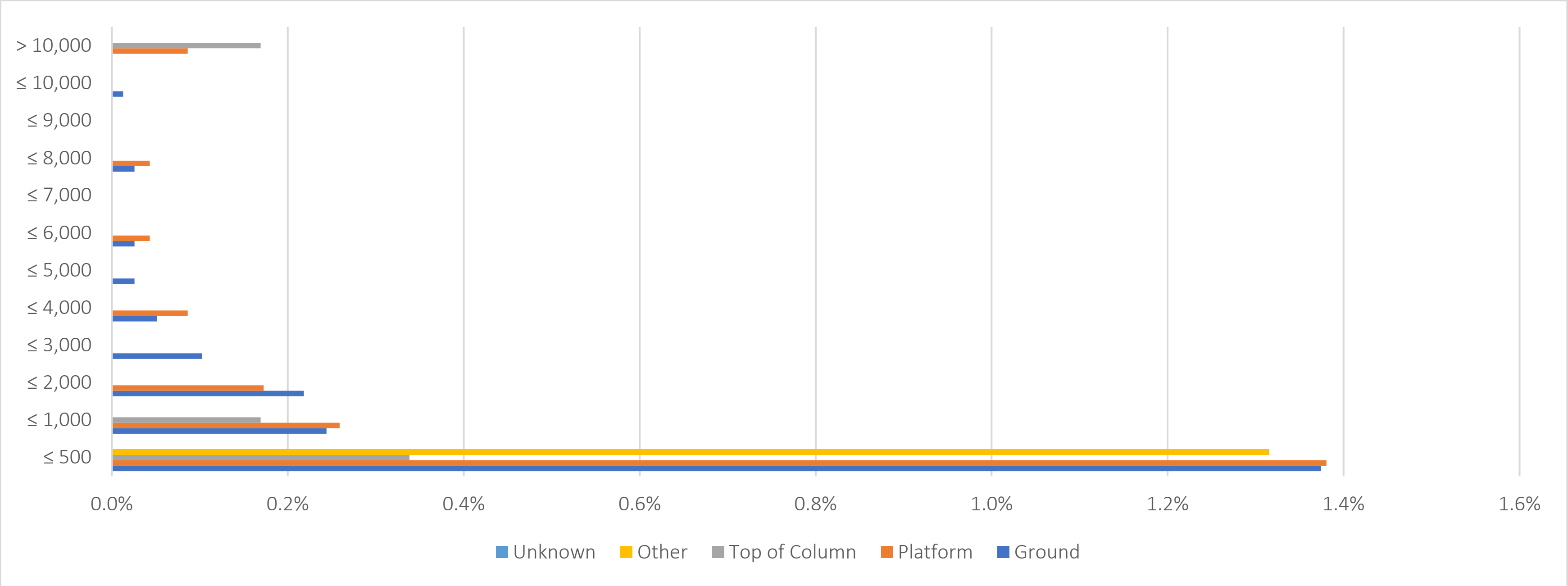


Figure III.31. *Percentage of Screened Components by Component Location and Screening Net Measurement (101 ppmv to >10,000 ppmv)*

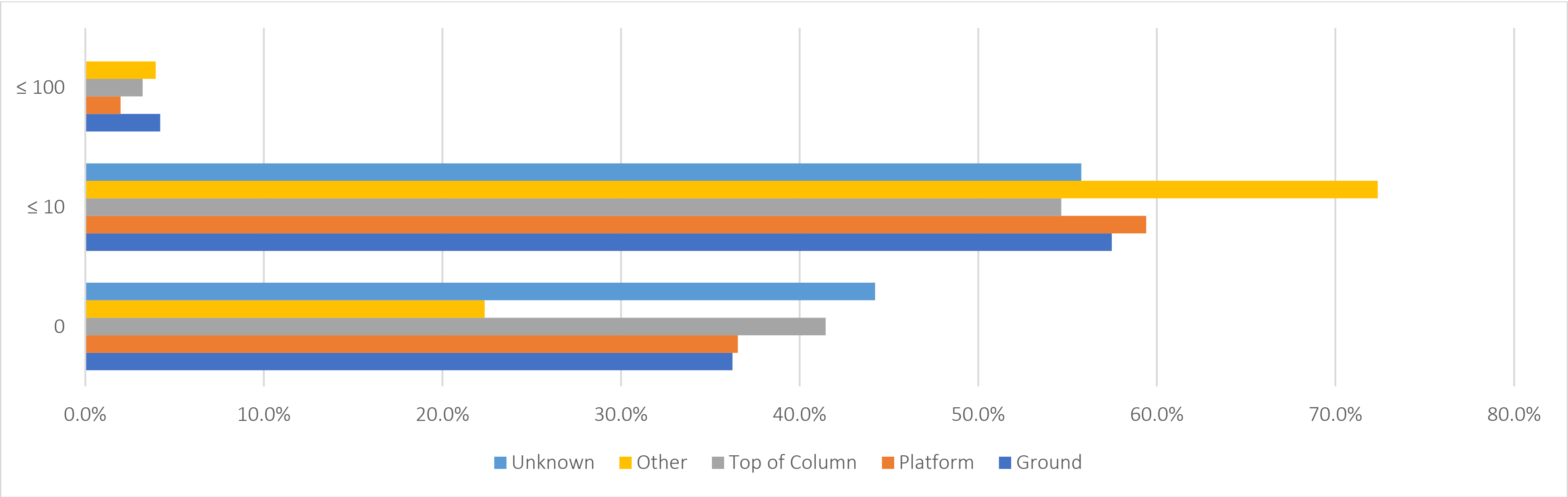


Figure III.32. *Percentage of Screened Components by Component Location and Screening Net Measurement (0 ppmv to 100 ppmv)*

Component Monitoring Time and Pace

Monitoring time for screened components varied from equal to or less than one minute to 36 minutes. When accounting for component size, monitoring pace varied from less than one second per inch to over 500 seconds per inch.

Most (53 percent) components were screened in one minute or less and 87 percent were screened in under three minutes.

The number of and percentage of screened components by monitoring time are provided in Table III-38 and Table III-39.

The distribution of screened components by screening pace (seconds of screening time per component circumferential inch) is listed in Table III-40 and Table III-41.

Component A-477 is treated as a leak of greater than 10,000 ppmv because of both the magnitude of the leak at a distance and the presence of a continual hydrocarbon liquid leaks. However, because the component could not be screened at the required screening distance, the time to measure component A-477 may not be representative of similar leaks that could be screened at the surface.

The cumulative percentage of all screened components within a screening net measurement range (0 ppmv, 1 – 10 ppmv, 11 to 100 ppmv, 101 ppmv to 500 ppmv, etc.) by screening time is plotted and shown in Figure III.33 and Figure III.34. Two figures are provided to aid differentiating the separate curves.

Plots for the following screening ranges are not included in the two figures:

- 4,001 ppmv to 5,000 ppmv (only two components in this category, both screened for four minutes),
- 6,001 ppmv to 7,000 ppmv (zero components in this category),
- 8,001 ppmv to 9,000 ppmv (zero components in this category), and
- 9,001 ppmv to 10,000 ppmv (only one component in this category).

Table III-38. Distribution of Screened Components by Monitoring Time and Screening Net Measurement

Monitoring Time (minutes)	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Unknown	11	15	4	0	0	0	0	0	0	0	0	0	0	0	0	30
≤ 1	2,621	3,097	22	5	2	0	1	0	0	0	0	0	0	1	0	5,749
2	878	1,590	51	20	2	5	1	0	0	0	0	0	0	0	0	2,547
3	263	697	83	23	2	3	0	0	0	0	0	0	0	0	1	1,072
4	92	393	68	20	4	6	3	1	2	0	0	2	0	0	0	591
5	44	182	41	15	5	3	1	3	0	1	0	0	0	0	1	296
6	17	104	28	18	3	0	0	1	0	0	0	0	0	0	1	172
7	10	62	28	10	3	2	1	0	0	0	0	0	0	0	0	116
8	8	41	21	8	1	1	0	0	0	0	0	1	0	0	0	81
9	1	23	9	4	0	0	1	0	0	1	0	0	0	0	0	39
10	4	18	11	4	0 [(1)]	0	0	0	0	0	0	0	0	0	1 [(2)]	38
11 – 15	3	28	21	9	1	0	0	1	0	1	0	0	0	0	0	64
16 – 20	1	5	3	3	1	1	0	0	0	0	0	0	0	0	0	14
21 – 25	0	3	3	1	0	0	0	0	0	0	0	0	0	0	0	7
26 – 30	0	1	1	2	1	0	0	0	0	0	0	0	0	0	0	5
31 – 36	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	3,954	6,259	396	142	25	21	8	6	2	3	0	3	0	1	4	10,823

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-39. *Percentage of Screened Components by Monitoring Time and Screening Net Measurement*

Monitoring Time (minutes)	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
Unknown	36.7	50.0	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
≤ 1	45.6	53.9	0.4	0.1	0.03	0.0	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.0	100.0
2	34.5	62.4	2.0	0.8	0.1	0.2	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
3	24.5	65.0	7.7	2.1	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	100.0
4	15.6	66.5	11.5	3.4	0.7	1.0	0.5	0.2	0.3	0.0	0.0	0.3	0.0	0.0	0.0	100.0
5	14.9	61.5	13.9	5.1	1.7	1.0	0.3	1.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	100.0
6	9.9	60.5	16.3	10.5	1.7	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.6	100.0
7	8.6	53.4	24.1	8.6	2.6	1.7	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
8	9.9	50.6	25.9	9.9	1.2	1.2	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	100.0
9	2.6	59.0	23.1	10.3	0.0	0.0	2.6	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	100.0
10	10.5	47.4	28.9	10.5	0.0 (1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6 (2)	100.0
11 – 15	4.7	43.8	32.8	14.1	1.6	0.0	0.0	1.6	0.0	1.6	0.0	0.0	0.0	0.0	0.0	100.0
16 – 20	7.1	35.7	21.4	21.4	7.1	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
21 – 25	0.0	42.9	42.9	14.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
26 – 30	0.0	20.0	20.0	40.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
31 – 36	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-40. Distribution of Screened Components by Screening Pace and Screening Net Measurement

Screening Pace (seconds/inch)	Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)														
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
≤ 1	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1 to 2	29	36	0	0	0	0	0	0	0	0	0	0	0	0	0	65
2 to 3	61	70	1	0	0	0	0	0	0	0	0	0	0	0	0	132
3 to 4	124	190	3	1	0	0	0	0	0	0	0	0	0	1	0	319
4 to 5	168	240	5	0	1	0	0	0	0	0	0	0	0	0	0	414
5 to 10	719	1,137	27	17	1	3	2	0	0	0	0	0	0	0	0	1,906
10 to 15	272	609	29	6	0	1	1	0	0	0	0	0	0	0	0	918
15 to 20	872	1,044	39	12	3	3	0	1	0	1	0	0	0	0	0	1,975
20 to 30	602	1,102	50	20	1 (1)	1	1	0	1	1	0	1	0	0	1 (2)	1,781
30 to 40	599	675	47	16	6	2	2	1	0	0	0	0	0	0	0	1,348
40 to 50	4	20	12	6	0	1	1	1	0	0	0	0	0	0	0	45
50 to 100	365	667	98	29	5	8	0	1	0	1	0	1	0	0	2	1,177
100 to 200	20	54	46	21	7	2	1	2	0	0	0	1	0	0	1	155
200 to 300	4	4	1	2	0	0	0	0	0	0	0	0	0	0	0	11
300 to 400	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	3
400 to 500	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
> 500	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Unknown	113	408	33	11	1	0	0	0	1	0	0	0	0	0	0	567
Total	3,954	6,259	396	142	25	21	8	6	2	3	0	3	0	1	4	10,823

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

Table III-41. Percentage of Screened Components by Screening Pace and Screening Net Measurement

Screening Pace (seconds/inch)	Percentage of Component Counts by Screening Net Measurement (Maximum Measurement - Background) (ppmv)															
	0	1 to ≤ 10	11 to ≤ 100	101 to ≤ 500	501 to ≤ 1,000	1,001 to ≤ 2,000	2,001 to ≤ 3,000	3,001 to ≤ 4,000	4,001 to ≤ 5,000	5,001 to ≤ 6,000	6,001 to ≤ 7,000	7,001 to ≤ 8,000	8,001 to ≤ 9,000	9,001 to ≤ 10,000	> 10,000	Total
≤ 1	25.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
1 to 2	44.6	55.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
2 to 3	46.2	53.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
3 to 4	38.9	59.6	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	100.0
4 to 5	40.6	58.0	1.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
5 to 10	37.8	59.6	1.4	0.9	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
10 to 15	29.6	66.3	3.2	0.7	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
15 to 20	44.2	52.9	2.0	0.6	0.2	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	100.0
20 to 30	33.8	61.9	2.8	1.1	0.1 (1)	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1 (2)	100.0
30 to 40	44.4	50.1	3.5	1.2	0.4	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
40 to 50	8.9	44.4	26.7	13.3	0.0	2.2	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
50 to 100	31.0	56.7	8.3	2.5	0.4	0.7	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.2	100.0
100 to 200	12.9	34.8	29.7	13.5	4.5	1.3	0.6	1.3	0.0	0.0	0.0	0.6	0.0	0.0	0.6	100.0
200 to 300	36.4	36.4	9.1	18.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
300 to 400	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
400 to 500	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
> 500	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Unknown	25.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Notes:

1. Does not Include component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)
2. Includes component A-477 (pump seal measuring 760 ppmv at distance with liquid hydrocarbons, treated as over 10,000 ppmv leak)

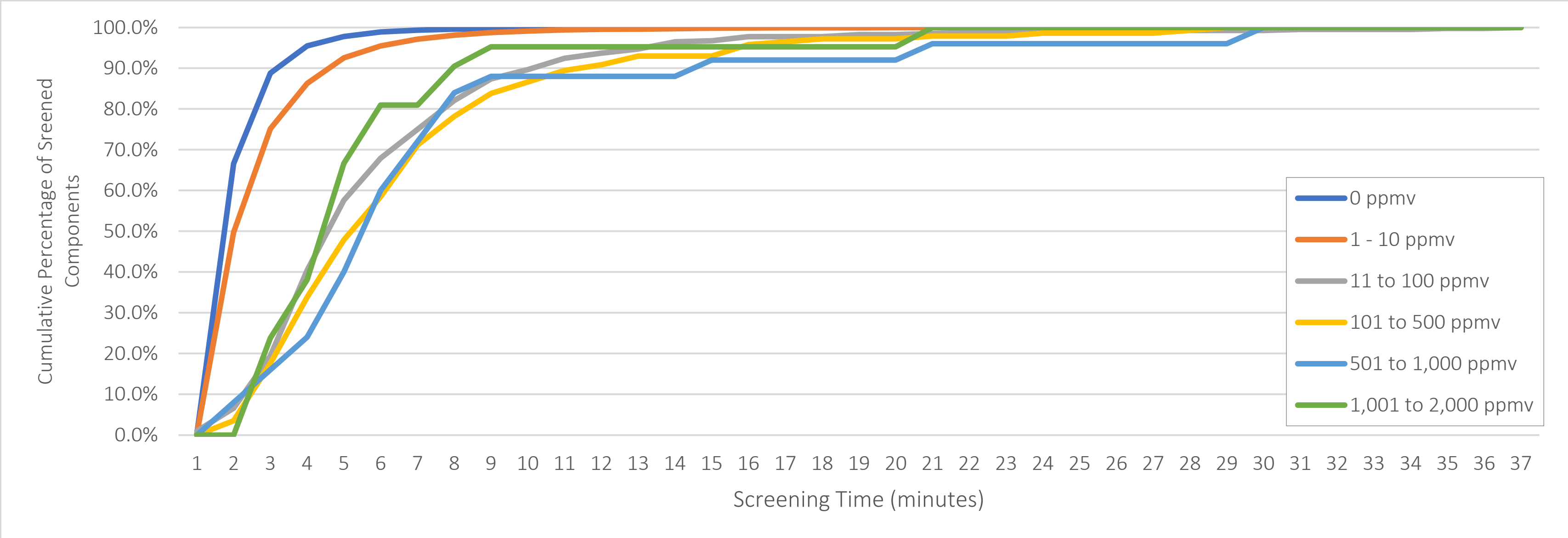


Figure III.33. Cumulative Percentage of Screened Components by Screening Net Measurement Range and Screening Time (0 ppmv to 2,000 ppmv)

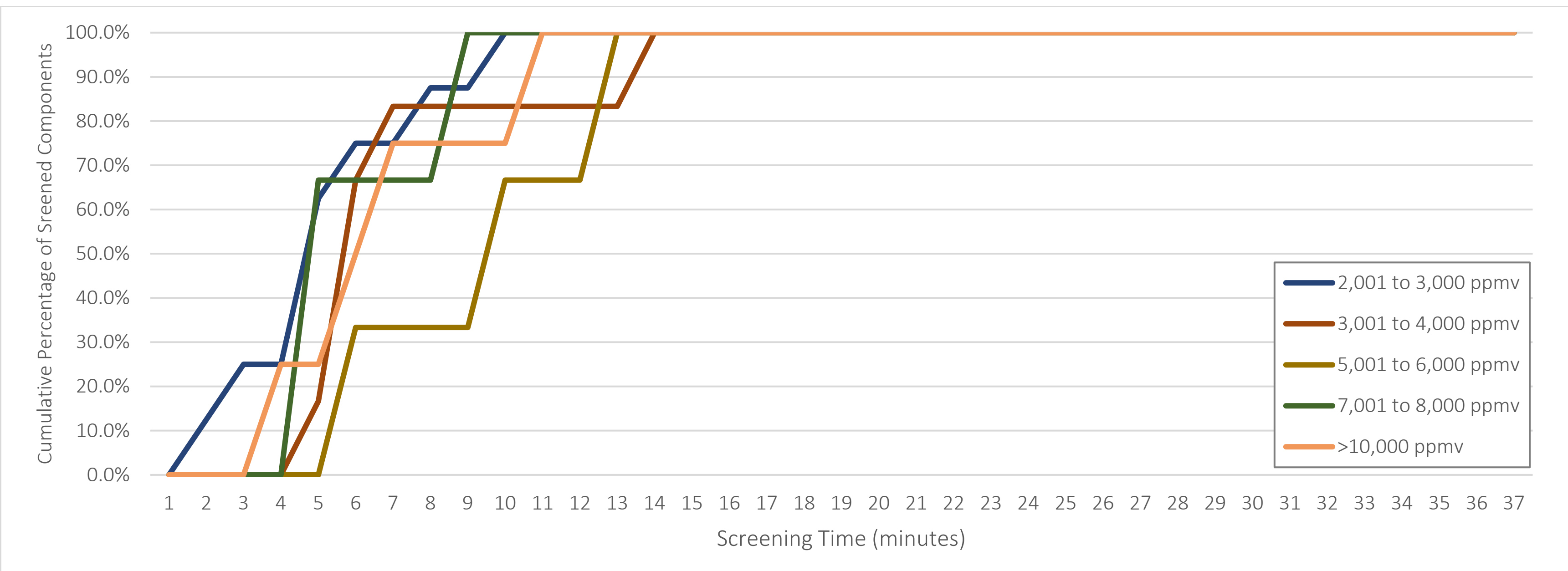


Figure III.34. Cumulative Percentage of Screened Components by Screening Net Measurement Range and Screening Time (2,000 ppmv to >10,000 ppmv)

iii. Mass Emissions Sampling

Mass emissions sampling ("bagging") began at Refinery A in January 2017 before screening at Refinery A had completed and prior to beginning screening at Refinery B. Per the methodology at the time, components with the highest 20 screening measurements were candidates for sampling by the third-party contractor (Tricord). The Air District sampled eight components at Refinery A: three duplicates of components (A-901, A-1050, and A-1730) sampled by the third-party contractor and six others. The Air District did not sample components at any other refinery apart from Refinery A.

Sampling occurred at the petroleum refineries over 99 days between January 2017 and November 2018.

Table III-42. Months and Years in Which Screening and Sampling Occurred

Petroleum Refinery	Study Months	
	Screening	Sampling
A	November 2016 through February 2017	January through March 2017
B	June 2017, July 2017, March 2018	July 2017, April 2018, May 2018
C	February 2018, March 2018, May 2018	May through July 2018
D	February and March 2018	March 2018, April 2018, November 2018
E	April and May 2018	August through November 2018

Components were sampled as soon as two days after screening and as long as 308 days after screening. The average number of days between screening and sampling was 100 days with a median of 80 days.

Except for five components at Refinery C, all sampled components were selected from components that were included in the field screening portion of the Study.

The five components at Refinery C that were identified outside of the field screening were:

- Sample C043: Tank Farm connector (plug) handling tar with a pre-bag leak of 41 ppmv,
- Sample C045: Tank Farm connector (tube fitting) handling tar with a pre-bag leak of 41 ppmv,
- Sample C047: Tank Farm agitator seal handling diesel with a pre-bag leak of 15 ppmv,
- Sample C049: Tank Farm connector (tubing) handling tar with a pre-bag leak of 230 ppmv, and
- Sample C054: Hydrocracker connector (threaded) handling hot oil with a pre-bag leak of 12 ppmv.

The components were identified by Refinery C personnel. It is not known how these components were identified by the refinery personnel.

III.iii.1. Field Observations

Sampling personnel identified numerous items that impacted sampling and/or may have had an impact on sampling results:

- High component temperatures melted physical tags that were affixed during field screening. In some cases, Mylar used for sampling was melted and a tin foil bag was used. In others, aluminum foil and/or high temperature tape was used to seal hot or irregular surfaces.

- Because of high component temperatures, some selected components could not be sampled. During sampling at Refinery B, the sampling team imposed an upper boundary (approximately 400 degrees Fahrenheit) on component external temperatures that could be sampled and stated that no components with temperatures above this this threshold could be sampled.
- Third-party sampling personnel created small holes in tent enclosures to “vent bag” to reduce off-scale vacuum. In these cases, either ambient air was pulled into the tent and through the sampling media or component leakage was emitted out of the tent. This impacted 39 samples (approximately 23 percent of the samples).
- Liquid samples (condensate) were collected from 11 samples where liquids formed in the bag and/or sample line. However, there were instances where liquid could not be collected. Component B-2040 had dripping product from a pump seal but because the pump was oriented vertically, a sample could not be collected. While sampling component A-1050, an oily sheen was formed in the bag but there was insufficient amount to collect or measure. The Mylar tent material itself was not shipped for laboratory analysis. For two samples collected by the Air District (component A-22 and component A-39), condensate was collected for both primary and replicate samples. However, because the components had pre-existing material on the surface of each component, it could not be determined whether the collected condensate was from the leak or liquefying of the surface material, so the collected condensate mass was not included with the sorbent tube results.
- Samples were sent for off-site laboratory analyses in overnight deliveries. However, samples were sent in batches with up to 15 days elapsing from sampling date and shipping date.
- Several sample media were found to have cracked or broken tube caps either in the field or when received by the laboratory:
    - Sample A017A1 XAD tube was received broken although the tube media was able to be recovered.
    - Samples D03A2 (D-596), D04A2, and D023A1 (component D-979) were received by the laboratory with cracked caps.
    - Sample D034 (component D-596) A1 charcoal tube broke at the top.
    - Sample B015 (component B-1314) charcoal tube A2 broke at the end.
    - After sampling of Sample B036 (component B-1099), the sampling team could not find caps for the tubes and temporarily wrapped tubing ends in Teflon tape.
- Field conditions during sampling varied. For example, while sampling of component C-20067-P, there was welding approximately 36 feet upwind of the pump. Sampling of component A-1742 was approximately 8 feet way from work being performed on an open sewer line and excavated pavement. Component D-1149 could not be sampled because of inaccessibility due to scaffolding erected between the time of field screening and sampling.
- Some components had material at or near the leak interface that interfered with sampling:
    - Component 1083 had accumulated solidified material that prevented a proper seal for tenting. Sampling personnel used a wire brush to scrape scaling on the sides of flanges for better adhesion of sealing materials.

- Sample D050 (component D-1367) had heavy buildup that was cleaned.

- Operations varied during field screening and sampling. In some cases, sampling personnel requested process unit operators to operate differently for the purposes of sampling. For example, for sample C018 (component C-20402.2), sampling personnel asked operators to turn on a closed loop.

- Tricord sampling pump flow rate limitations increased required sampling times. After Refinery A, Tricord sampling personnel requested to remove the XAD tubes to increase sampling times. This reduced the number of sampling tubes from three (one XAD tube, two charcoal tubes) to two (two charcoal tubes). The reduction in sampling tubes may have increased the likelihood of breakthrough. Breakthrough of the second tube of sample C004 (component C-20048) was indicated by the laboratory as likely occurring.

The following observations were also made:

- Leaking concentration measurements taken prior to sampling ("pre-bag" measurements) often varied significantly from those measured during field screening. The most significant difference was for sample C004 (component C-20048) where field screening measured a leak concentration of 5,482 ppmv and pre-bag screening measured 28,300 ppmv.
- Components not in operation still had emissions. For example, component C-20706 (sample C016) was a pump that was off, and sampling personnel were told by an operator that the pump had not be in operation for 15 years. Field screening measured a leak from this pump of 30 ppmv while pre-bag measured at background (net measurement equaled zero ppmv).

III.iii.2. Measurements

A total of 165 unique components at the five petroleum refineries were sampled. Samples at Refinery A were collected using a XAD tube in series with two coconut charcoal tubes while samples at the other refineries were collected using only two coconut charcoal tubes.

The distribution of samples and summary of average sample results by refinery is presented in Table III-43 and a histogram provided in Figure III.35.

Table III-43. Summary of Mass Emissions Sampling by Petroleum Refinery for Sorbent Tube Results

			Average Sample Emissions (2)	
Petroleum Refinery	Number of Samples (1)	Percentage of Total Samples (%)	Minimum (kg/hour)	Maximum (kg/hour)
A	25	15	1.72E-05	3.66E-03
B	30	18	1.17E-06	1.62E-03
C	28	17	1.19E-06	1.38E-02
D	40	24	1.16E-06	2.30E-02
E	42	26	1.13E-06	4.01E-03
Total	**165**	**100**	**1.13E-06**	**2.30E-02**

Notes:
1. Only includes number of unique component samples and does not include number of samples taken for quality control purposes (duplicate, background, spike, and trip).
2. Average of primary and replicate sample results

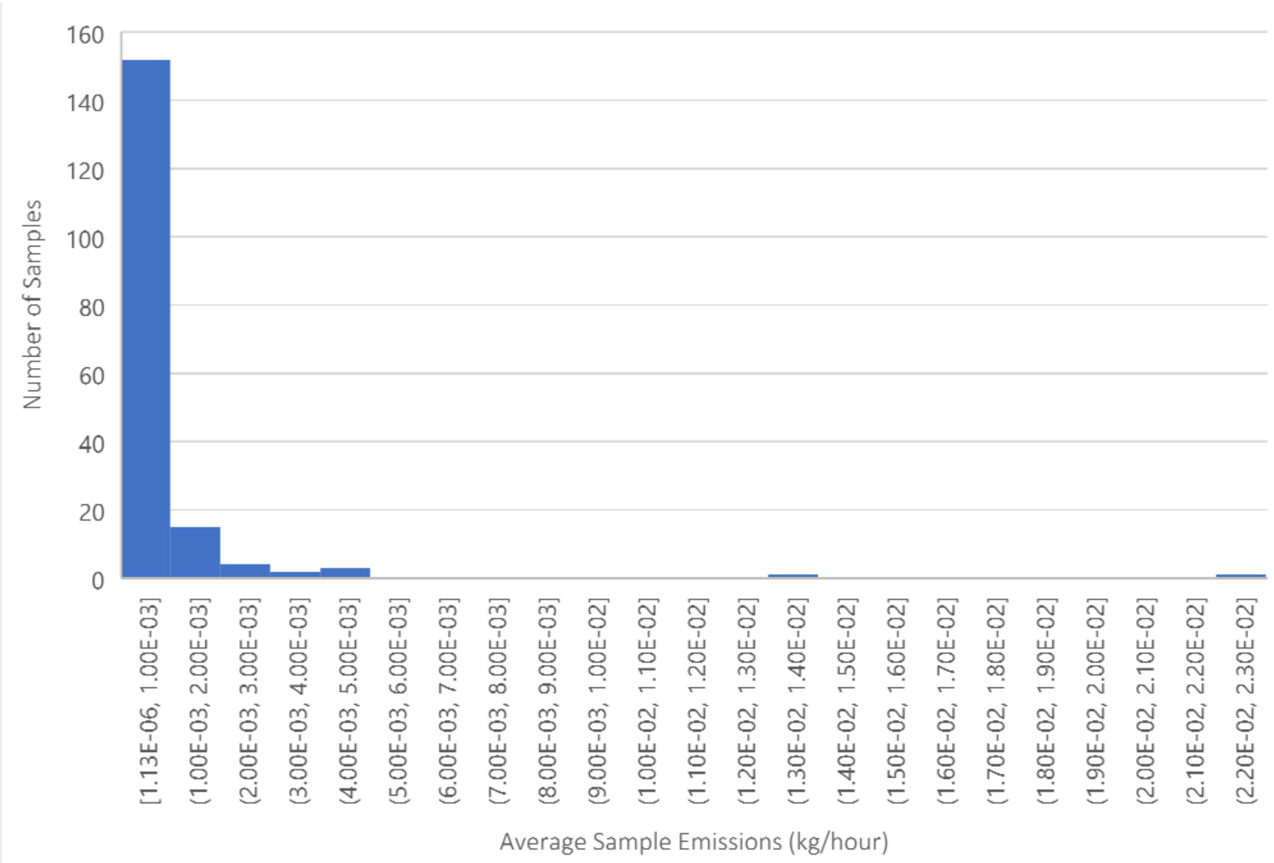


Figure III.35. *Histogram of Mass Emissions Sampling Results for Sorbent Tubes*

III.iii.2.1. Sampling for Lighter Compounds

Since the sorbent tubes were only analyzed for C_5 to C_{24} compounds and were not suited for lower carbon compounds, evacuated canister samples were collected in addition to sorbent tube samples for four components at Refinery A: components, A-22, A-39, A-902, and A-1083. Canister samples were not collected at any other refinery.

For these samples, EPA Method 18 was used to identify and quantify methane while EPA Method TO-14A was used to identify the presence and quantities of the following C_2 to C_6 compounds:

- Ethylene (C_2H_4)
- Acetylene (C_2H_2)
- Ethane (C_2H_6)
- Propylene (C_3H_6)
- Propane (C_3H_8)
- Isobutane (C_4H_{10})
- 1-Butene (C_4H_8)
- Butane (C_4H_{10})
- trans-2-Butene (C_4H_8)
- cis-2-Butene (C_4H_8)
- Isopentane (C_5H_{12})
- 1-Pentene (C_5H_{10})
- Pentane (C_5H_{12})
- Isoprene (C_5H_8)
- trans-2-Pentene (C_5H_{10})
- cis-2-Pentene (C_5H_{10})
- 2,2-Dimethylbutane
- Cyclopentane (C_5H_{10})
- 2,3-Dimethylbutane (C_6H_{14})
- 2-Methylpentane (C_6H_{14})
- 3-Methylpentane (C_6H_{14})
- 1-Hexene (C_6H_{12})
- Hexane (C_6H_{14})
- Methylcyclopentane (C_6H_{12})
- Benzene (C_6H_6)
- Cyclohexane (C_6H_{12})

In addition, EPA Method TO-15 was used to identify and quantify the following compounds:

- Propylene
- Freon 12
- Freon 14
- Chloromethane
- Chloroethene (Vinyl chloride)
- 1,3-Butadiene
- Bromomethane
- Chloroethane
- Bromoethene (Vinyl bromide)
- Freon 11
- Ethanol
- Acrolein
- Freon 113
- 1,1-Dichloroethene
- Acetone
- Carbon disulfide
- Isopropyl Alcohol
- Allyl chloride (3-chloropropene)
- Acetonitrile
- Hexane
- 1,1-Dichloroethane
- Vinyl acetate
- cis-1,2-Dichloroethylene
- Methyl ethyl ketone (2-Butanone)
- Ethyl acetate
- Chloroform
- Tetrahydrofuran
- 1,1,1-Trichloroethane
- Cyclohexane
- Carbon tetrachloride
- Benzene
- 2,2,4-trimethylpentane
- 1,2-Dichloroethane
- Heptane
- Trichloroethene
- 1,2-Dichloropropane
- Methyl methacrylate
- 1,4-Dioxane
- Bromodichloromethane
- cis-1,3-Dichloropropene
- Methyl isobutyl ketone
- Toluene
- trans-1,3-Dichlorpropene
- 1,1,2-Trichloroethane
- Tetrachloroethene
- 2-Hexanone (Methyl butyl ketone)

The four components were in two different process units: a fluidized catalytic cracking unit (A-022, A-039) and a hydrotreater (A-0901, A-1083).

They handled different stream materials: recycled gas oil (A-022), light gas oil / heavy gas oil (A-039), diesel (A-0901), and fractionator bottoms (A-1083).

Each had different pre-bag screening measurements: 1,600.0 ppmv (A-022), 332.8 ppmv (A-039), 493.3 ppmv (A-0901), and 17.6 ppmv (A-1083).

Sample results for the four components by collection device (canister or sorbent tube) and test method (TO-14A, TO-15, EPA Method 18) are presented in Table III-44.

Table III-44. Total Emission Rates Measured by Sample Collection Method and Method

Sample	Total Emission Rates (kg/hour)			
	Canister TO-14A / Method 18 (1) C_1 to C_6 Compounds	Canister TO-15 C_1 to C_{10} Compounds	Primary Sorbent Tube Method 18 C_5 to C_{30} Compounds	Replicate Sorbent Tube Method 18 C_5 to C_{30} Compounds
A-022	4.30E-07	3.22E-06	2.68E-04	1.39E-04
A-039	2.50E-08	3.33E-06	1.85E-04	2.54E-04
A-901	1.23E-07	2.01E-07	1.40E-04	1.21E-04
A-1083	7.60E-08	1.53E-07	4.63E-05	8.57E-06

Note:
1. EPA Method 18 used for detecting and measuring methane

Sample results by collection method and by grouping pollutants by carbon number are plotted for sample concentrations (Figure III.36, Figure III.38, Figure III.40, Figure III.42) and by emission rate (Figure III.37, Figure III.39, Figure III.41, Figure III.43).

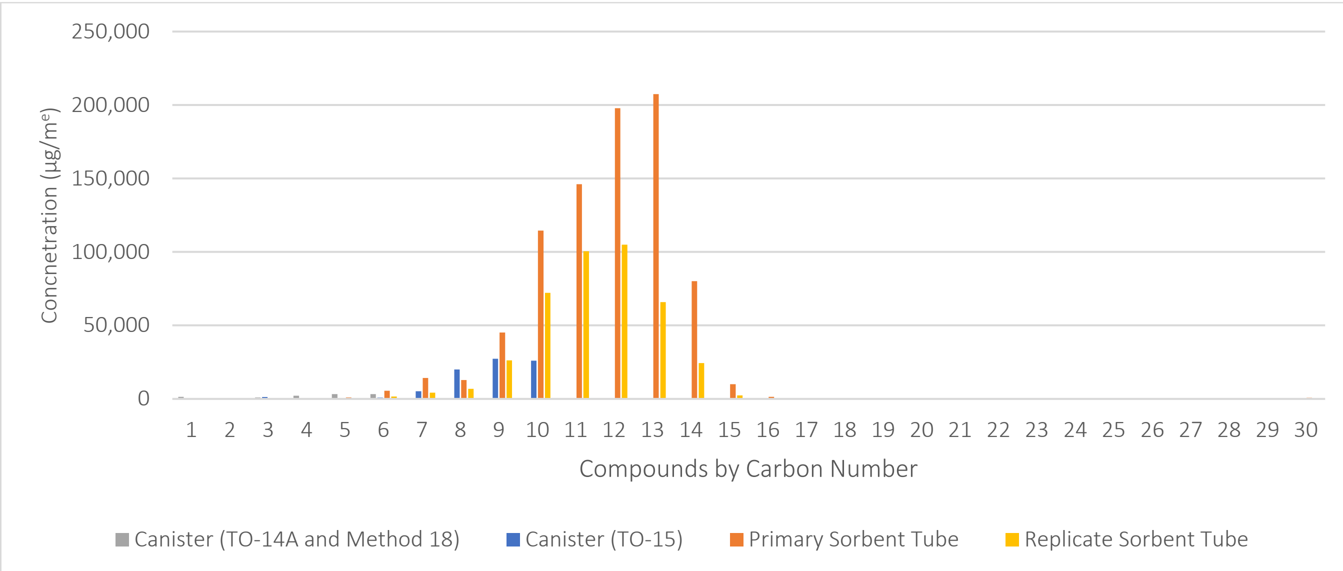


Figure III.36. Canister and Sorbent Tube Concentration Results for Sample A-22

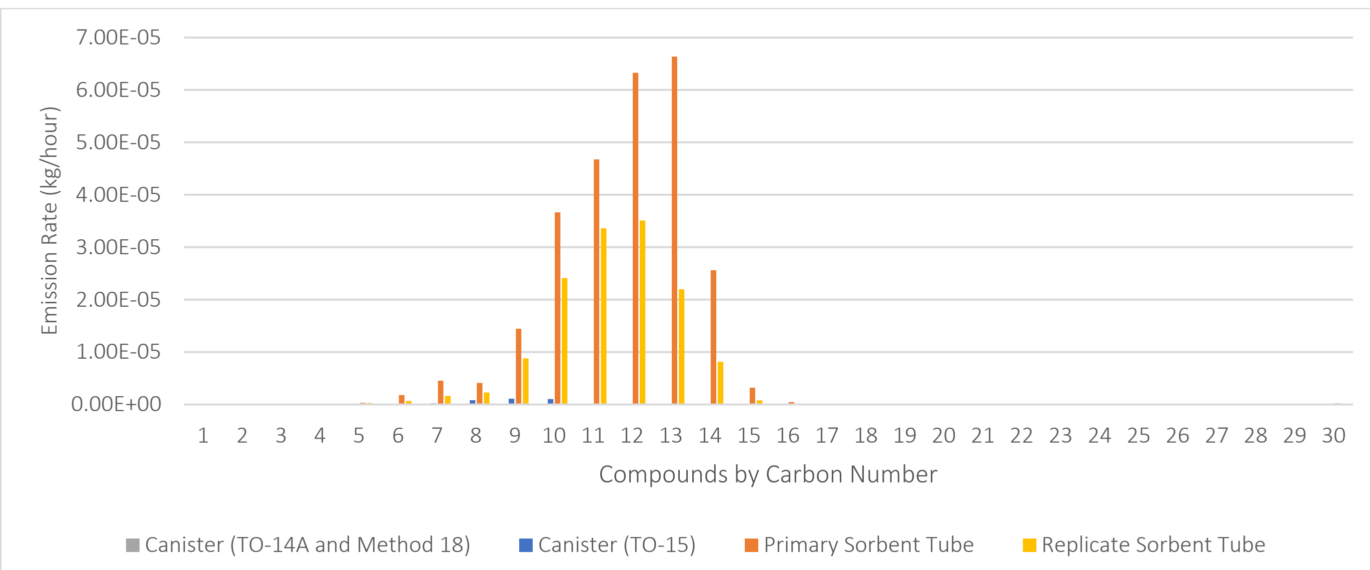


Figure III.37. Canister and Sorbent Tube Emission Results for Sample A-22

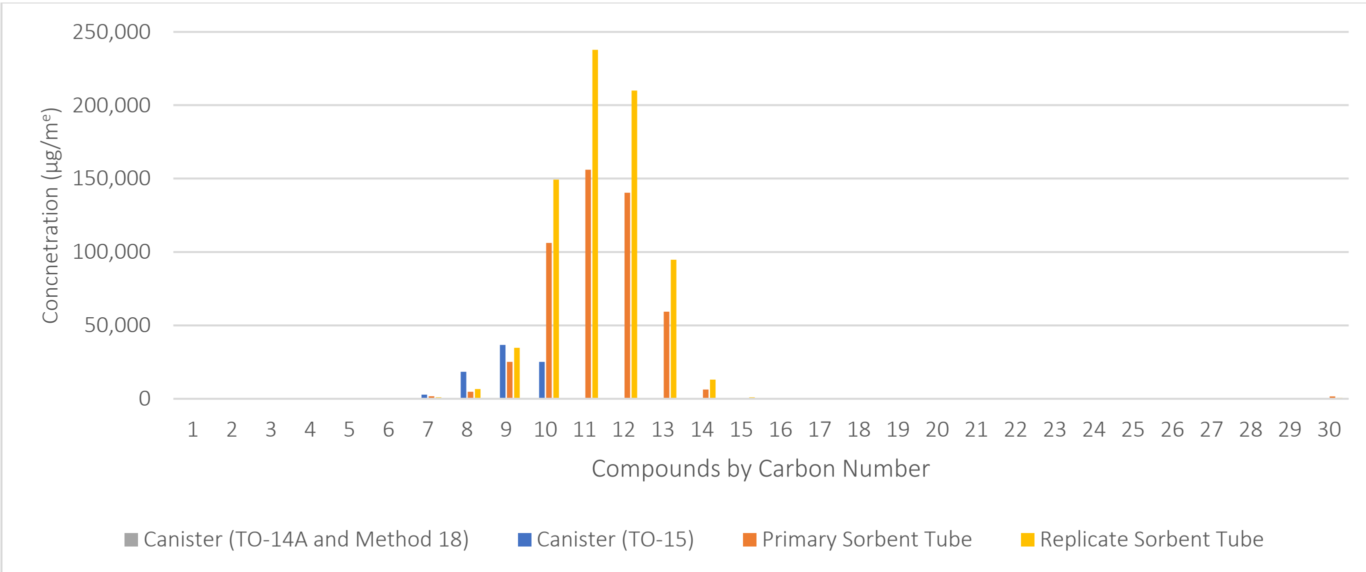


Figure III.38. Canister and Sorbent Tube Concentration Results for Sample A-39

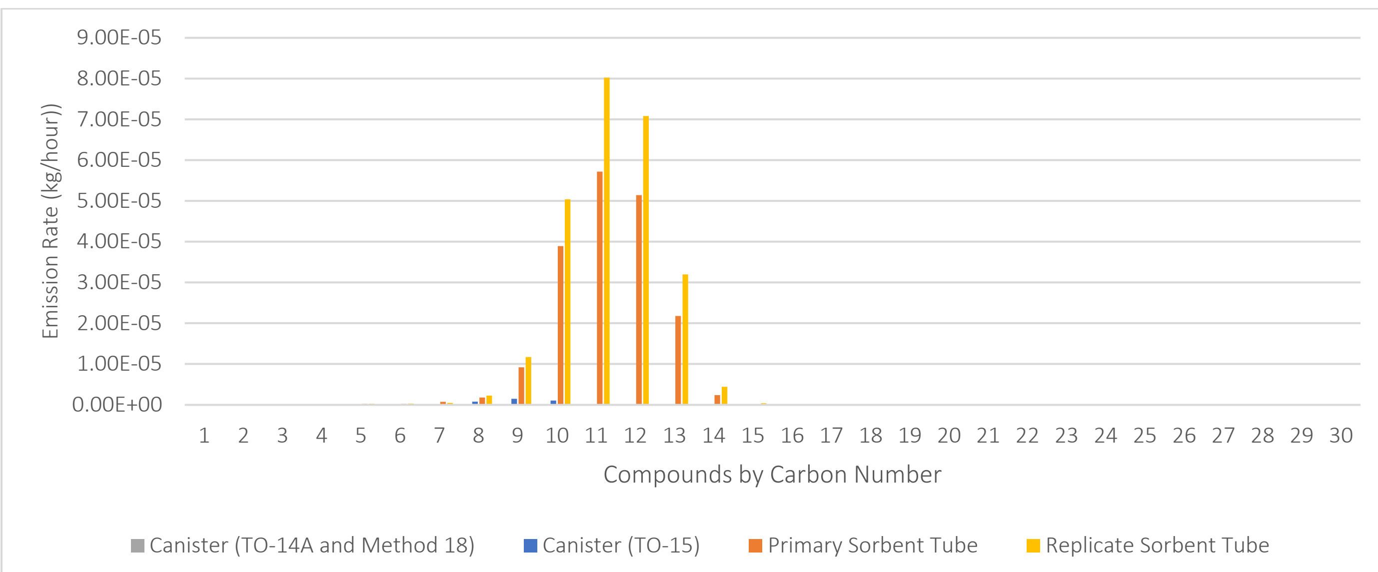


Figure III.39. Canister and Sorbent Tube Emission Results for Sample A-39

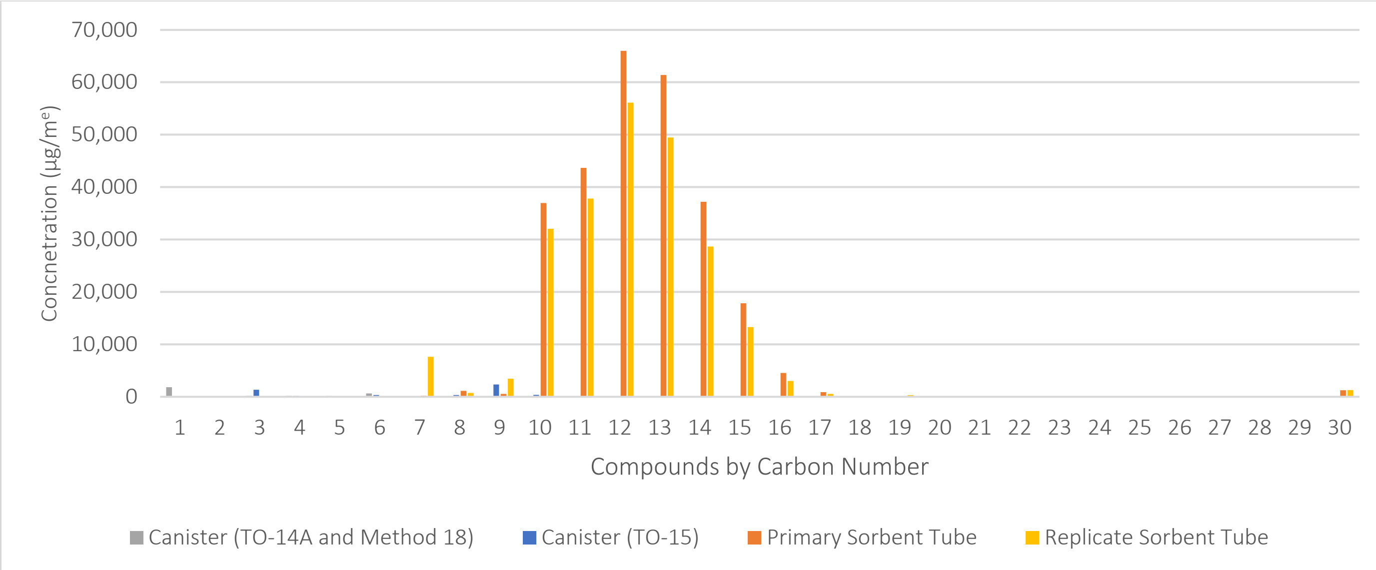


Figure III.40. Canister and Sorbent Tube Concentration Results for Sample A-901

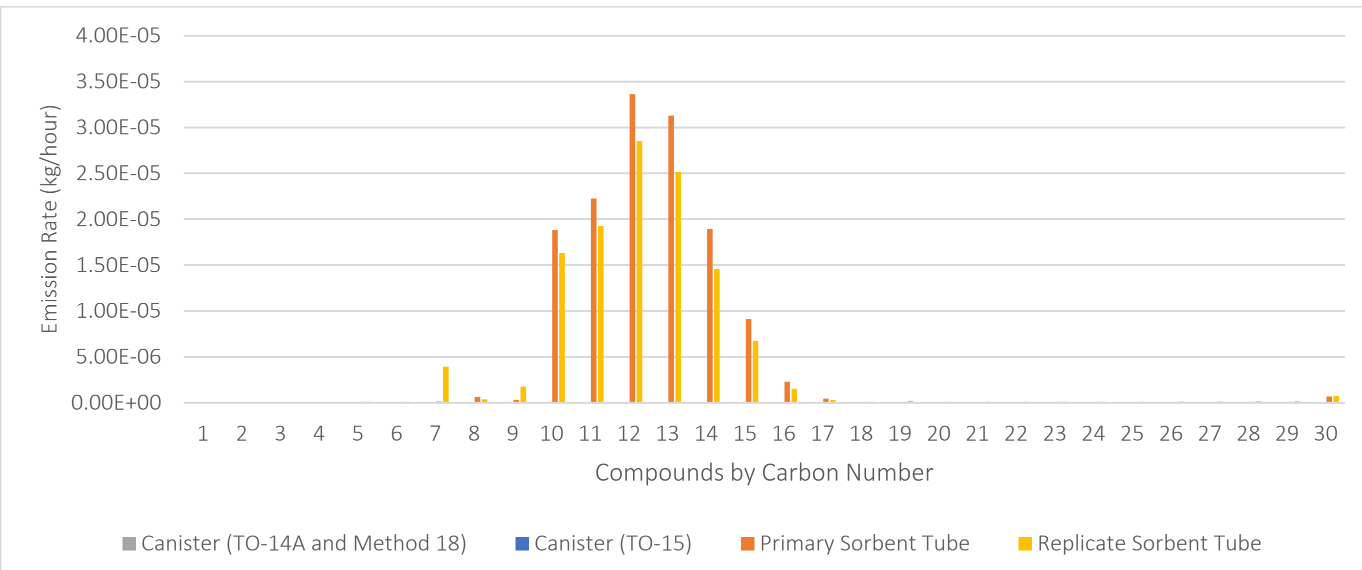


Figure III.41. Canister and Sorbent Tube Emission Results for Sample A-901

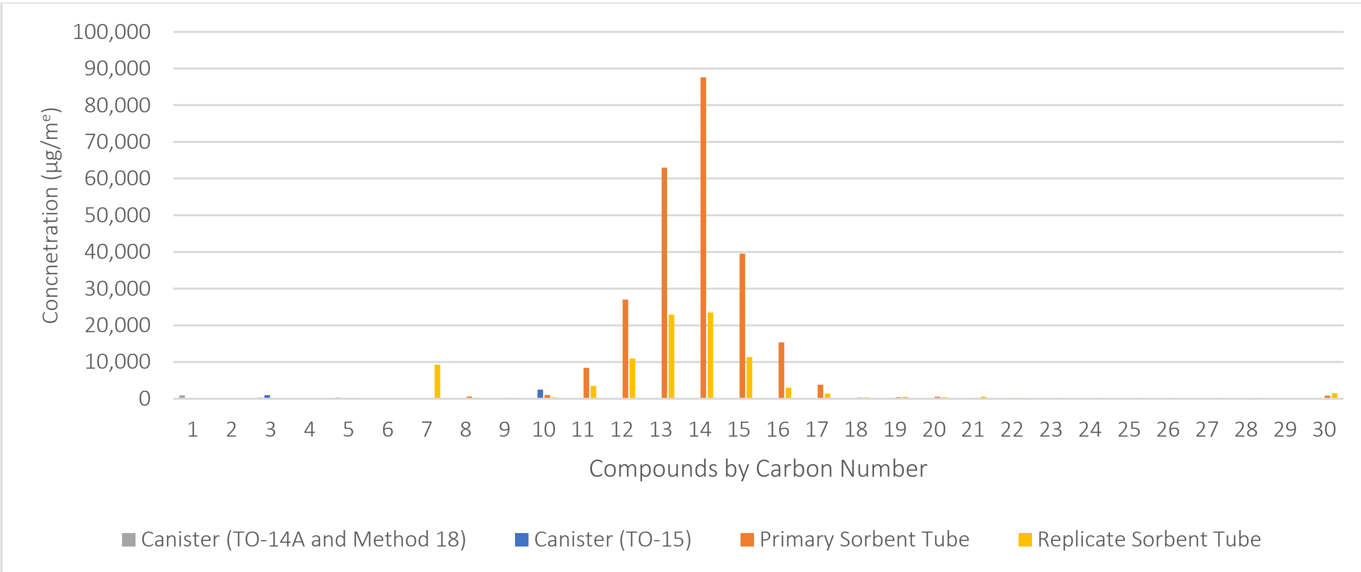


Figure III.42. Canister and Sorbent Tube Concentration Results for Sample A-1083

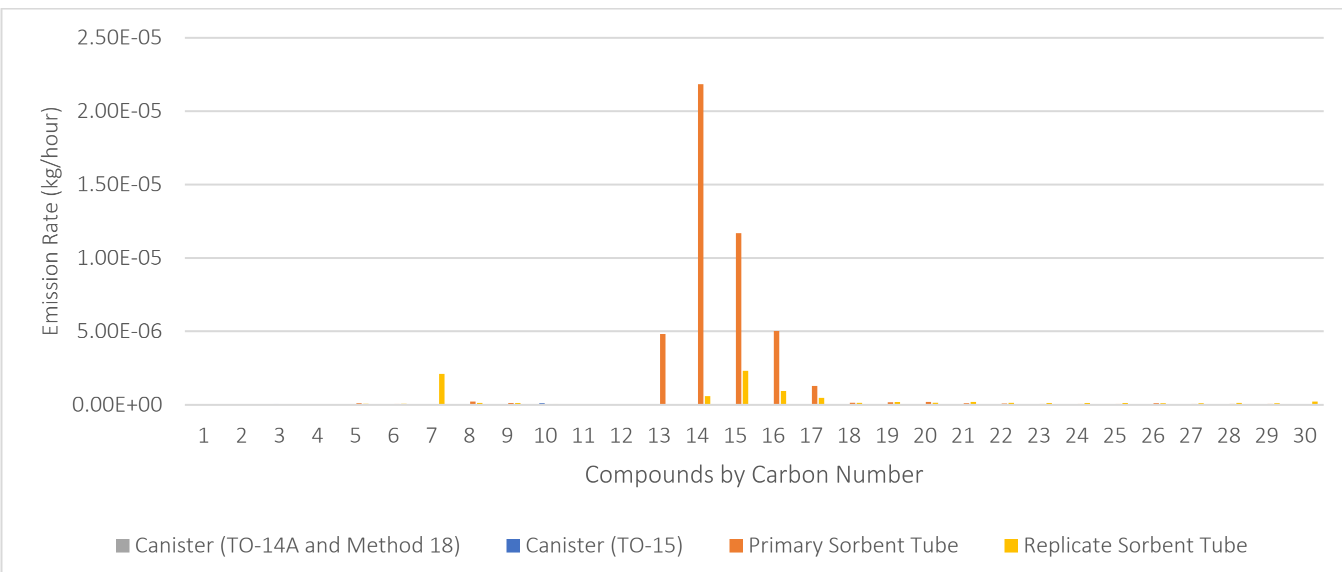


Figure III.43. Canister and Sorbent Tube Emission Results for Sample A-1083

Canister sample results from the four components are not included in any of the subsequent sections on sample results.

III.iii.2.2. Process Units

Not all process units that had components screened had components sampled. Some general process units / areas are not represented. Of the components that were screened by general process unit / area, the number of components sampled varied. Hydrotreating process units were sampled the most by total number while blending and tank farms were sampled the most by percentage of components screened (see Table III-45).

Table III-45. Number of Components Sampled by General Process Unit / Area Category

General Process Unit / Area Category	Number of Components Screened	Number of Components Sampled	Sampled (%)
Aromatic Saturation	8	1	13
Asphalt Plant	71	2	3
Blending / Tank Farm	8	2	25
Catalytic Cracking	875	10	1
Catalytic Reformer	2	0	0
Coker	1,450	5	0.3
Crude Unit	1,123	8	1
Crude Unit / Coker	159	2	1
Fuel Gas Treatment	53	0	0
Gas Recovery	22	0	0
Hydrocracker	1,074	38	4
Hydrogen Production	32	0	0
Hydrotreater	4,464	72	2
Hydrotreater and Hydrocracker	834	0	0
Isomerization	1	0	0
Marine Terminal	10	0	0
Other	25	2	8
Polymerization	11	0	0
Reformulation	17	1	6
Separation	9	0	0
Solvent Deasphalting	26	0	0
Sulfur Recovery	114	1	1
Tank Farm	433	21	5
Utilities	2	0	0
Total	10,823	165	1.5

The distribution of total mass emissions from all samples by general process unit / area also varied as shown in Table III-46 and Figure III.46.

Table III-46. Distribution of Total Hydrocarbon Emissions from Sampled Sources by Process Unit / Area Category

General Process Unit / Area Category	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
Aromatic Saturation	1	0.6	1.89E-06	0.002
Asphalt Plant	2	1.2	5.21E-06	0.01
Blending / Tank Farm	2	1.2	4.37E-05	0.04
Catalytic Cracking	10	6.1	5.07E-03	5.1
Catalytic Reformer	0	0	0	0
Coker	5	3.0	4.60E-05	0.05
Crude Unit	8	4.8	7.15E-03	7.2
Crude Unit / Coker	2	1.2	1.57E-05	0.02
Fuel Gas Treatment	0	0	0	0
Gas Recovery	0	0	0	0
Hydrocracker	38	23.0	1.83E-02	18.3
Hydrogen Production	0	0	0	0
Hydrotreater	72	43.6	6.71E-02	67.1
Hydrotreater and Hydrocracker	0	0	0	0
Isomerization	0	0	0	0
Marine Terminal	0	0	0	0
Other	2	1.2	9.33E-04	0.9
Polymerization	0	0	0	0
Reformulation	1	0.6	6.68E-04	0.7
Separation	0	0	0	0
Solvent Deasphalting	0	0	0	0
Sulfur Recovery	1	0.6	1.71E-06	0.002
Tank Farm	21	12.7	5.86E-04	0.6
Utilities	0	0	0	0
Total	**165**	**100**	**9.99E-02**	**100**

Notes:

1. Does not include results of duplicate samples. For components that had repeated samples, only the first sample results are included.

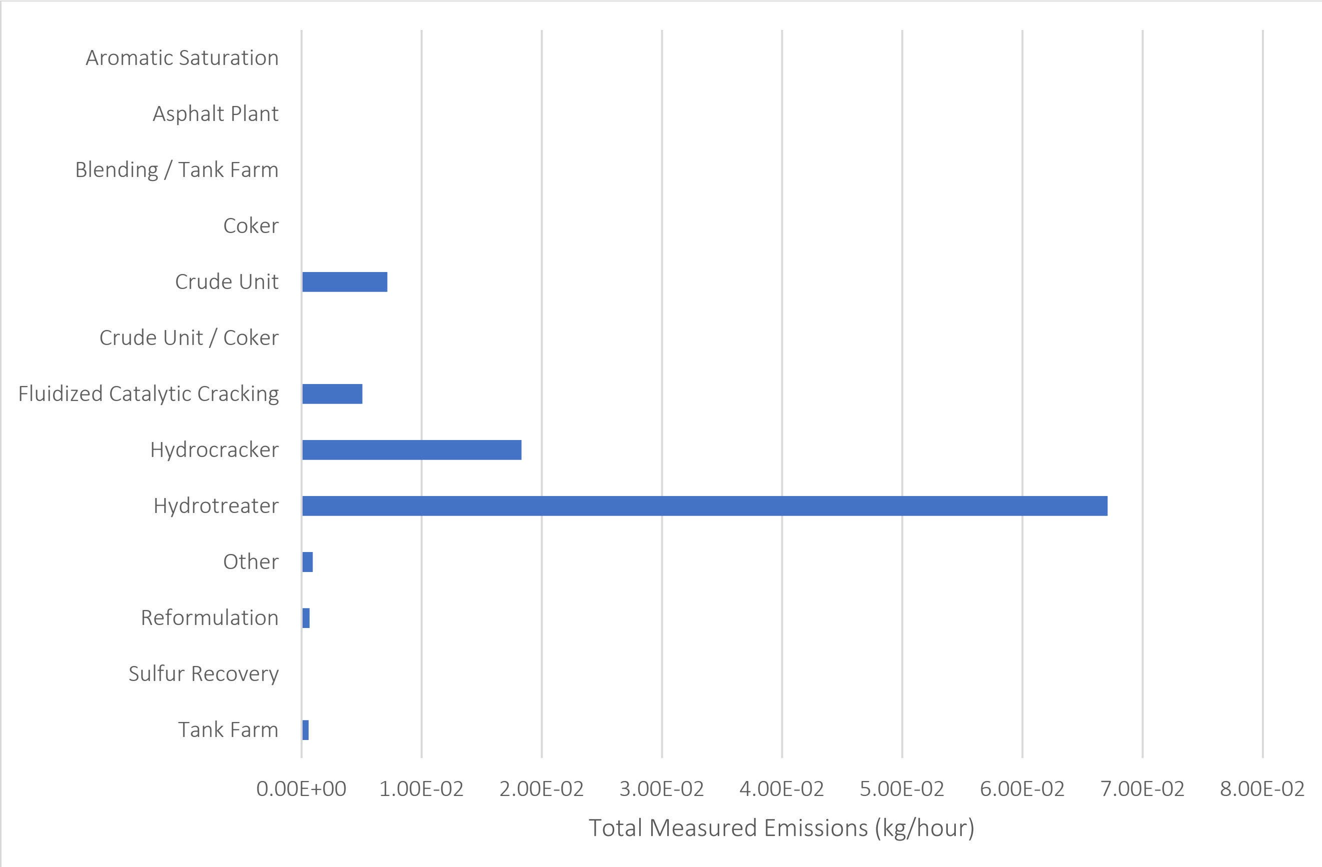


Figure III.44. Total Measured Emissions from All Samples by General Process Unit / Area

As shown in Table III-46 and Figure III.44, components within hydrotreaters comprised most of the sampled components (43.6 percent) and of sampled emissions (67.1 percent).

III.iii.2.3. Component Types and Subtypes

Of the total samples, pump seals, connectors, and valves represented approximately 19 percent, 37 percent, and 44 percent, respectively. The distribution of samples and total measured emissions by component type are provided in **Table III-47** and **Table III-48**.

Table III-47*. Number of Samples by Component Type*

Component Type	Number Screened	Number Sampled	Sampled (%)
Pump Seals	734	32 [(1)]	4
Connectors	4,710	61	1
Valves	5,349	72	1
Pressure Relief Devices	30	0	0
Total	**10,823**	**165**	**1.5**

Note:
1. Includes one sample of a storage tank agitator seal leak.

Table III-48*. Distribution of Total Hydrocarbon Emissions from Sampled Sources by Component Type*

	Sampled Sources [(1)] within Range			Total Measured Emissions within Range	
Emission Rate (kg/hour)	Number Sampled	% of Sampled Sources	% of Total Screened	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
Pump Seals					
> 0.01	1	3	0.1	0.0230	65.8
0.001 - 0.01	3	9	0.4	0.0085	24.3
0.0001 - 0.001	6	19	0.8	0.0026	9.2
0.00001 - 0.0001	7	22	1.0	0.0002	0.6
0.000001 - 0.00001	15	47	2.0	0.00005	0.1
Total	**32**	**100**	**4.4**	**0.0344**	**100**
Connectors					
> 0.01	0	0	0	0	0
0.001 - 0.01	5	8	0.1	0.0073	56.6
0.0001 - 0.001	12	20	0.3	0.0037	37.3
0.00001 - 0.0001	20	33	0.4	0.0007	5.4
0.000001 - 0.00001	24	39	0.5	0.0001	0.7
Total	**61**	**100**	**1.3**	**0.0118**	**100**
Valves					
> 0.01	1	1	0.02	0.0138	25.6
0.001 - 0.01	14	19	0.3	0.0321	59.8
0.0001 - 0.001	19	26	0.4	0.0070	13.0
0.00001 - 0.0001	19	26	0.4	0.0008	1.5
0.000001 - 0.00001	19	26	0.4	0.0001	0.1
Total	**72**	**100**	**1.3**	**0.0537**	**100**

Note:
1. Does not include results of duplicate samples. For components that had repeated samples, only the first sample results are included.

The distribution of samples by component subtype are provided in Table III-49.

Table III-49. Number of Samples by Component Subtype

Component Type	General Component Subtype	Screened	Sampled [1]	Sampled (%)
Pump Seals	All	734	32 [2]	4
Connectors	Coupling	13	1	8
	Elbow	52	1	2
	End Cap	12	1	8
	Flange	1,499	9	1
	Gate	15	0	0
	Hatch	13	1	8
	Manway	9	0	0
	Other	3	0	0
	Plug	1,354	23	2
	Pressure Gauge	19	1	5
	Pump Housing	319	4	1
	Reducer	10	0	0
	Sight Glass	4	0	0
	Tee	40	0	0
	Threaded Connector	412	11	3
	Union	95	5	5
	Unknown	840	4 [3]	0.5
Valves	Ball Valve	98	0	0
	Bellow Seal Valve	29	0	0
	Butterfly Valve	2	0	0
	Check Valve	51	0	0
	Control Valve	228	6	3
	Elbow	1	0	0
	Gate Valve	4,247	59	1
	Globe Valve	143	5	3
	Hex Valve	1	0	0
	Needle Valve	228	0	0
	Orbit Valve	1	0	0
	Plug	6	1	17
	Regulator	3	0	0
	Safety Valve	14	0	0
	Unknown	298	1	0
Pressure Relief Devices	Pressure Relief Valve	6	0	0
	Rupture Disc	1	0	0
	Safety Valve	9	0 [2]	0
	Unknown	14	0	0
Total		**10,823**	**165**	**1.5**

Notes:
1. Does not include results of duplicate samples. For components that had repeated samples, only the first sample results are included.
2. Includes one sample of a storage tank agitator seal leak.
3. Two pressure safety valves were sampled. Both pressure safety valves did not have an opening to atmosphere and sample enclosure included connection at flange. These samples were classified as connectors.

Measured sample emissions by component subtype are listed in Table III-50.

Because pressure relief valves were not sampled and the subtypes for pumps was unknown, only connectors and valves are listed in the table.

Table III-50. Distribution of Total Hydrocarbon Emissions from Sampled Sources by Component Subtype

Component Type	General Component Subtype	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
Connectors	Coupling	1	2	2.08E-06	0.02
	Elbow	1	2	3.96E-05	0.3
	End Cap	1	2	2.50E-06	0.02
	Flange	9	15	2.38E-03	20.1
	Gate	0	0	0	0
	Hatch	1	2	1.30E-04	1.1
	Manway	0	0	0	0
	Other	0	0	0	0
	Plug	23	38	1.57E-03	13.2
	Pressure Gauge	1	2	7.38E-06	0.1
	Pump Housing	4	7	2.35E-03	19.9
	Reducer	0	0	0	0
	Sight Glass	0	0	0	0
	Tee	0	0	0	0
	Threaded Connector	11	18	2.21E-03	18.7
	Union	5	8	1.53E-03	12.9
	Unknown	4 (2)	7	1.61E-03	13.6
	Total	**61**	**100**	**1.18E-02**	**100**
Valves	Ball Valve	0	0	0	0
	Bellow Seal Valve	0	0	0	0
	Butterfly Valve	0	0	0	0
	Check Valve	0	0	0	0
	Control Valve	6	8	4.14E-04	0.8
	Elbow	0	0	0	0
	Gate Valve	59	82	5.12E-02	95.3
	Globe Valve	5	7	1.58E-03	2.9
	Hex Valve	0	0	0	0
	Needle Valve	0	0	0	0
	Orbit Valve	0	0	0	0
	Plug	1	1	4.63E-04	0.9
	Regulator	0	0	0	0
	Safety Valve	0	0	0	0
	Unknown	1	1	9.30E-05	0.2
	Total	**72**	**100**	**5.37E-02**	**100**

III.iii.2.4. Process Stream Materials

Most components sampled (approximately 73 percent) handled one of three general stream materials: diesel, gas oil, or jet fuel as outlined in Table III-45 and Table III-51.

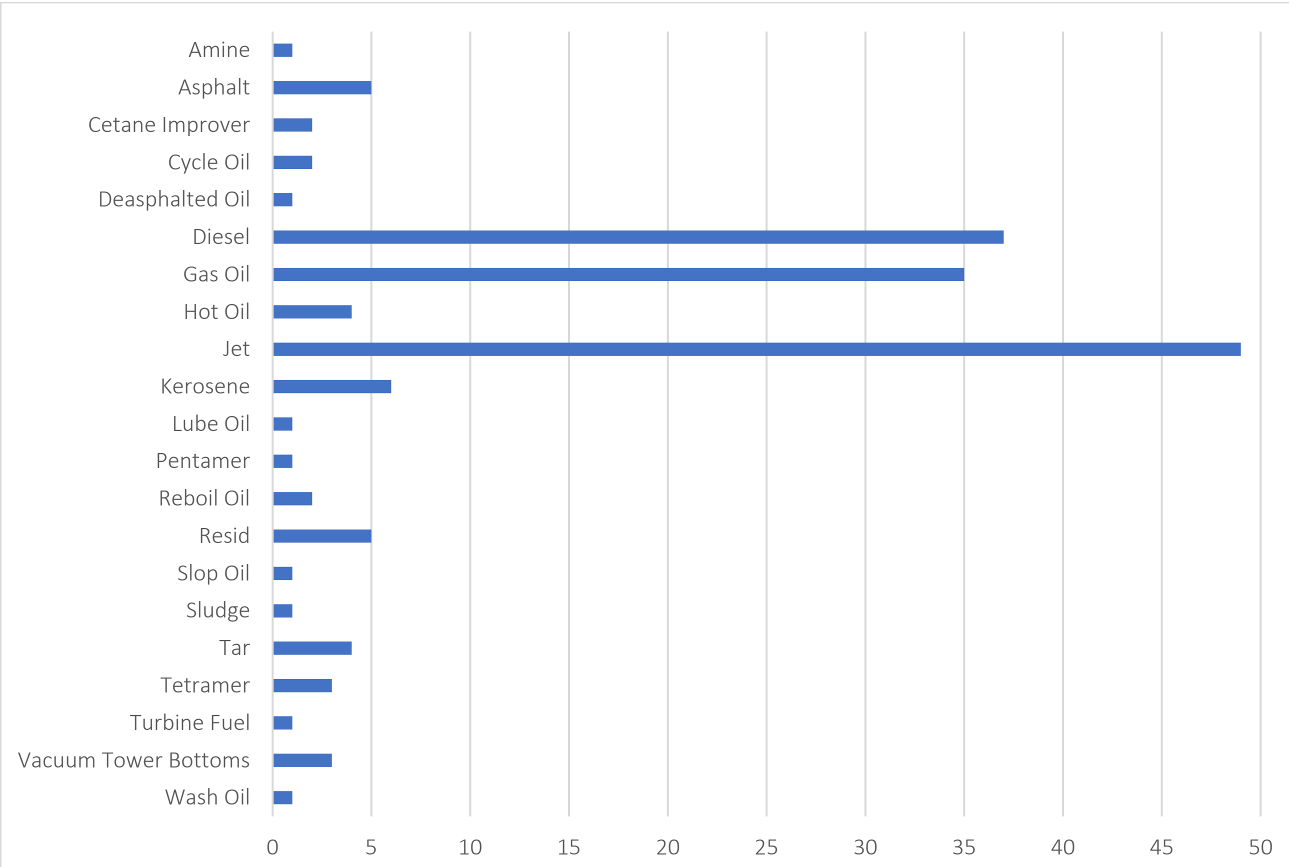


Figure III.45. Count of Mass Emission Samples by General Process Stream Material

Total measured sample emissions by general process material are shown in Table III-51 and Figure III.46.

Table III-51. *Distribution of Total Hydrocarbon Emissions from Sampled Components by General Stream Material*

Material	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
Amine	1	0.6	1.26E-06	0.001
Asphalt	5	3.0	1.38E-02	13.8
Cetane Improver	2	1.2	5.09E-06	0.01
Cycle Oil	2	1.2	7.61E-06	0.01
Deasphalted Oil	1	0.6	1.35E-06	0.001
Diesel	37	22.4	1.03E-02	10.4
Gas Oil	35	21.2	8.49E-03	8.5
Hot Oil	4	2.4	1.57E-05	0.02
Jet	49	29.7	6.23E-02	62.3
Kerosene	6	3.6	3.13E-03	3.1
Lube Oil	1	0.6	2.61E-06	0.003
Pentamer	1	0.6	8.17E-04	0.8
Reboil Oil	2	1.2	9.73E-05	0.1
Resid	5	3.0	7.26E-05	0.1
Slop Oil	1	0.6	7.05E-04	0.7
Sludge	1	0.6	1.79E-06	0.002
Tar	4	2.4	5.44E-05	0.1
Tetramer	3	1.8	1.22E-04	0.1
Turbine Fuel	1	0.6	1.89E-06	0.002
Vacuum Tower Bottoms	3	1.8	2.86E-05	0.03
Wash Oil	1	0.6	1.59E-06	0.002
Total	165	100	9.99E-02	100

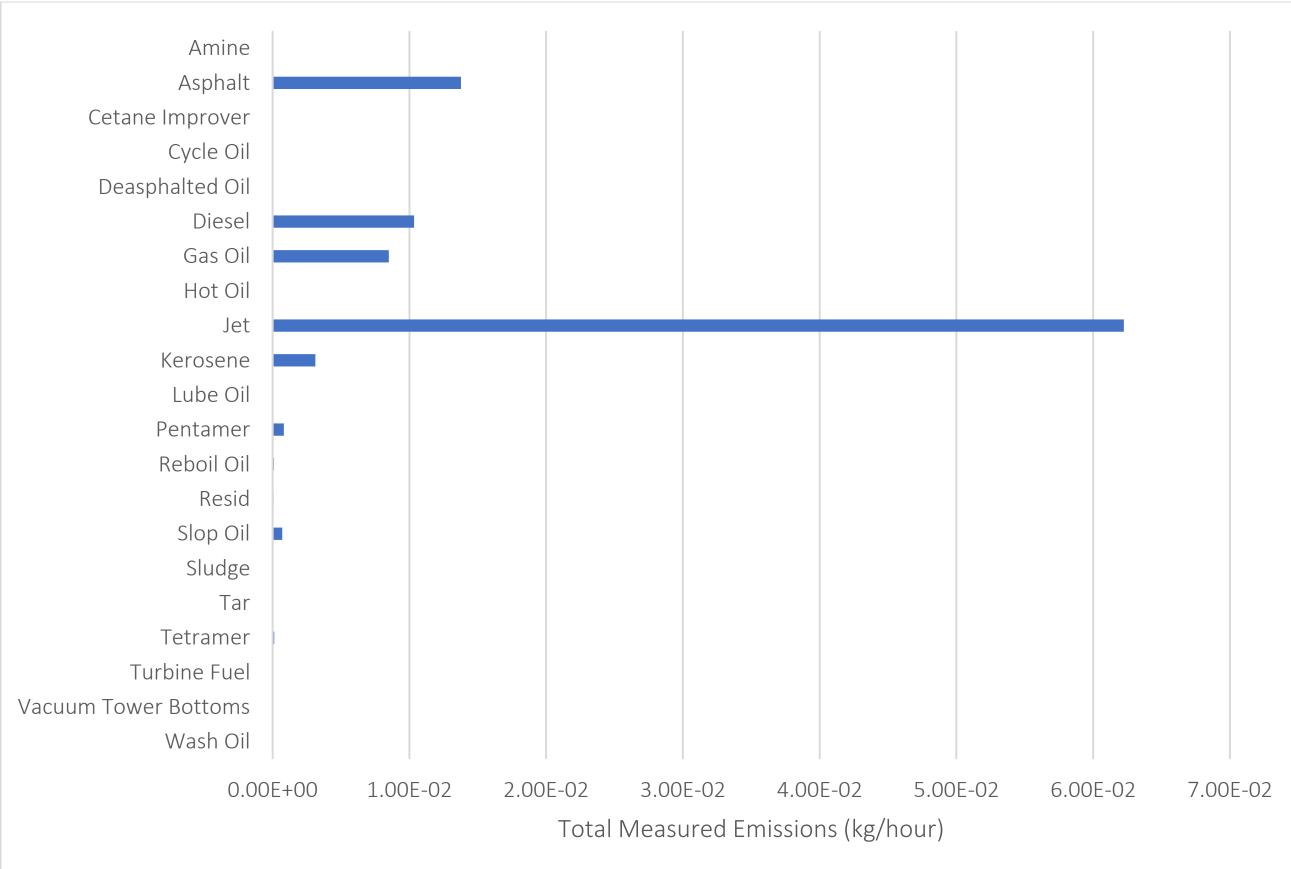


Figure III.46. Measured Total Hydrocarbon Emissions from All Samples by General Process Stream Material

III.iii.2.5. Other

Component Size

Like screening, most sampled components were equal to or less than one inch in diameter. Summary results by component size are supplied in the following figures and tables.

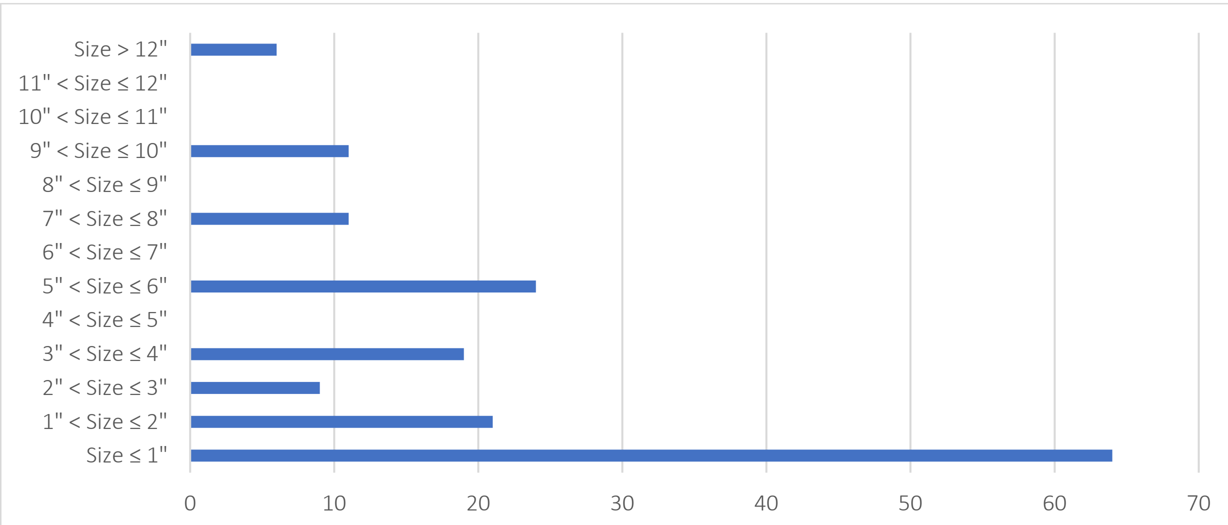


Figure III.47. *Count of Mass Emission Samples by Component Size (Process Line Diameter)*

Table III-52. *Number of Samples by Component Size (Process Line Diameter)*

Size (inches)	Number Screened	Number Sampled [1]	Sampled (%)
Size ≤ 1"	5,723	64	1.1
1" < Size ≤ 2"	1,420	21	1.5
2" < Size ≤ 3"	564	9	1.6
3" < Size ≤ 4"	748	19	2.5
4" < Size ≤ 5"	5	0	0
5" < Size ≤ 6"	842	24	2.9
6" < Size ≤ 7"	0	0	N/A
7" < Size ≤ 8"	430	11	2.6
8" < Size ≤ 9"	3	0	0
9" < Size ≤ 10"	289	11	3.8
10" < Size ≤ 11"	0	0	N/A
11" < Size ≤ 12"	119	0	0
Size > 12"	205	6	2.9
Unknown	475	0	0
Total	**10,823**	**165**	**1.5**

Note:

1. Does not include results of duplicate samples. For components that had repeated samples, only the first sample results are included.

Table III-53. Distribution of Total Hydrocarbon Emissions from Sampled Components by Component Size (Line Diameter)

Size (inches)	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
Size ≤ 1"	64	38.8	1.48E-02	14.8
1" < Size ≤ 2"	21	12.7	3.25E-02	32.5
2" < Size ≤ 3"	9	5.5	2.35E-03	2.4
3" < Size ≤ 4"	19	11.5	1.29E-02	12.9
4" < Size ≤ 5"	0	0	0	0
5" < Size ≤ 6"	24	14.5	1.94E-02	19.4
6" < Size ≤ 7"	0	0	0	0.0
7" < Size ≤ 8"	11	6.7	1.95E-03	2.0
8" < Size ≤ 9"	0	0	0	0.0
9" < Size ≤ 10"	11	6.7	1.51E-02	15.1
10" < Size ≤ 11"	0	0	0	0
11" < Size ≤ 12"	0	0	0	0
Size > 12"	6	3.6	8.91E-04	0.9
Unknown	0	0	1.48E-02	14.8
Total	**165**	**100**	**9.99E-02**	**100**

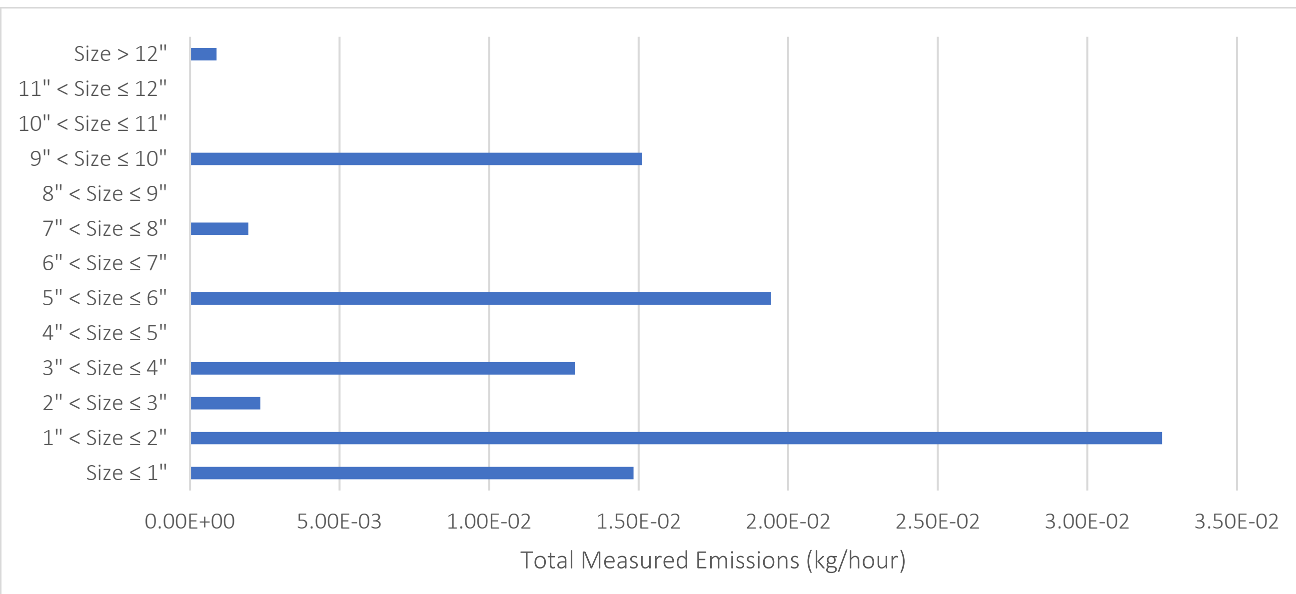


Figure III.48. Measured Total Hydrocarbon Emissions from All Samples by Component Size (Process Line Diameter)

Sample results by component size and type are shown in **Figure III.49**.

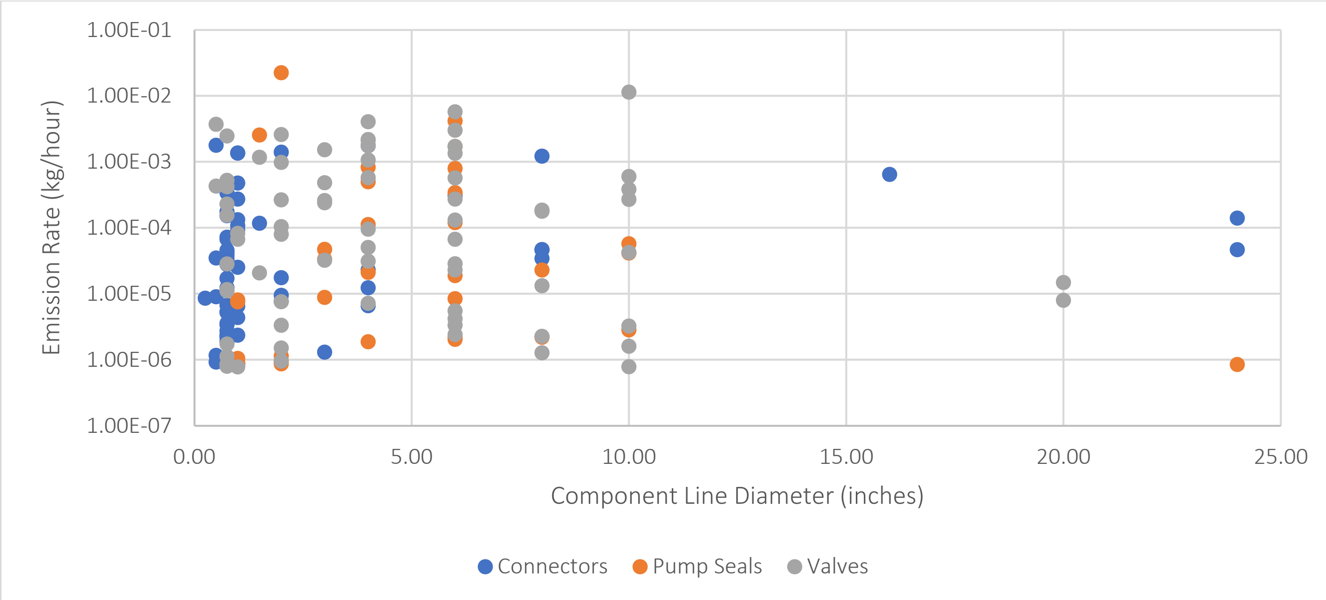


Figure III.49*. Primary Sample Results (logarithm scale) by Component Size (Process Line Diameter) and Component Type*

Component Operating Pressure

The operating pressure of sampled components varied from less than 5 psig to 2,200 psig. However, the operating pressure of approximately 28 percent of the samples is unknown (Figure III.50 and Table III-54). Total emissions from components with unknown operating pressure represented 17 percent of the total measured emissions from all samples (Table III-55 and Figure III.51).

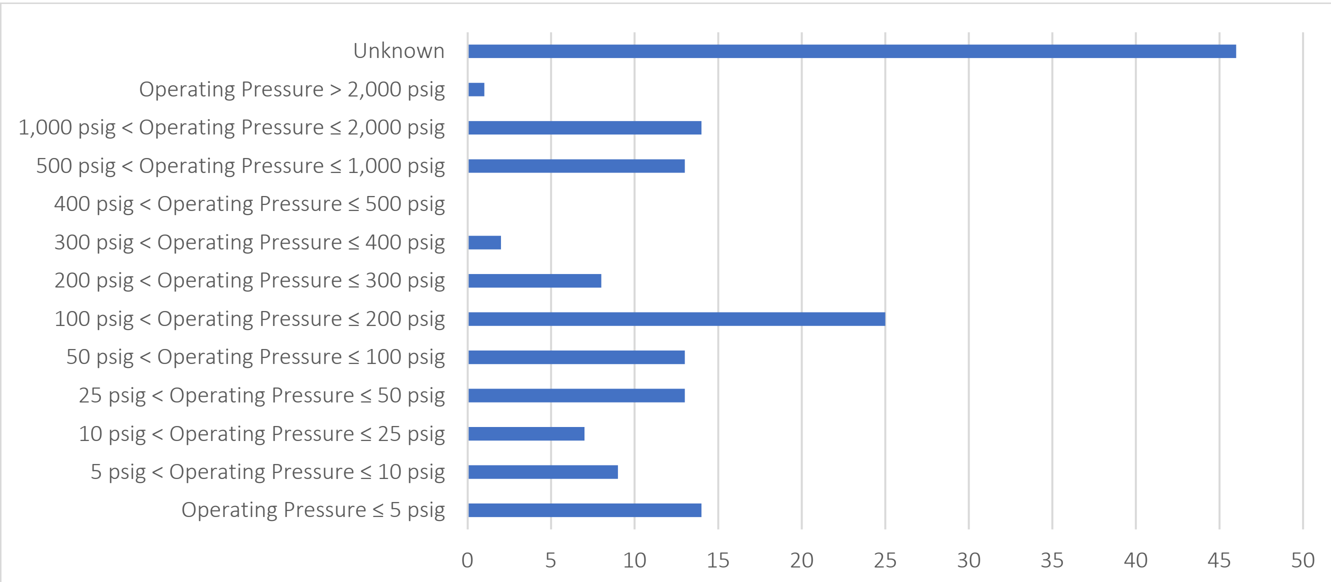


Figure III.50. Count of Mass Emission Samples by Component Operating Pressure

Table III-54. Number of Samples by Component Operating Pressure

Operating Pressure (psig)	Number Screened	Number Sampled [1]	Sampled (%)
Operating Pressure ≤ 5 psig	1,020	14	1.4
5 psig < Operating Pressure ≤ 10 psig	146	9	6.2
10 psig < Operating Pressure ≤ 25 psig	650	7	1.1
25 psig < Operating Pressure ≤ 50 psig	1,184	13	1.1
50 psig < Operating Pressure ≤ 100 psig	1,443	13	0.9
100 psig < Operating Pressure ≤ 200 psig	1,447	25	1.7
200 psig < Operating Pressure ≤ 300 psig	578	8	1.4
300 psig < Operating Pressure ≤ 400 psig	200	2	1.0
400 psig < Operating Pressure ≤ 500 psig	110	0	0
500 psig < Operating Pressure ≤ 1,000 psig	492	13	2.6
1,000 psig < Operating Pressure ≤ 2,000 psig	468	14	3.0
Operating Pressure > 2,000 psig	88	1	1.1
Unknown	2,997	46	1.5
Total	**10,823**	**165**	**1.5**

Note:
1. Does not include results of duplicate samples. For components that had repeated samples, only the first sample results are included.

Table III-55. Distribution of Total Hydrocarbon Emissions from Sampled Components by Component Operating Pressure

Operating Pressure (psig)	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
Operating Pressure ≤ 5 psig	14	8.5	1.24E-04	0.1
5 psig < Operating Pressure ≤ 10 psig	9	5.5	1.46E-02	14.6
10 psig < Operating Pressure ≤ 25 psig	7	4.2	4.32E-03	4.3
25 psig < Operating Pressure ≤ 50 psig	13	7.9	1.41E-03	1.4
50 psig < Operating Pressure ≤ 100 psig	13	7.9	1.48E-02	14.9
100 psig < Operating Pressure ≤ 200 psig	25	15.2	5.76E-03	5.8
200 psig < Operating Pressure ≤ 300 psig	8	4.8	2.14E-03	2.1
300 psig < Operating Pressure ≤ 400 psig	2	1.2	1.98E-05	0.02
400 psig < Operating Pressure ≤ 500 psig	0	0	0	0
500 psig < Operating Pressure ≤ 1,000 psig	13	7.9	3.21E-02	32.1
1,000 psig < Operating Pressure ≤ 2,000 psig	14	8.5	7.38E-03	7.4
Operating Pressure > 2,000 psig	1	0.6	1.13E-05	0.01
Unknown	46	27.9	1.72E-02	17.2
Total	165	100	9.99E-02	100

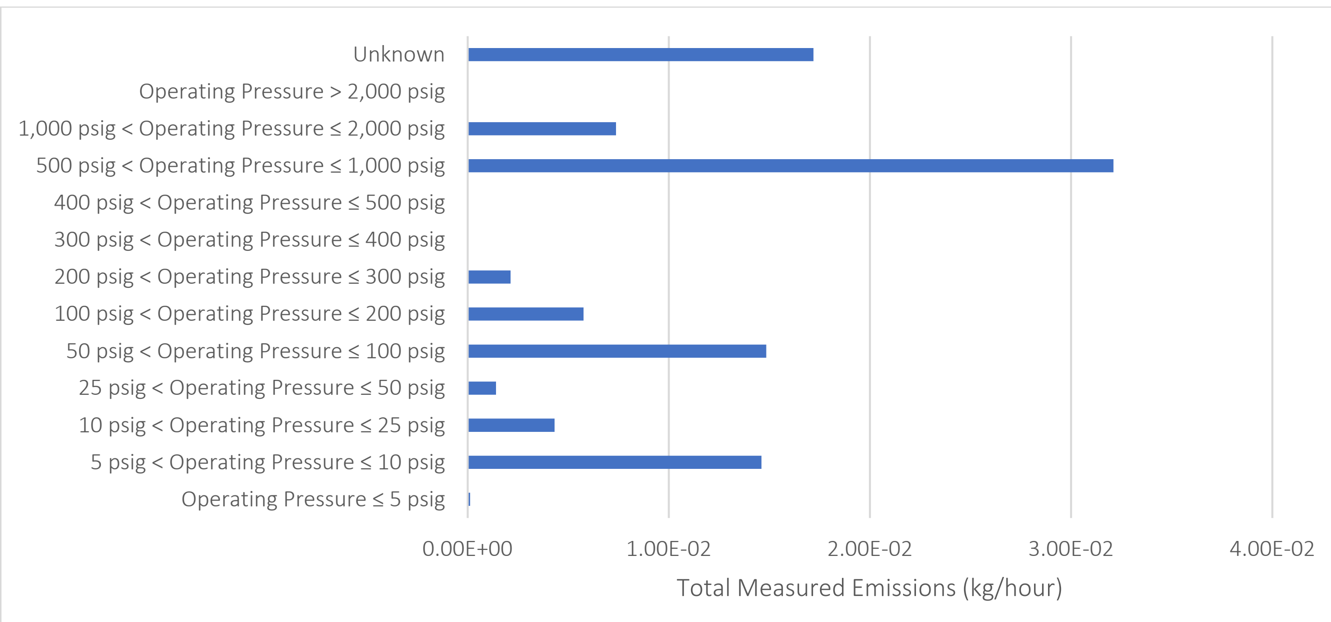


Figure III.51. Measured Total Hydrocarbon Emissions from All Samples by Component Operating Pressure

Primary sample results (on a logarithm scale) by component operating pressure and component type are shown in Figure III.52. Results from duplicate sampling of the same component are not provided.

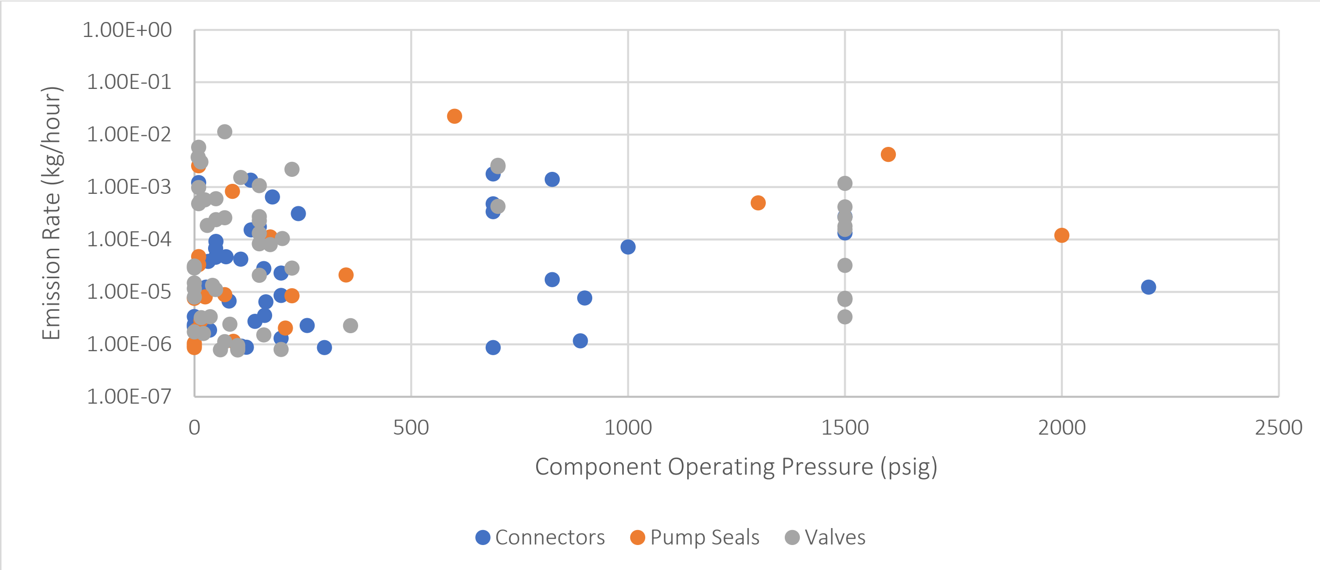


Figure III.52. Primary Sample Results (logarithm scale) by Component Operating Pressure and Component Type

Component External Temperature

Sampled components had external temperatures ranging from 48 degrees Fahrenheit to 540 degrees Fahrenheit. Most sampled components had external temperatures less than 100 degrees Fahrenheit. The external temperature of only one component (A-039) during sampling is unknown. A temperature was not recorded during either screening or sampling of the component.

The distribution of component samples and total measured emissions by external temperature categories (intervals of 100 degrees Fahrenheit) is provided in the following tables and figures.

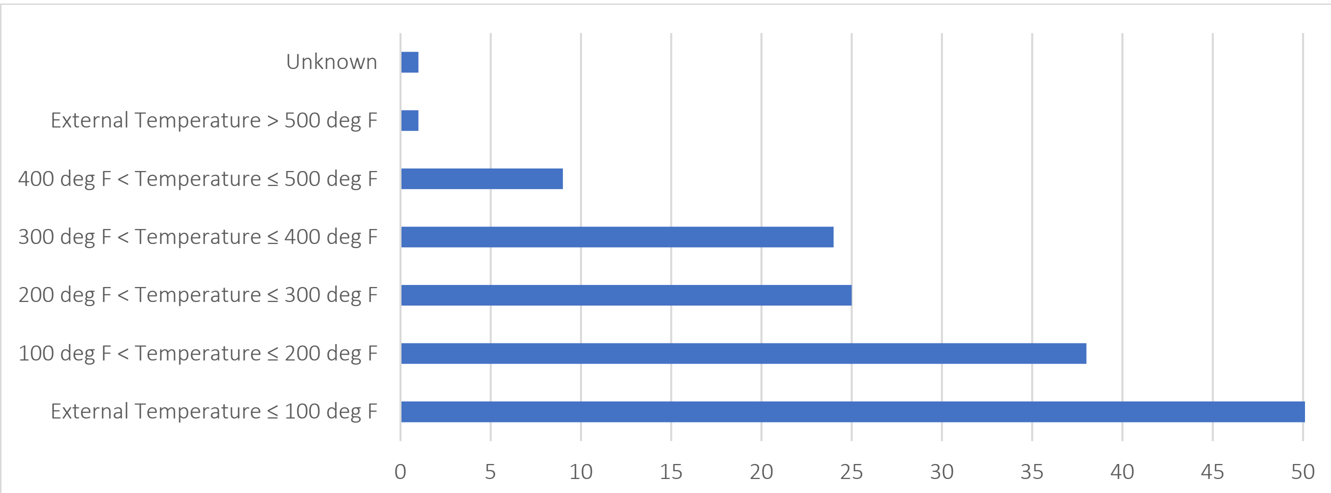


Figure III.53. *Count of Mass Emission Samples by Component External Temperature*

Table III-56. *Number of Samples by Component External Temperature*

External Temperature (Degrees Fahrenheit)	Number Screened	Number Sampled (1)	Sampled (%)
External Temperature ≤ 100 deg F	4,476	67	41.4
100 deg F < Temperature ≤ 200 deg F	2,941	38	27.2
200 deg F < Temperature ≤ 300 deg F	1,340	25	12.4
300 deg F < Temperature ≤ 400 deg F	1,016	24	9.4
400 deg F < Temperature ≤ 500 deg F	586	9	5.4
External Temperature > 500 deg F	253	1	2.3
Unknown	211	1	1.9
Total	**10,823**	**165**	**1.5**

Note:

1. Does not include results of duplicate samples. For components that had repeated samples, only the first sample results are included.

Table III-57. Distribution of Total Hydrocarbon Emissions from Sampled Sources by Component External Temperature

External Temperature (Degrees Fahrenheit)	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
External Temperature ≤ 100 deg F	67	40.6	1.05E-02	10.5
100 deg F < Temperature ≤ 200 deg F	38	23.0	8.81E-03	8.8
200 deg F < Temperature ≤ 300 deg F	25	15.2	4.71E-02	47.1
300 deg F < Temperature ≤ 400 deg F	24	14.5	2.45E-02	24.5
400 deg F < Temperature ≤ 500 deg F	9	5.5	8.86E-03	8.9
External Temperature > 500 deg F	1	0.6	2.74E-05	0.03
Unknown	1	0.6	2.19E-04	0.2
Total	165	100	9.99E-02	100

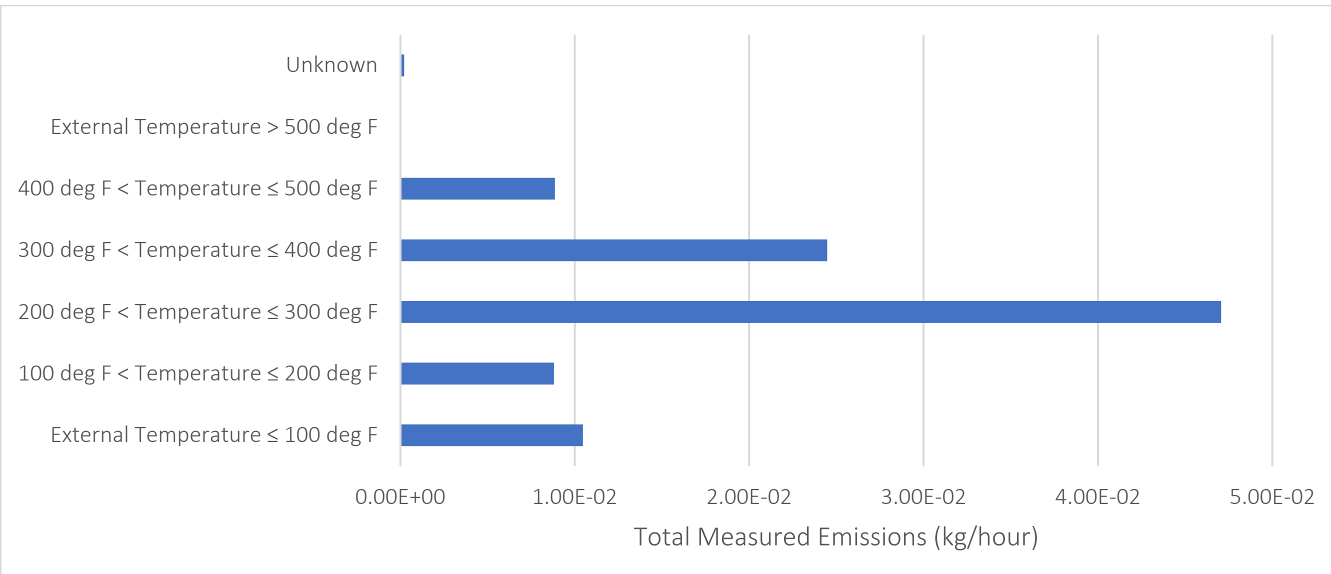


Figure III.54. Measured Total Hydrocarbon Emissions from All Samples by Component External Temperature

Measured emissions of primary samples by component type and component external temperature are shown in Figure III.55.

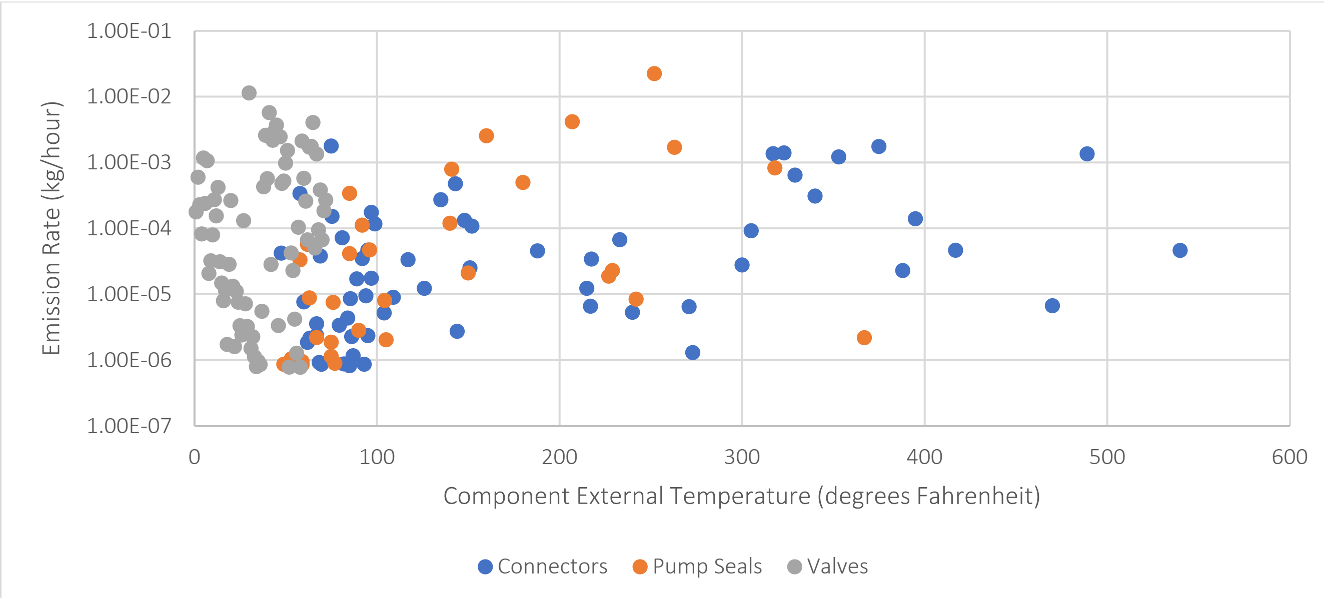


***Figure III.55**. Primary Sample Results (logarithm scale) by Component External Temperature and Component Type*

Component Vibration

Approximately 93 percent of sampled components were identified by screening field personnel as having low to no vibration (see Table III-55). Five components classified as having high vibration were sampled while the vibration amount of five other sampled components was unknown.

Table III-58. Distribution of Total Hydrocarbon Emissions from Sampled Sources by Component Vibration

Vibration Amount	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Emissions
None	74	44.8	3.61E-02	36.1
Low	80	48.5	6.31E-02	63.2
Medium	1	0.6	4.32E-06	0.004
High	5	3.0	6.06E-04	0.6
Unknown	5	3.0	5.76E-05	0.1
Total	**165**	**100**	**9.99E-02**	**100**

Total measured emissions from all samples by identified vibration amount is presented in Figure III.56.

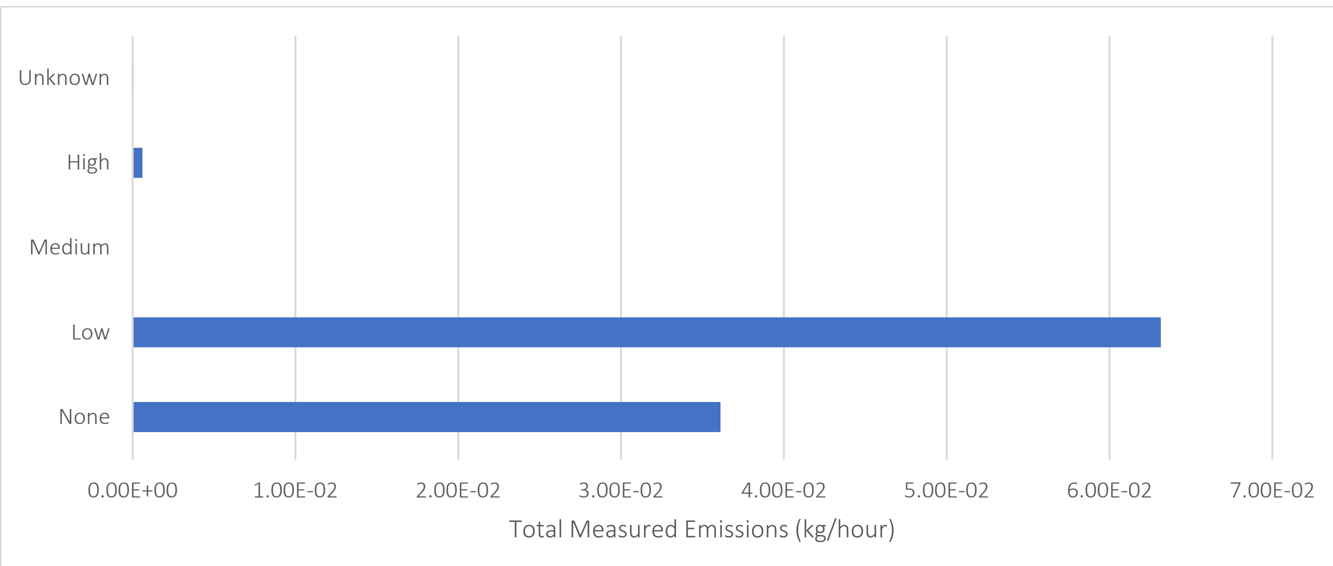


Figure III.56. Measured Total Hydrocarbon Emissions from All Samples by Component Vibration

Cyclic Vibration

Only eight components (representing 4.8 percent of all samples) categorized as undergoing cyclic vibration by screening field personnel were sampled. Most (80.6 percent) sampled components were identified as not undergoing cyclic vibration.

Summary counts and total emissions by cyclic vibration categorization are shown in Table III-59 and Figure III.57.

Table III-59. Distribution of Total Hydrocarbon Emissions from Sampled Sources by Cyclic Vibration

Cyclic Vibration	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Emissions
None	133	80.6	8.73E-02	87.4
Yes	8	4.8	7.71E-03	7.7
Unknown	24	14.5	4.88E-03	4.9
Total	**165**	**100**	**9.99E-02**	**100**

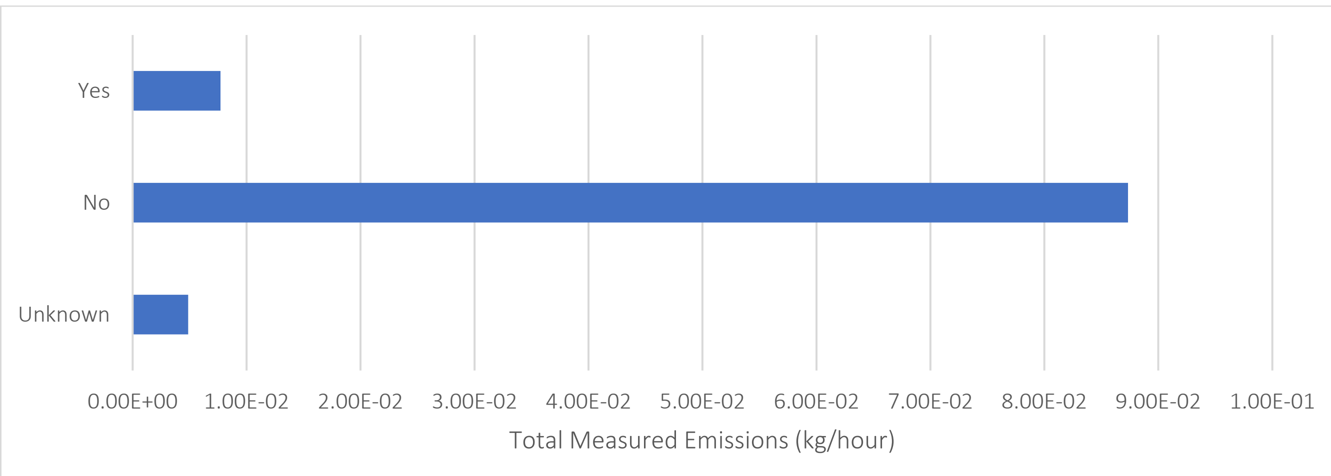


Figure III.57. Measured Total Hydrocarbon Emissions from All Samples by Cyclic Vibration

Component Location / Elevation

The general component location (ground, platform, top of column, or other) for five sampled components was not known. These were the five components (Samples C043, C045, C047, C049, and C054) that were not included in the field screening portion of the Study but were identified by Refinery C personnel for sampling. Four of the five were in a tank farm so were likely at ground level. The fifth component was in a hydrocracker and could have been in any of the four general locations.

The number of sampled components as well as the total measured mass emissions by general location category are provided in Table III-60 and **Figure III.58**.

Table III-60. Distribution of Total Hydrocarbon Emissions from Sampled Components by Component Location (Elevation)

Component Location	Sampled	Sampled (%)	Total Emissions (kg/hour)	% of Total Emissions
Ground	131	79.4	7.72E-01	71.9
Platform	23	13.9	2.01E-01	21.4
Top of Column	4	2.4	2.54E-02	5.5
Other	2	1.2	6.79E-04	0.7
Unknown	5	3.0	5.77E-04	0.5
Total	**165**	**100**	**9.99E-02**	**100**

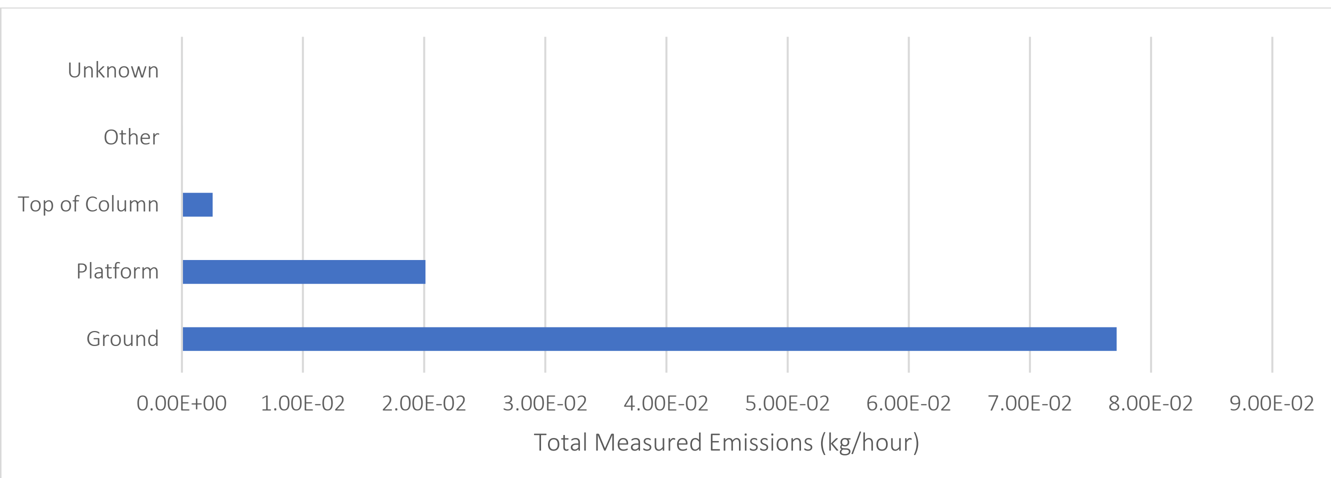


***Figure III.58**. Measured Total Hydrocarbon Emissions from All Samples by Component Location (Elevation)*

Screening Value

Measured emissions varied directionally by screening value as shown in Figure III.59 where results of primary samples by screening net measurement (where background concentration measurement is subtracted from a component's pre-bag maximum screening value) and component type is presented.

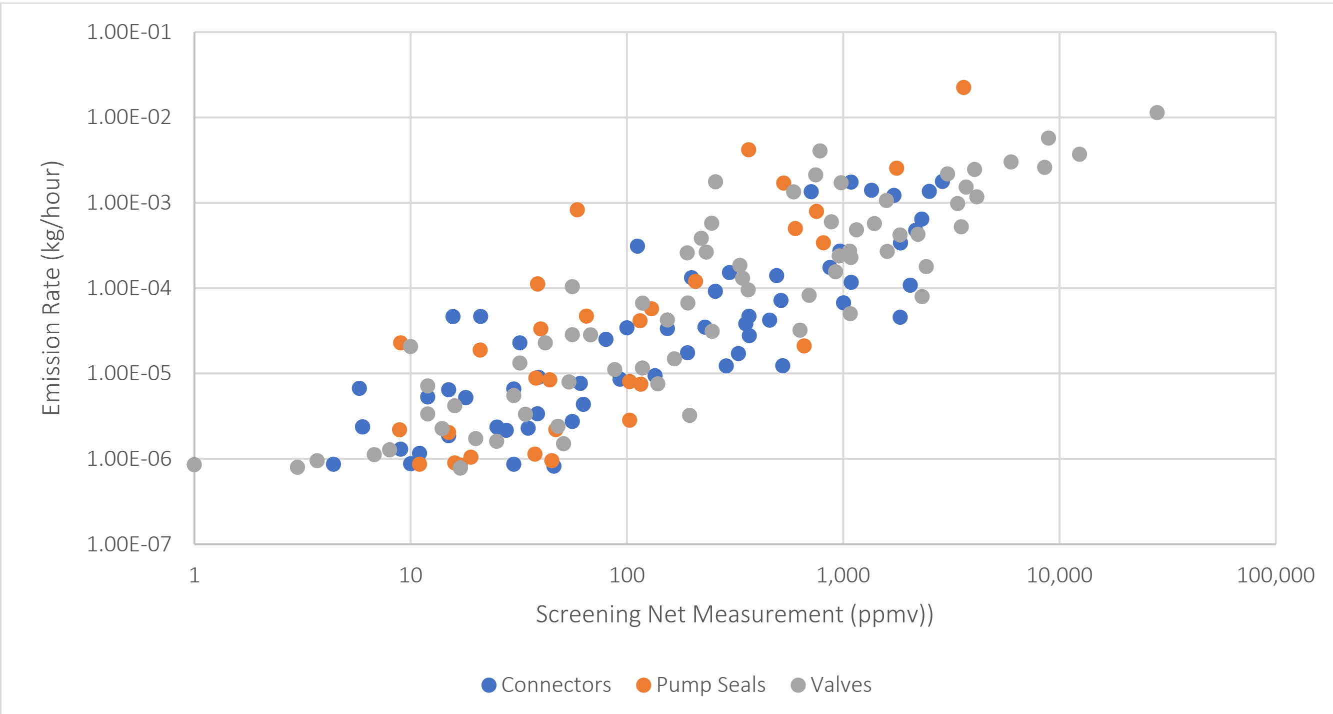


Figure III.59. *Primary Sample Results (logarithm scale) by Screening Net Measurement (logarithm scale) and Component Type*

iv. Emission Estimates of Both Sampled and Non-Sampled Components

Over 10,000 components were screened for equipment leaks while only 165 components had mass emissions measured. Therefore, it was necessary to derive a method for estimating emissions from non-sampled components.

In addition, because sampling of selected components occurred later than field screening (with as many as 308 days elapsing between screening and sampling), components that were sampled may have had different emissions at the time of sampling than at the time of screening due to process, operational, or other changes.

Most of the field screening data that was collected included the petroleum refinery, process unit, process unit sub-area, component type, component subtype, stream material, component size, external temperatures of the components, component operating pressure, component elevation in addition to leak concentration measurements.

III.iv.1. Regression Analysis

From the sampled (bagged) data, a relationship between two or more covariates may be modeled using regression analysis to estimate mass emissions from components that were screened but not sampled.

Information collected during field screening and sampling was analyzed to develop an equation for estimating emissions from screening data. A detailed description of the statistical analysis is provided in Appendix D-1.

From this analysis, linear equations were developed for predicting mass emissions. As with previous studies, log transforms of the measured emission rate and screening value were found to better fit the linear regression model. Since some net screening values were zero, it was not possible to take the logarithm of every value. Two approaches were used to account for this: 1) add a constant to every screening value (10 was used), or 2) limit the use of the regression equations to those components that had screening values above a threshold (10 ppmv was chosen). The equations for both approaches had the following form:

$$\hat{y}_i = a + b*\log_{10}[\text{Screening Value}_i] + c*[\text{Component Temperature}_i] \qquad \text{[III-2]}$$

where:

$\hat{y}_i$	= predicted log (emission rate (kg/hour))
i	= component
a, b, c	= regression parameters, a = intercept, b and c = coefficients
Screening Value	= maximum screening measurement (ppmv), for Approach 1) a constant of 10 was added
Component Temperature	= component external temperature

Separate regression equations were developed for pumps and valves and connectors with regression parameters shown in the following table.

Table III-61. Regression Parameters

Component Type (Model)	Regression Parameters			Regression Standard Errors			Adjusted R^2	Sigma	n
	Intercept (a)	Screening Value (b)	Temperature (c)	Intercept	Screening Value	Temperature			
Pumps (1)	-7.98	1.41	0.0044	0.19	0.19	0.0014	71.3	0.65	30
Pumps (2)	-7.70	1.21	0.0062	0.39	0.20	0.0018	75.0	0.62	27
Valves and Connectors (1)	-7.45	1.12	0.0026	0.12	0.05	0.0003	84.6	0.41	131
Valves and Connectors (2)	-7.27	1.05	0.0027	0.14	0.05	0.0003	82.4	0.42	188

However, the regression equations do not exactly predict measured emissions of sampled components as shown in Table III-62, which compares the results of the total predicted emissions of those samples used to develop the equations with the total measured emissions of those samples.

Table III-62. Comparison of Regression Predicted Emissions with Measured Sampled Emissions

Component Type (Model)	Measured (kg/hour)	Predicted (Without Bias Adjustment)		Predicted (Bias Adjusted)	
		Predicted (kg/hour)	Predicted / Measured (%)	Adjusted (kg/hour)	Adjusted / Measured (%)
Pumps (1)	0.034	0.020	58	0.032	92
Pumps (2)	0.034	0.021	62	0.033	95
Valves and Connectors (1)	0.049	0.036	73	0.054	109
Valves and Connectors (2)	0.049	0.036	72	0.054	110

As shown in the Table III-62, the regression equations predicted emissions that were an underestimate of what was measured. This difference between the predicted emissions and what was measured is attributed to measurement error and transformation scale bias as discussed in Appendix D-1.

III.iv.2. Simulation

Predicted emissions for a component were derived using regression equations in the logarithm scale. However, the mean leak rate was determined on the original scale.

When regression is accomplished on one scale by transforming data and then the resulting regression-derived values are de-transformed, an additional error is introduced termed transformation scale bias. The 1980 EPA Study corrected for this bias through use of a Scale Bias Correction Factor. However, this approach was found (see Appendix D-1) to be not appropriate for this Study. Rather, to adjust for this, simulation of regression errors was performed (discussed in detail in Appendix D-1). As shown in Table III-62, the ratios of the adjust predictions to measured values were near (within 10 percent) of 100 percent, falling within statistical uncertainty of 100 percent. Thus, the model adjustments appeared adequate.

III.iv.3. Bootstrapping

Most pumps in heavy liquid service at each petroleum refinery were screened. However, only approximately six percent of the total estimated number of valves and less than two percent of the total estimated number of connectors were screened and included within the Study. To address sampling error for connectors and valves, bootstrapping with replacement was performed.

After estimating predicted emissions from screened connectors and valves using the regression equations forming an array of predicted emissions, a new data set of the same size as the original data set was created. Then for each place within the new data set, an observation from the original data set was randomly selected and placed within the new data set. From the newly created data set, the mean was determined. This process is repeated multiple times to create a set of means. These were used to estimate the mean leakage rates and to provide confidence intervals.

III.iv.4. Average Emissions Data Sets

During screening, several categories of components were identified as warranting a separate treatment for analysis. These include:

- components in heavy liquid service but within an LDAR program,
- components handling non-process lube oil,
- components handling gaseous phase heavy liquid streams, and
- pumps with steam injection pump seals.

In addition, any components that did not have any of the required information (screening value or temperature) to use the corresponding regression equation was excluded from analysis.

LDAR Components

There were 94 screened components at Refinery A and three screened components at Refinery B that were determined to be in heavy liquid service but were being routinely monitored within the refinery's LDAR program. As the intent of an LDAR program is to routinely monitor components for leaks and repair any leaks found, components within an LDAR program would be expected to have less leaks (both in magnitude and frequency) and corresponding less emissions than similar components not within an LDAR program. Therefore, including such components may bias emission estimates low.

Non-Process Lube Oil Components

Historically, components handling non-process lube oil, such as seal pots containing lubricating oil for pump seals, have not be included in emissions inventories as there is no established method for estimating the number of such components and emissions from such material at ambient conditions would not be expected to be great. As emissions from non-process lubricating oils were expected to differ from process lubricating oils at higher temperatures and pressure, it was decided to pull these components out of the Study and incorporate them into a separate study, the Lube Oil Study.

Storage Tank Area Components

Because components in heavy liquid service were not historically inventoried, the number of such components was estimated based on the known number of components in gas or light liquid service within certain process unit categories. However, this method does not account for process units for which there are heavy liquid service components but no gas or light liquid service components or for process units and / or areas that were not included within the EPA study from which the multipliers were derived. This includes storage tanks and tank farms. Therefore, current emissions inventories do not account for fugitive emissions from such areas including tank farms (emissions from storage tanks themselves are included in inventories). Such components include valves, connectors, and pump seals from piping leading to and away from storage tanks.

While screening at Refinery B, the petroleum refineries expressed a concern that by only including process unit components within the Study, average emissions may differ (expected to be higher) than components handling process streams at ambient temperatures and pressure such as those in the storage tank farms. Even though there was not a method for estimating the number of such components, there was a concern that emissions from such components would be overestimated if using average emission factors derived solely from process unit components. It was decided to include such components within the Study. However, because such components were included in the Study, a method for estimating and including such components into emissions inventories is needed.

Gaseous Phase Heavy Liquid Service

The five petroleum refineries have agreed to incorporate any components handling a heavy liquid stream in the gaseous phase within their LDAR programs. As such, it will be necessary to exclude these components from average emission factors meant to be used in the future for non-monitored components in heavy liquid service.

Steam-Injected Pump Seals

While screening at Refinery A, a pump seal leak of 760 ppmv was measured at a foot or more away from the seal with liquid hydrocarbons spewing from the seal. However, a screening at a closer distance (at the seal interface) was not possible as the pump had steam injection with steam billowing from the seal. Whenever, a screening instrument probe was placed too close to the interface, steam would condense within the screening instrument and cause it to malfunction. As previous studies have shown screening values to decrease with distance from the leak interface and the presence and rate of liquid hydrocarbon leaks, this pump was viewed as having a leak of over 10,000 ppmv and possibly with the highest emission rate of all components screened. However, because of the steam injection, this pump could not be sampled.

Several other similar pumps were found while screening. The presence of steam injection was identified as an important categorical delineation. In addition to the difficulty in screening at the proper distance and in sampling, steam injection at the seal introduces an additional leak forming mechanism that is not present in non-steam injected pumps that supports treating this sub-category of pumps differently.

III.iv.5. Analysis Results

The developed regression equations, bootstrap sampling technique, and simulation methods discussed above were used in computer programs created to estimate emissions from the screened components. The results of those estimates are presented in this section.

III.iv.5.1. Process Units

Total emissions by general process unit /area category are shown in Table III-63 and Figure III.60.

Table III-63. Distribution of Total Hydrocarbon Emissions by Process Unit / Area Category

General Process Unit / Area Category	Sampled	Screened	Total Emissions (kg/hour)	% of Total Emissions
Aromatic Saturation	1	7	0.01308	5.5
Asphalt Plant	2	69	0.00026	0.1
Atmospheric Distillation Unit	0	4	0.00182	0.8
Blending / Tank Farm	2	6	0.00007	0.0
Catalytic Cracking	10	880	0.02178	9.2
Catalytic Reformer	0	2	0.00001	0.0
Coker	5	1,502	0.01105	4.7
Crude Unit	8	1,112	0.03429	14.5
Crude Unit / Coker	2	157	0.00090	0.4
Distillation	0	10	0.00005	0.0
Fractionation	0	1	0.00000	0.0
Fuel Gas Treatment	0	55	0.00021	0.1
Gas Recovery	0	22	0.00908	3.8
Hydrocracker	27	1,053	0.01516	6.4
Hydrogen Production	0	34	0.00013	0.1
Hydrotreater	77	4,402	0.10639	44.9
Hydrotreater and Hydrocracker	10	824	0.01717	7.2
Isomerization	0	1	0.00000	0.0
Marine Terminal	0	10	0.00004	0.0
Other	0	14	0.00005	0.0
Polymerization	2	9	0.00096	0.4
Reformulation	1	16	0.00077	0.3
Separation	0	10	0.00004	0.0
Solvent Deasphalting	0	26	0.00059	0.2
Sulfur Recovery	1	122	0.00046	0.2
Tank Farm	17	432	0.00262	1.1
Utilities	0	2	0.00001	0.0
Vacuum Distillation Unit	0	13	0.00007	0.0
Total	165	10,795	0.2371	100

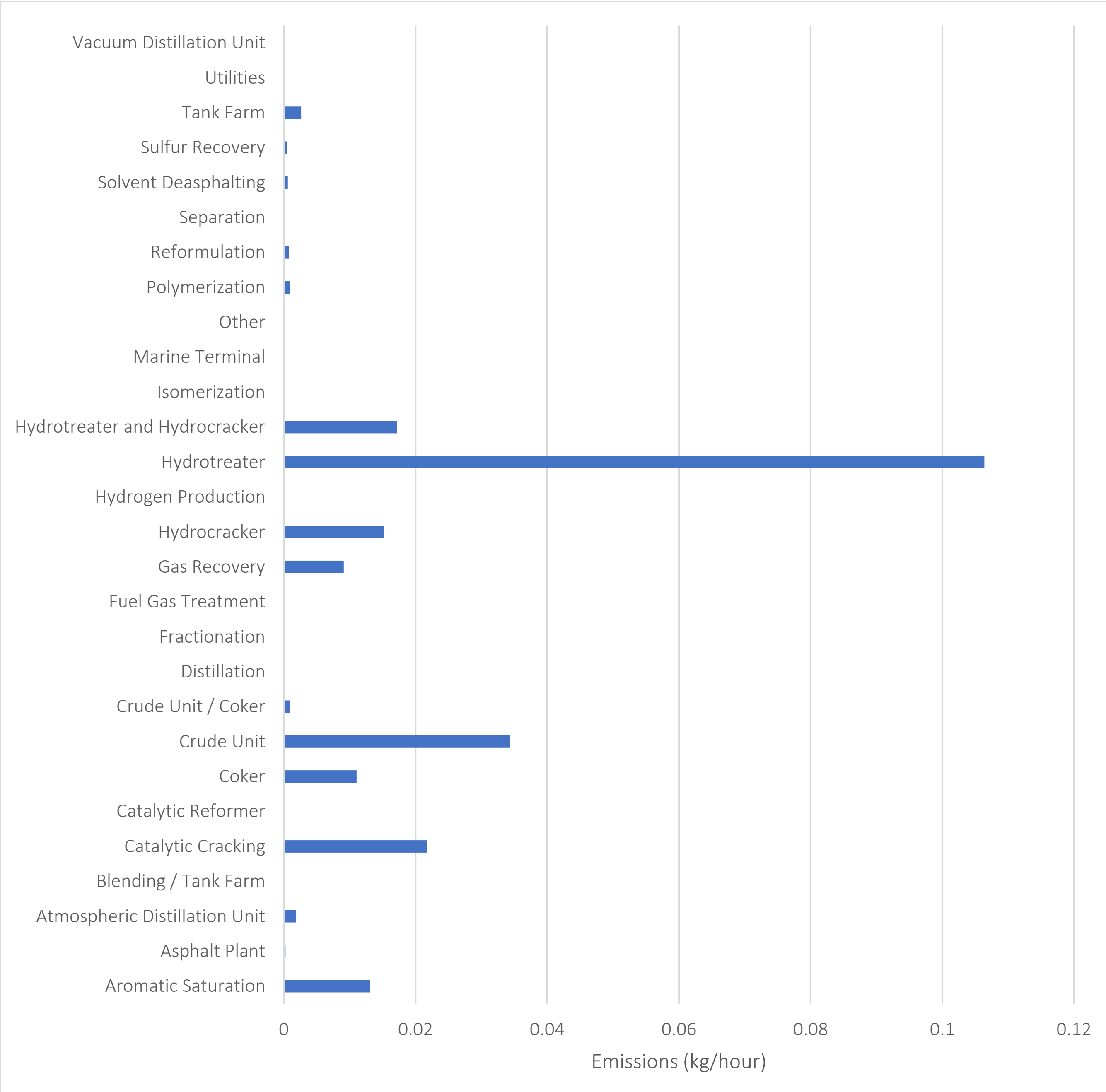


Figure III.60. Emissions by General Process Unit / Area

III.iv.5.2. Component Types and Subtypes

The distribution of emissions by component type is listed in Table III-64 and by component subtype in Table III-65.

Table III-64. Distribution of Total Hydrocarbon Emissions by Component Type

			Total Measured Emissions within Range	
Emission Rate (kg/hour)	Number Sampled	Number Screened	Total Emissions (kg/hour)	% of Total Source of Measured Emissions
Pump Seals				
> 0.01	1	2	0.0530	51.1
0.001 - 0.01	3	12	0.0414	39.9
0.0001 - 0.001	6	8	0.0059	5.7
0.00001 - 0.0001	7	22	0.0011	1.0
0.000001 - 0.00001	15	630	0.0024	2.3
Total	32	674	0.1037	100
Connectors				
> 0.01	0	0	0.0000	0.0
0.001 - 0.01	5	1	0.0116	34.1
0.0001 - 0.001	12	6	0.0036	10.6
0.00001 - 0.0001	20	42	0.0021	6.0
0.000001 - 0.00001	24	4,466	0.0169	49.3
Total	61	4,515	0.0342	100
Valves				
> 0.01	1	1	0.0138	15.8
0.001 - 0.01	14	18	0.0380	43.6
0.0001 - 0.001	19	43	0.0123	14.1
0.00001 - 0.0001	19	135	0.0047	5.4
0.000001 - 0.00001	19	4919	0.0185	21.2
Total	72	5116	0.0873	100

Table III-65. Distribution of Total Hydrocarbon Emissions by Component Subtype

Component Type	General Component Subtype	Sampled	Screened	Total Emissions (kg/hour)	% of Total Emissions
Connectors	Block Off Plate	0	1	3.75E-06	0.0
	Control Valve	0	2	7.50E-06	0.0
	Coupling	1	11	4.32E-05	0.1
	Cover	0	1	3.75E-06	0.0
	Elbow	1	48	2.16E-04	0.6
	End Cap	1	11	4.39E-05	0.1
	Flange	7	1,488	1.22E-02	34.0
	Gate	1	39	1.76E-04	0.5
	Hatch	1	12	1.98E-04	0.6
	Manway	0	9	3.38E-05	0.1
	Other	1	0	4.01E-05	0.1
	Plug	21	1,326	6.76E-03	18.9
	Pressure Gauge	2	16	6.89E-05	0.2
	Pump Housing	4	160	3.30E-03	9.2
	Reducer	0	10	3.75E-05	0.1
	Safety Valve	1	0	2.40E-06	0.0
	Sight Glass	0	4	2.25E-05	0.1
	Tee	0	40	1.49E-04	0.4
	Threaded Connector	4	404	1.98E-03	5.5
	Union	5	89	2.12E-03	5.9
	Unknown	9	1,042	8.42E-03	23.5
	Total	**59**	**4,713**	**0.0358**	**100**
Valves	Ball Valve	0	98	4.20E-04	0.5
	Bellow Seal Valve	0	29	1.09E-04	0.1
	Butterfly Valve	0	2	7.50E-06	0.0
	Check Valve	0	51	1.91E-04	0.2
	Control Valve	5	221	2.81E-03	3.1
	Coupling	0	1	3.75E-06	0.0
	Elbow	1	3	2.21E-05	0.0
	Flange	0	6	2.25E-05	0.0
	Gate	57	4,123	8.09E-02	88.5
	Gate Valve	0	42	1.71E-04	0.2
	Globe	0	13	5.84E-05	0.1
	Globe Valve	5	125	2.87E-03	3.1
	Hex Valve	0	1	3.75E-06	0.0
	Needle Valve	0	228	8.53E-04	0.9
	Orbit Valve	0	1	2.29E-04	0.3
	Plug	3	12	6.12E-04	0.7
	Pressure Gauge	0	1	3.75E-06	0.0

Component Type	General Component Subtype	Sampled	Screened	Total Emissions (kg/hour)	% of Total Emissions
	Regulator	0	3	1.13E-05	0.0
	Safety Valve	1	13	5.16E-05	0.1
	Threaded Connector	0	4	1.50E-05	0.0
	Union	0	1	3.75E-06	0.0
	Unknown	2	298	2.05E-03	2.2
	Total	74	5,276	0.0914	100

III.iv.5.3. Materials

Total emissions by general stream material are shown in Table III-66.

Table III-66. Distribution of Total Hydrocarbon Emissions by General Stream Material

General Stream Service	Sampled	Screened	Total Emissions (kg/hour)	% of Total Emissions
Amine	1	152	5.68E-04	0.2
Asphalt	5	344	1.53E-02	5.9
Asphalt/Resid	0	90	3.38E-04	0.1
Atmospheric Tower Bottoms	0	57	2.14E-04	0.1
Cetane Improver	1	35	1.30E-04	0.1
Coke	0	22	1.18E-03	0.5
Condensate	0	7	2.63E-05	0.0
Crude	0	75	4.75E-02	18.5
Cycle Oil	2	35	1.31E-04	0.1
Deasphalted Oil	1	98	3.66E-04	0.1
Decant Oil	0	80	3.13E-04	0.1
Diesel	42	1,130	3.42E-02	13.3
Diesel - Light Gas Oil	0	28	1.05E-04	0.0
Flushing Oil	0	13	4.88E-05	0.0
Fuel Oil	0	31	1.16E-04	0.0
Gas Oil	23	3,673	2.62E-02	10.2
Gas Oil (Cracked)	0	10	9.08E-03	3.5
Heating Oil	0	62	2.89E-04	0.1
Heavy Cycle Oil	0	22	8.25E-05	0.0
Heavy Gas Oil	0	28	1.05E-04	0.0
Hot Oil	0	22	1.31E-02	5.1
Hydraulic Oil	0	24	9.00E-05	0.0
Hydrocracked Distillates, Heavy	0	8	3.00E-05	0.0
Jet	49	1,296	7.40E-02	28.7
Kerosene	6	151	4.42E-03	1.7
Light Cycle Oil	1	210	1.61E-03	0.6
Light Gas Oil	8	341	4.83E-03	1.9
Light Gas Oil/Heavy Gas Oil	1	9	1.97E-03	0.8
Lube Oil	2	779	3.50E-03	1.4
Medium Cycle Oil	0	24	9.00E-05	0.0
Other	1	397	2.07E-03	0.8
Pentamer	1	2	5.50E-04	0.2
Polysulfice	0	2	7.50E-06	0.0
Recovered Oil	0	3	1.13E-05	0.0
Recycled Gas Oil	2	80	1.40E-03	0.5

General Stream Service	Sampled	Screened	Total Emissions (kg/hour)	% of Total Emissions
Resid	5	511	2.13E-03	0.8
Seal Oil	0	38	1.43E-04	0.1
Slop Oil	1	21	7.46E-04	0.3
Sludge	1	184	6.88E-04	0.3
Slurry	0	80	1.41E-03	0.5
Tar	4	17	1.16E-04	0.0
Tetramer	3	11	1.27E-04	0.0
Turbine Fuel	1	2	7.98E-06	0.0
Unknown	1	289	5.17E-03	2.0
Vacuum Gas Oil	0	17	6.38E-05	0.0
Vacuum Tower Bottoms	3	284	2.73E-03	1.1
Total	165	10,794	0.2574	100

III.iv.5.4. Other

The following tables and figures present total emissions by other categories including component size, component operating pressure, component external temperature, and component vibration (amount, cyclic or not).

Component Size

Table III-67. Distribution of Total Hydrocarbon Emissions by Component Size (Process Line Diameter)

Size (inches)	Screened	Sampled	Total Emissions (kg/hour)	% of Total Emissions
Size ≤ 1"	5,668	64	3.99E-02	16.6
1" < Size ≤ 2"	1,435	21	4.63E-02	19.3
2" < Size ≤ 3"	577	9	1.09E-02	4.5
3" < Size ≤ 4"	732	19	2.92E-02	12.2
4" < Size ≤ 5"	5	0	1.88E-05	0.0
5" < Size ≤ 6"	817	24	2.87E-02	11.9
6" < Size ≤ 7"	0	0	1.40E-03	0.6
7" < Size ≤ 8"	422	11	2.17E-02	9.0
8" < Size ≤ 9"	3	0	1.13E-05	0.0
9" < Size ≤ 10"	289	11	2.01E-02	8.4
10" < Size ≤ 11"	0	0	0.00E+00	0.0
11" < Size ≤ 12"	129	0	5.20E-03	2.2
Size > 12"	242	6	7.92E-03	3.3
Unknown	476	0	2.88E-02	12.0
Total	10,795	165	0.2402	100

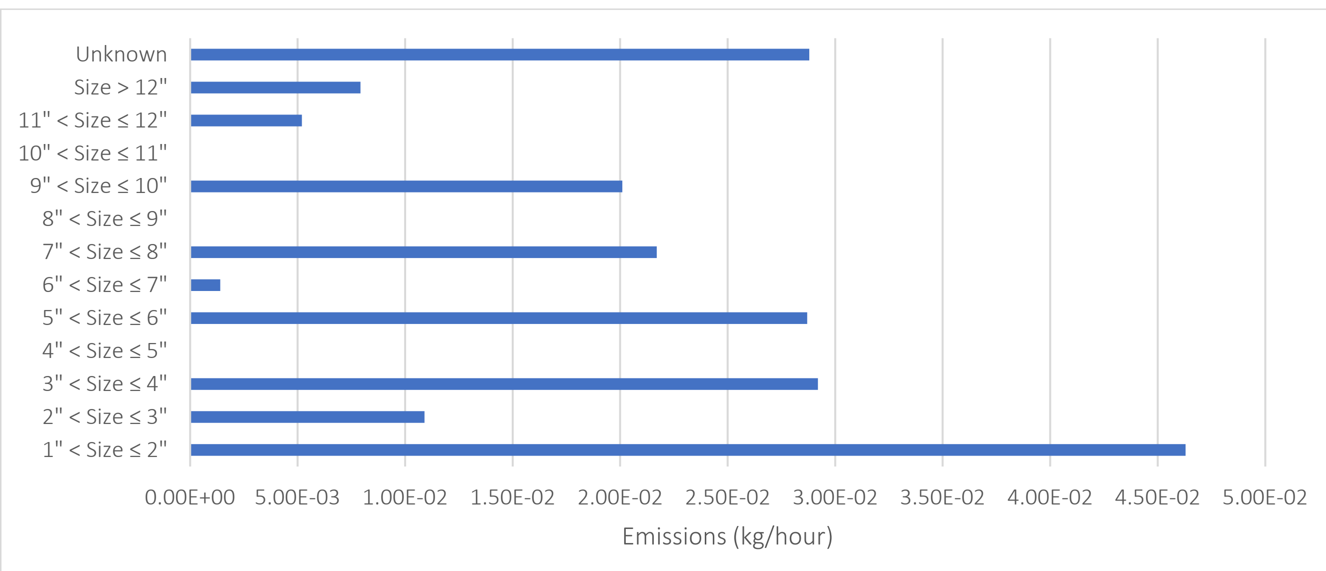


Figure III.61. Emissions by Component Size (Diameter)

Component Operating Pressure

Table III-68. Distribution of Total Hydrocarbon Emissions by Operating Pressure

Operating Pressure (psig)	Screened	Sampled	Total Emissions (kg/hour)	% of Total Emissions
Operating Pressure ≤ 5 psig	1,068	16	4.09E-03	1.8
5 psig < Operating Pressure ≤ 10 psig	137	9	1.82E-02	7.8
10 psig < Operating Pressure ≤ 25 psig	652	7	8.06E-03	3.5
25 psig < Operating Pressure ≤ 50 psig	1,217	14	1.07E-02	4.6
50 psig < Operating Pressure ≤ 100 psig	1,440	16	3.50E-02	15.1
100 psig < Operating Pressure ≤ 200 psig	1,458	27	2.96E-02	12.8
200 psig < Operating Pressure ≤ 300 psig	583	8	1.39E-02	6.0
300 psig < Operating Pressure ≤ 400 psig	200	2	5.19E-03	2.2
400 psig < Operating Pressure ≤ 500 psig	114	0	6.03E-04	0.3
500 psig < Operating Pressure ≤ 1,000 psig	486	13	3.70E-02	16.0
1,000 psig < Operating Pressure ≤ 2,000 psig	454	14	9.73E-03	4.2
Operating Pressure > 2,000 psig	89	1	1.09E-03	0.5
Unknown	2,897	38	5.89E-02	25.4
Total	10,795	165	0.2321	100

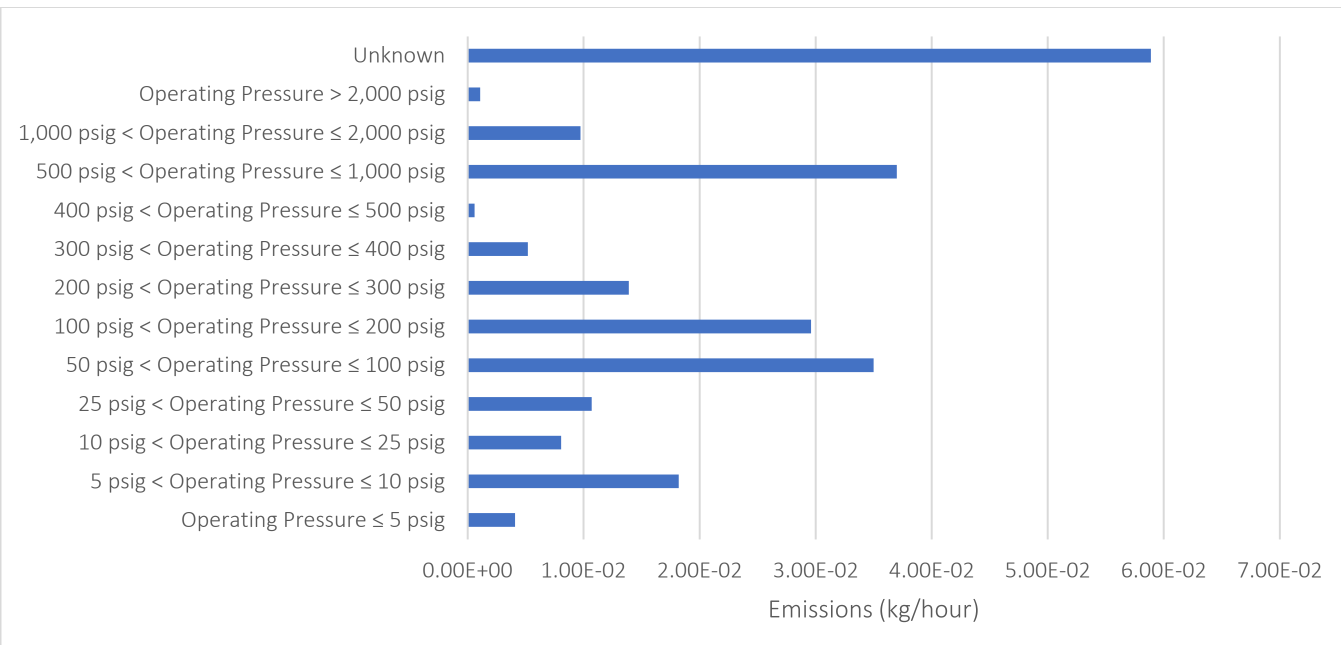


Figure III.62. Emissions by Component Operating Pressure

Component External Temperature

Table III-69. Distributions of Total Hydrocarbon Emissions by Component External Temperature

External Temperature (Degrees Fahrenheit)	Screened	Sampled	Total Emissions (kg/hour)	% of Total Emissions
External Temperature ≤ 100 deg F	4,456	53	2.82E-02	10.1
100 deg F < Temperature ≤ 200 deg F	2,931	48	2.67E-02	9.5
200 deg F < Temperature ≤ 300 deg F	1,354	22	5.74E-02	20.4
300 deg F < Temperature ≤ 400 deg F	997	30	5.91E-02	21.1
400 deg F < Temperature ≤ 500 deg F	587	9	4.45E-02	15.9
External Temperature > 500 deg F	255	2	1.74E-02	6.2
Unknown	215	1	4.73E-02	16.9
Total	10,795	165	2.81E-01	100

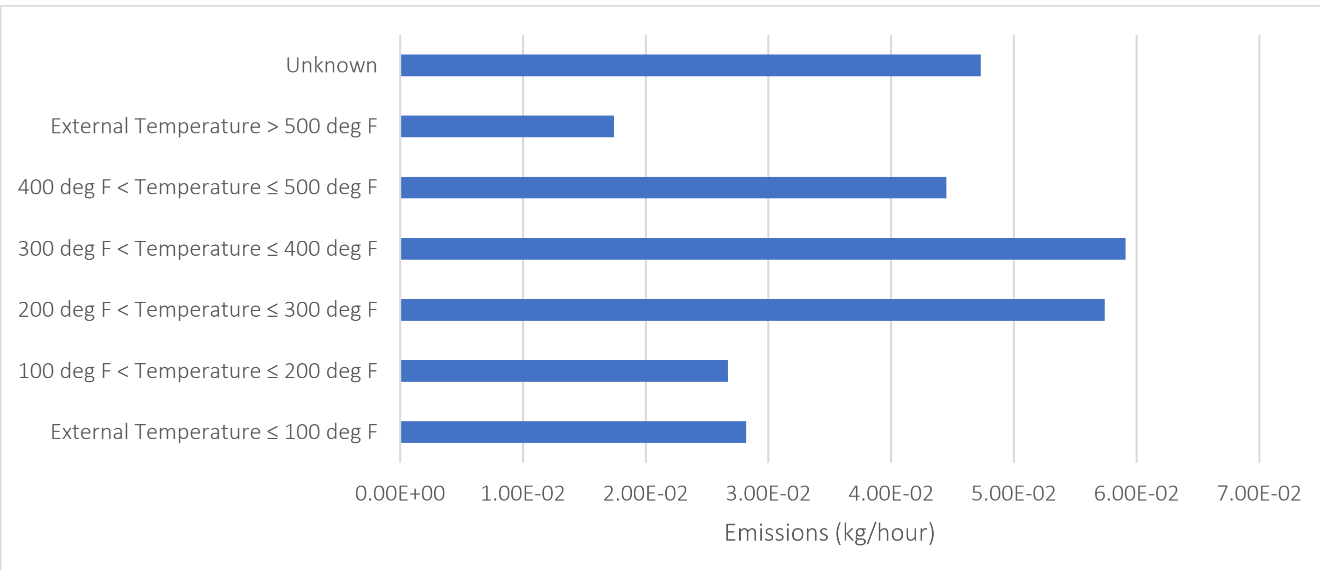


Figure III.63. Emissions by Component External Temperature

Component Vibration

Table III-70. Distribution of Total Hydrocarbon Emissions by Component Vibration

Vibration Amount	Screened	Sampled	Total Emissions (kg/hour)	% of Total Emissions
None	5,621	75	6.48E-02	27.4
Low	4,962	80	1.69E-01	71.5
Medium	8	1	8.79E-05	0.0
High	53	5	1.72E-03	0.7
Unknown	151	4	6.19E-04	0.3
Total	10,795	165	2.36E-01	100

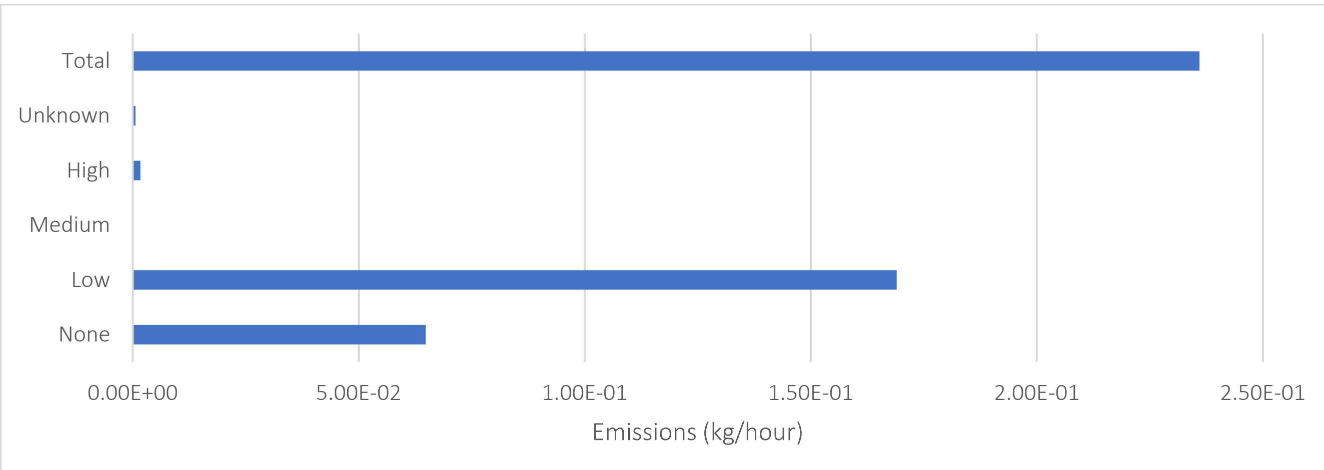


Figure III.64. *Emissions by Component Vibration Amount*

Cyclic Vibration

Table III-71. Distribution of Total Hydrocarbon Emissions by Component Cyclic Vibration

Cyclic Vibration	Screened	Sampled	Total Emissions (kg/hour)	% of Total Emissions
Yes	77	0	3.03E-04	0.1
None	9,637	133	1.69E-01	71.8
Unknown	1,081	32	6.60E-02	28.0
Total	10,795	165	0.2355	100

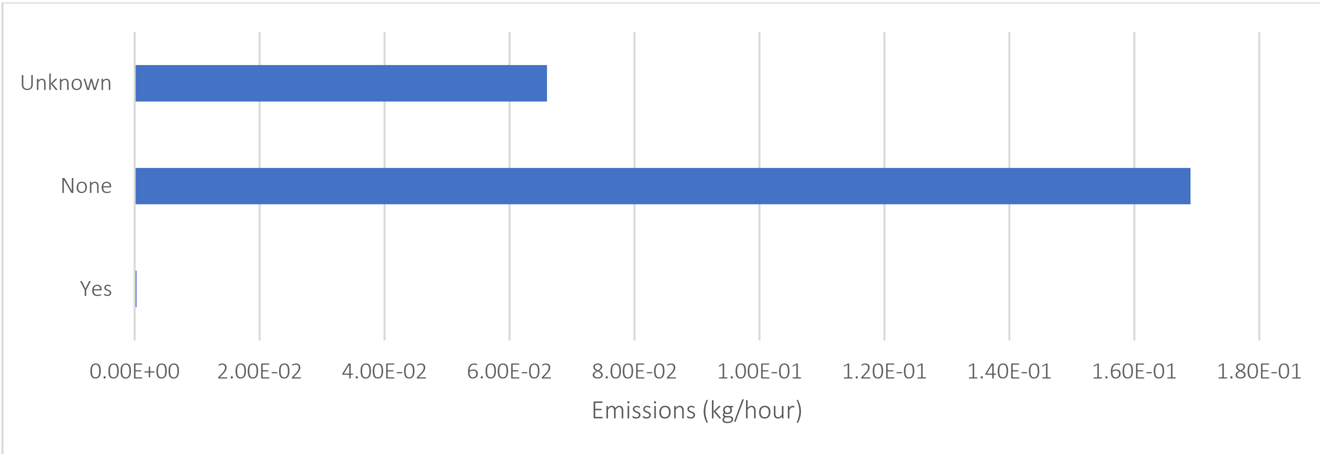


***Figure III.65**. Emissions by Cyclic Vibration*

III.iv.5.5. Sampling a Subset of Process Units

Prior to initiating the Study, the Air District and the five petroleum refineries agreed to only include two process units within the Study as a practical consideration. During the Study, the number of process units included expanded as necessary to meet the targeted number of screened components.

However, there were still a considerable number of process units / areas where connectors (non-pump housing or pump-associated) and valves were not screened and not included within the Study.

The following table includes a comparison of the total number of process units / areas where connectors (non-pump associated) and valves were screened compared to the total number of process units / areas at each petroleum refinery.

Table III-72. Comparison of the Number of Process Units / Areas Where Connectors and Valves Were Screened

Refinery	Number of Process Units / Areas in Study (1)	Total Number of Process Units / Areas (2)	Percentage of Total Units / Areas in Study (%)
A	4	42	10
B	7	27	26
C	5	75	7
D	4	64	6
E	5	36	14
Total	25	244	10

Notes:

1. Only includes units / areas where non-pump associated connectors and valves were screened
2. Based on the number of unique areas listed in each petroleum refinery's leak detection and repair program. May not include units / areas for which there are no components within the leak detection and repair program.

As shown in Table III-72, approximately 10 percent of the total process units / areas had non-pump associated connectors and valves screened within the Study.

As discussed in previous sections, process units / areas were selected and included within the Study to account for the diversity of process unit categories (crude unit, catalytic cracking unit, hydrotreater, etc.), process steams, and operating conditions (ambient temperature and pressure, operating temperature, operating pressure, etc.).

However, only a fraction of the total number of process units / areas had connectors and valves screened within in the Study, so the sampling was not at random, and there is an increase in the uncertainty of the overall results.

III.iv.5.6. Large Leakers

As shown from previous studies (see Table I-5 and Section I.iii.2 1970s Studies), emissions from components in heavy liquid service is dominated by a few large leakers. Over 80 percent of emissions is from approximately two percent of components. Most pump seals were sampled, but only about 10 percent of the estimated number of valves and five percent of the estimated number of connectors were sampled so, it is very likely that the largest valve and connector leakers were not sampled.

Using the regression estimates and cumulative probability theory (see Appendix D-1 for a detailed analysis), a cumulative distribution of the maximum emissions by component type was derived and shown in Figure III.66.

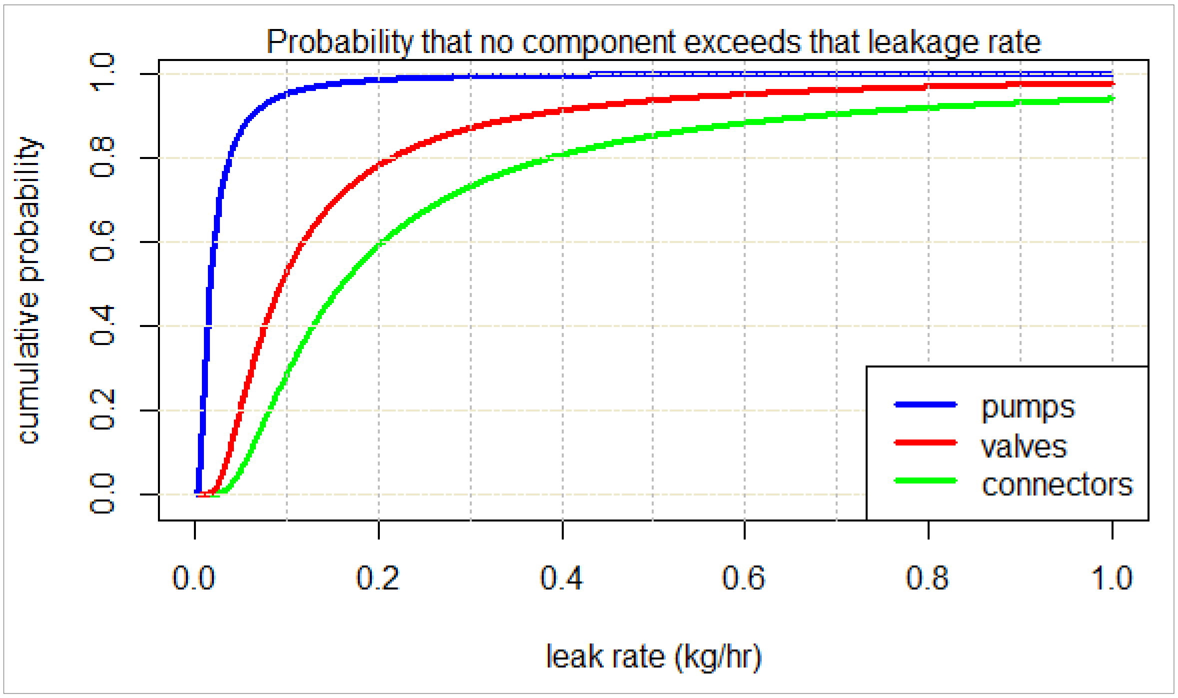


Figure III.66. Cumulative Distribution of Maximum Leakage by Component Type (Pump Seals, Valves, Connectors)

The greatest emissions measured during sampling was 0.016 kg/hour for a valve (Sample C004), 0.002 kg/hour for a connector (Sample A030), and 0.024 kg/hour for a pump seal (Sample D045).

Figure III.66 shows there is a 70 percent chance of one of the petroleum refineries' connectors leaking more than 0.1 kg/hour and a 40 percent chance of the maximum being greater than 0.2 kg/hour. For valves, there is a close to 50 percent chance of leaking more than 0.1 kg/hour and a 20 percent chance of leaking more than 0.2 kg/hour.

Although pump seals were found to leak considerably more than connectors or valves on average, pump seal maximum leakage is lower because there are not nearly as many; there is a less than 10 percent chance of a pump leakage rate greater than 0.1 kg/hour.

Previous studies and the current Study show that screening values are highly skewed. Most screened components have low screening values while less than one percent have screening values greater than 10,000 ppmv.

To understand whether screening results may be biased because of missing large leakers, a comparison of the number of components found with screening values greater than 10,000 ppmv within the Study and in previous studies can be made.

For this comparison, two previous studies are useful: the 1980 EPA Study and the WSPA/API study published in API 337. In the 1980 EPA Study, components were not included in a leak detection and repair program. However, in API 337, screening results from six petroleum refineries (four in California and two in Washington) were evaluated. Of the California petroleum refineries, two (CA-1 and CA-2) had been screening heavy liquid service components within their leak detection and repair program while the other two screened heavy liquid service components in preparation for the 1993 Refinery Study.

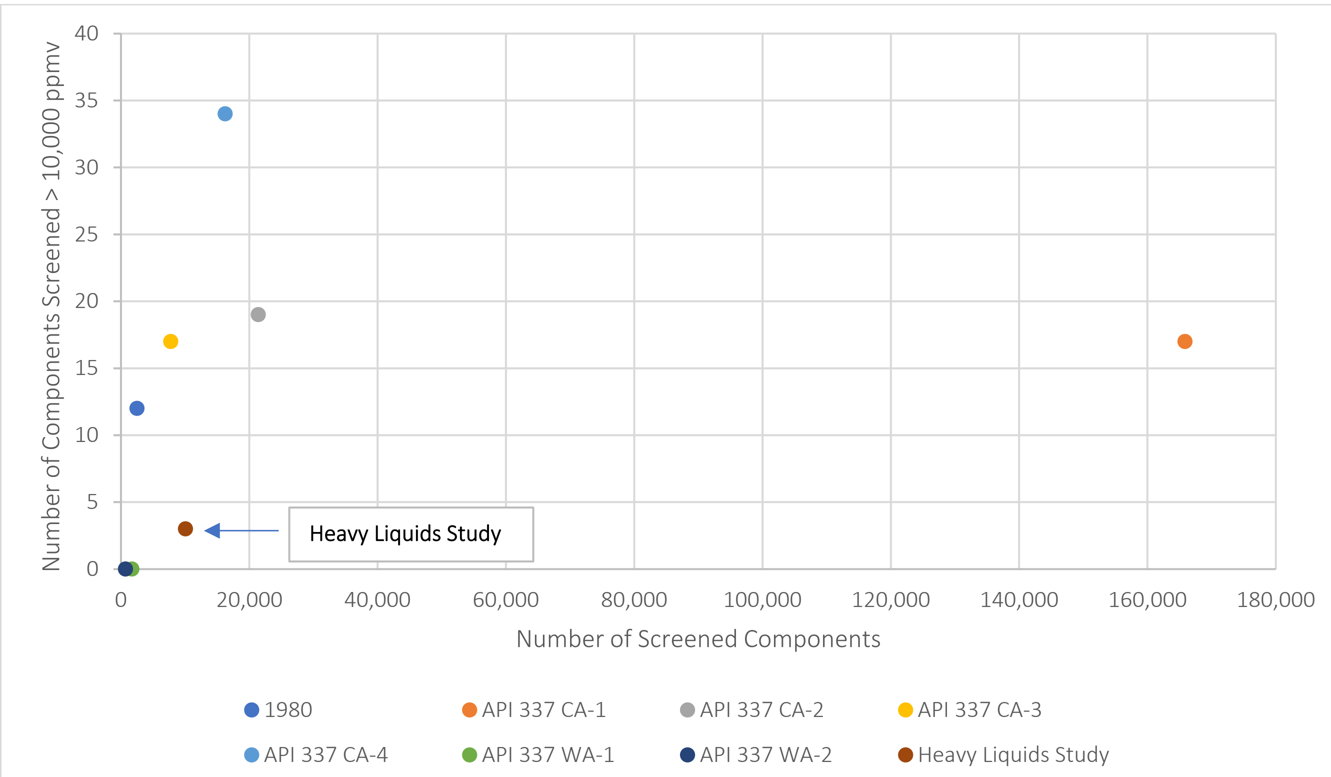


Figure III.67. Comparison of the Number of Components with Screening Values Greater than 10,000 ppmv

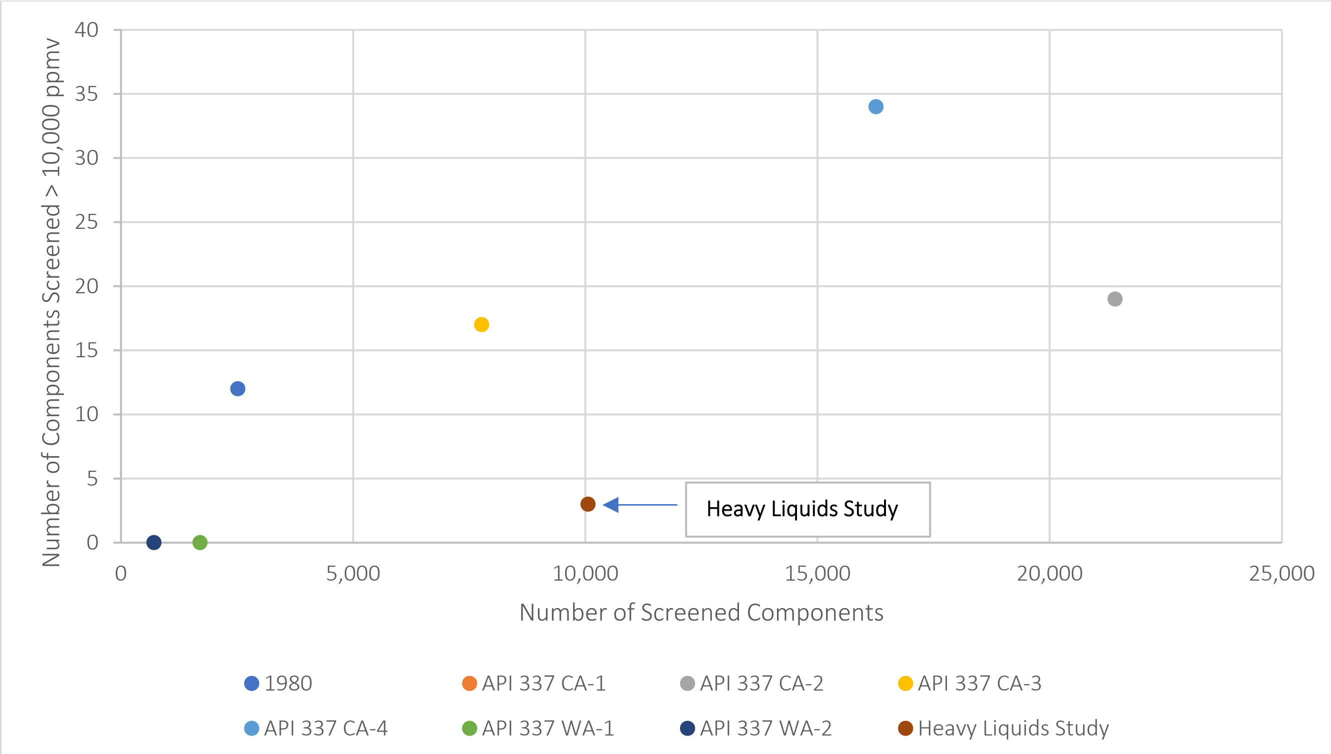


Figure III.68. Comparison of the Number of Components with Screening Values Greater than 10,000 ppmv (Excludes API 337-CA-1)

As shown in **Figure III.67** and **Figure III.68**, the number of components found with screening values greater than 10,000 ppmv in the Heavy Liquids Study was much lower than previous studies.

This difference may be attributed to a difference in emission leaks between the five petroleum refineries during the Study and the other petroleum refineries in previous studies.

However, the three Study components (all valves) with screening values greater than 10,000 ppmv were all found within the same petroleum refinery process unit. The difference in results may also be attributed to the Study design: either the number of screened components was too small to capture the actual distribution of screening results, the selection of process units was insufficiently random, or the total number of process units / areas included within the Study was too small.

III.iv.5.7. Estimated Emission Rates for Various Scenarios

After estimating emissions for screened components, emission rates of connectors, valves, and pump seals for two scenarios were estimated.

Both scenarios exclude steam-quenched pumps and components handling non-process lube oil. The scenarios differ by whether they include or exclude screened components that were within a petroleum refinery's leak detection and repair (LDAR) program.

Emissions estimates by scenario are presented in Table III-73.

Table III-73. Average Emission Factors for Different Categories of Components

Scenario	Connectors (kg/hour/connector)			Valves (kg/hour/valve)			Pump Seals (kg/hour/pump seal)		
	Point Estimate	Confidence Interval 5%	Confidence Interval 95%	Point Estimate	Confidence Interval 5%	Confidence Interval 95%	Point Estimate	Confidence Interval 5%	Confidence Interval 95%
1	8.8-06	6.1E-06	1.51E-05	2.74E-05	1.71E-05	4.29E-05	1.58E-04	7.8E-05	5.84E-04
2	9.4E-06	6.6E-06	1.60E-05	2.84E-05	1.80E-05	4.43E-05	1.18E-04	4.8E-05	4.87E-04

Notes:

Scenario 1 excludes gaseous phase components, steam-quenched pumps, and components handling non-process lube oil

Scenario 2 excludes LDAR components, gaseous phase components, steam-quenched pumps, and components handling non-process lube oil

v. Quality Control

The results of those quality control activities that have recorded qualitative metrics are presented in this section.

The specific quality control activities varied by Study phase: (1) Screening, (2) Sampling, (3) Laboratory, and (4) Analysis.

There were multiple quality assurance and quality control procedures whose efficacy could not be qualitatively measured. For example, training of both screening and sampling personnel in the methodologies to be employed was conducted. However, the training program did not incorporate any pre-training or post-training assessments of personnel. Some indication of the efficacy of the training was noted in field notes of third-party auditors and/or Air District observers.

There were also some quality control procedures that could be qualitatively measured but whose outcome was not recorded and could not be verified.

These are discussed in each of the following sections along with a presentation of the qualitative metrics that were recorded and/or derived from recorded information.

III.v.1. Screening

Quality control procedures for field screening included:

- training of field screening personnel,
- use of an established screening methodology and protocol,
- use of same model screening instruments,
- use of instrument probes and hoses with same specified dimensions,
- pre-monitoring instrument calibrations,
- post-monitoring instrument drift tests,
- use of specified calibration gases for calibrations
- use of standardized field data sheets (see Appendix C-1 for an example), and
- digital photographs of components with leaks above a given threshold.

A metric for determining the efficacy of training and of following the screening methodology does not exist. Field observations of each measurement and whether screening personnel followed the required protocol were not taken. However, third-party auditors (the number and personnel varied by refinery) did observe generally the instrument calibrations, instrument drift checks, and screening measurements. There were times when instrument calibrations, instrument drift tests, and/or screening was done prior to a third-party auditor arriving and observing.

In third-party auditor forms, there were several instances where the auditor noted “the tech was reminded to slow down” or “both technicians were reminded & shown the proper [protocol] speed”, indicating that screening personnel were screening too fast and not following what was stated in training or within the protocol.

Screening instruments, probes, and hoses meeting minimum requirements were verified in the field, but verification was not recorded. The serial numbers of all screening instruments are known and can be used to track measurements to individual screening instruments, if necessary.

All gases used to calibrate and drift test screening instruments were verified as meeting the required specifications for hydrocarbon content and accuracy as well as for not being expired. This information was recorded and verified but is not presented here.

The internal pump flow rates of screening instruments were checked using a rotameter during instrument calibrations to verify minimum flow rates. However, an entry location for this information was not provided on the calibration data sheets so this information was not recorded except for Refinery C, which revised the template calibration data sheet to include data entry location for this information. For Refinery C, screening instrument pump flow rates varied between 1.0 to 2.5 liters per minute and were within the specification of the protocol.

Instrument Calibrations and Drift

To improve the accuracy of measurements, screening instruments were to be calibrated with five gas standards and zero gas prior to each monitoring session and to be drift tested after each monitoring session with results recorded. Most screening occurred in two periods: a morning session and an afternoon session. In these instances, screening instruments were to be calibrated in the morning prior to screening, drift tested at the end of the morning screening session, calibrated again in the afternoon prior to screening, and then drift tested at the end of the afternoon screening session. Some instruments were only used in a morning or afternoon session and therefore a drift test was not required in the session in which screening with that instrument did not occur.

There were multiple instances at Refinery D and Refinery E where instruments were only calibrated in the morning and drift tested at the end of the day.

There were also occasions where drift tests were not performed, or the drift test forms were missing, and a drift test and results could not be verified.

At Refinery C, in several cases, the third-party auditor noted that a screening instrument would not pass (failed) one or more drift tests so was drift tested at the end of the day. In other cases, an instrument was left running overnight before a subsequent drift test was performed. Drift tests for these failed checks were not recorded so it is not known what the actual instrument drift check was. In these cases, the measured drift was treated as unknown.

Where the Air District conducted field screening (all of Refinery A and approximately half of the screening measurements at Refinery B), the same screening instruments were used. However, these instruments differed from those used by each refinery's screening personnel. The number of unique screening instruments used at each refinery varied from seven to twelve instruments.

A summary of the screening instrument drift checks is provided in Table III-74. The table reflects the results of instruments that were drift tested and whose results could be verified. The number of checks reflects the number of unique tests made. The summary information pertains to all instruments that were tested. Summary tables by screening instrument and refinery are provided in Appendix C-2.

Table III-74. Summary Results of Field Screening Instrument Drift Checks

Refinery	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
A	10	291	-9.5%	-47.7%	100.0%	14.3%	-11.1%	-7.8%
	100	291	-2.7%	-24.8%	51.0%	6.2%	-3.4%	-2.0%
	500	291	-1.8%	-23.5%	55.8%	6.2%	-2.5%	-1.1%
	3,000	291	-1.6%	-21.2%	38.6%	5.4%	-2.2%	-1.0%
	10,000	291	-1.6%	-17.7%	34.0%	5.0%	-2.1%	-1.0%
B	10	136	-7.4%	-33.7%	22.0%	9.3%	-9.0%	-5.9%
	100	136	-3.3%	-15.3%	9.5%	4.3%	-4.0%	-2.6%
	500	136	-2.3%	-13.8%	11.3%	4.0%	-2.9%	-1.6%
	3,000	136	-2.9%	-71.3%	8.0%	6.9%	-4.1%	-1.8%
	10,000	136	-2.0%	-10.9%	5.6%	2.8%	-2.4%	-1.5%
C	10	103	-4.8%	-20.0%	24.0%	8.8%	-6.6%	-3.1%
	100	103	-1.6%	-11.1%	11.7%	5.1%	-2.6%	-0.6%
	500	103	-1.5%	-9.8%	14.1%	5.1%	-2.5%	-0.5%
	3,000	103	-1.4%	-11.1%	14.0%	4.7%	-2.3%	-0.4%
	10,000	103	-1.0%	-16.2%	11.7%	4.7%	-2.0%	-0.1%
D	10	127	-2.4%	-33.0%	56.4%	14.8%	-5.0%	0.2%
	100	127	-2.3%	-9.7%	9.7%	3.8%	-3.0%	-1.6%
	500	127	2.3%	-12.3%	513.0%	45.8%	-5.8%	10.3%
	3,000	127	-0.1%	-12.6%	51.9%	7.8%	-1.5%	1.3%
	10,000	127	-1.0%	-24.3%	9.1%	3.4%	-1.6%	-0.4%
E	10	94	-13.2%	-34.2%	16.2%	9.4%	-15.1%	-11.2%
	100	94	-5.3%	-19.2%	7.7%	5.0%	-6.3%	-4.3%
	500	94	-4.7%	-17.6%	6.3%	4.3%	-5.6%	-3.9%
	3,000	94	-4.9%	-39.1%	9.0%	6.2%	-6.2%	-3.6%
	10,000	94	-2.9%	-16.5%	5.9%	3.7%	-3.7%	-2.2%

As shown in Table III-74, the average percent drift varied the most for the 10 ppmv standard and in every case the average drift was negative. Except for the 500 ppmv standard at Refinery D, the entire confidence interval for each standard was negative suggesting a negative bias in screening results.

For Refinery D, there was a maximum drift reading of 513 percent for the 500 ppmv standard. From the field calibration sheet for this test, it appeared that the 3,000 ppmv standard was used during the 500 ppmv drift test. If so, the test for this standard would not have been valid. However, this could not be verified.

Plots of the average drift percentage by instrument, standard, and refinery are shown in Figure III.69, Figure III.70, Figure III.71, Figure III.72, and Figure III.73.

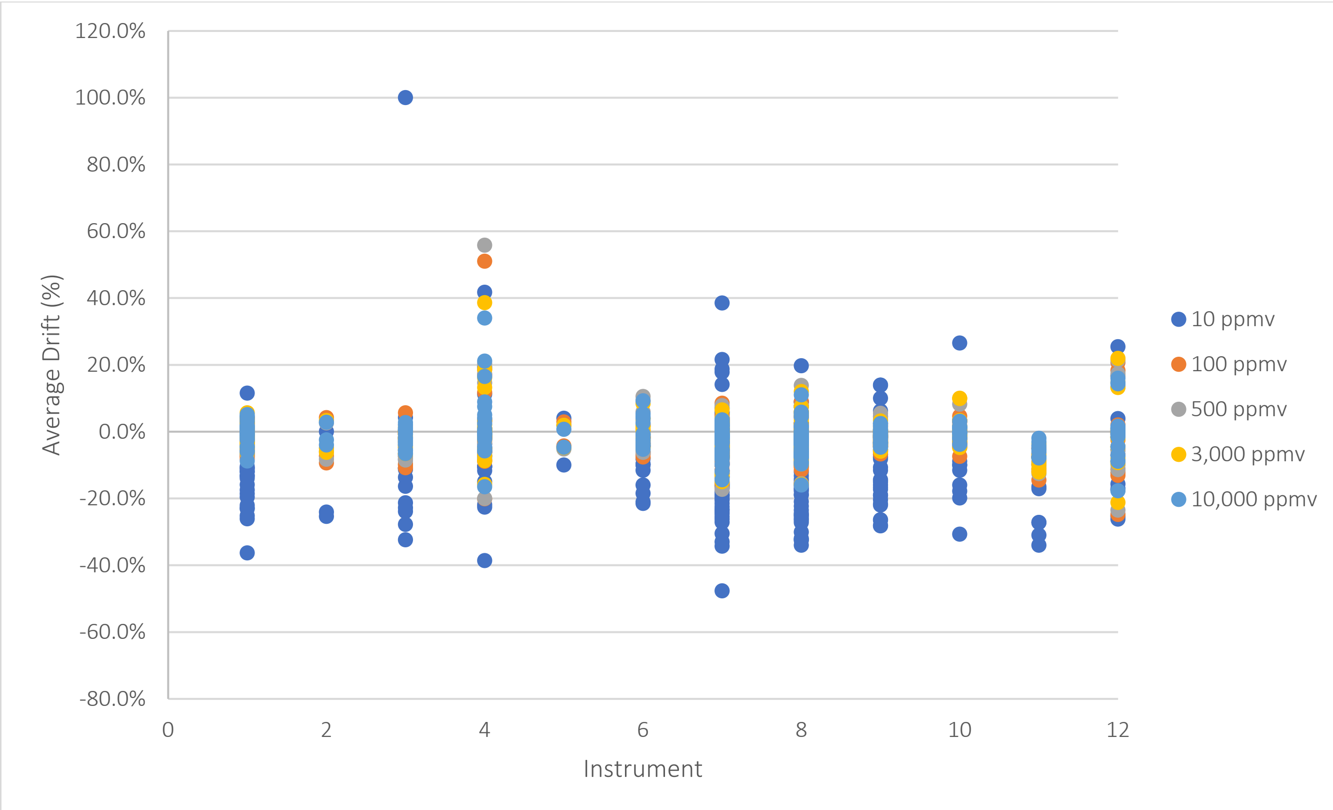


Figure III.69. *Average Drift by Calibration Gas of Screening Instruments Used at Refinery A.*

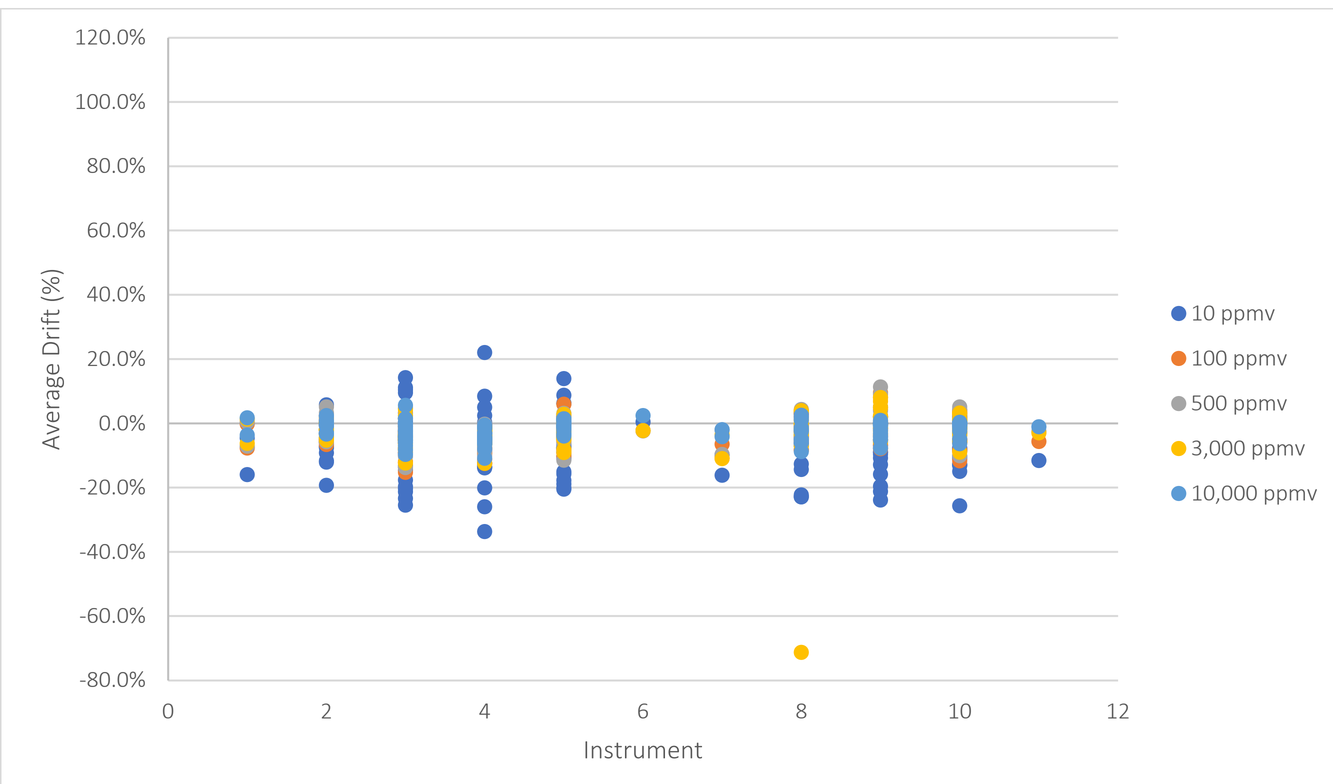


Figure III.70. *Average Drift by Calibration Gas of Screening Instruments Used at Refinery B.*

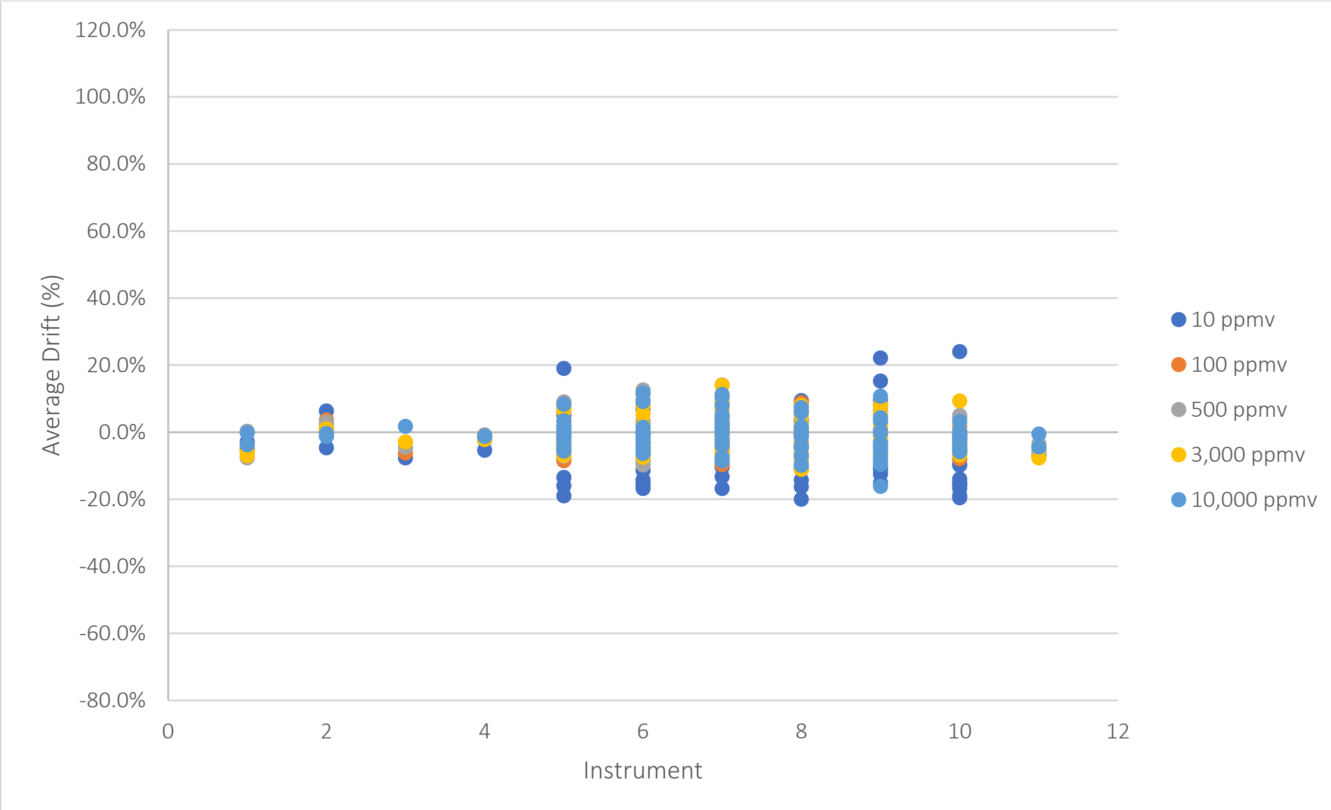


Figure III.71. Average Drift by Calibration Gas of Screening Instruments Used at Refinery C.

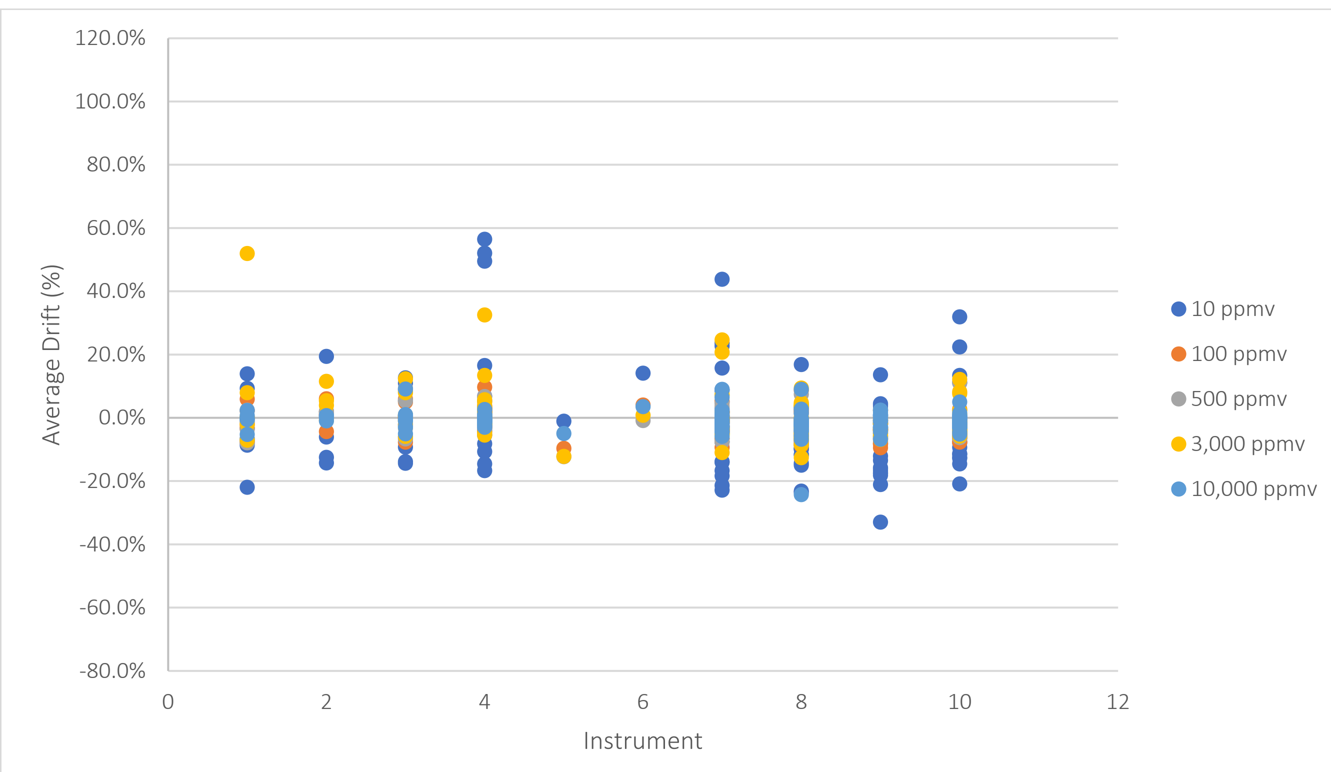


Figure III.72. Average Drift by Calibration Gas of Screening Instruments Used at Refinery D.

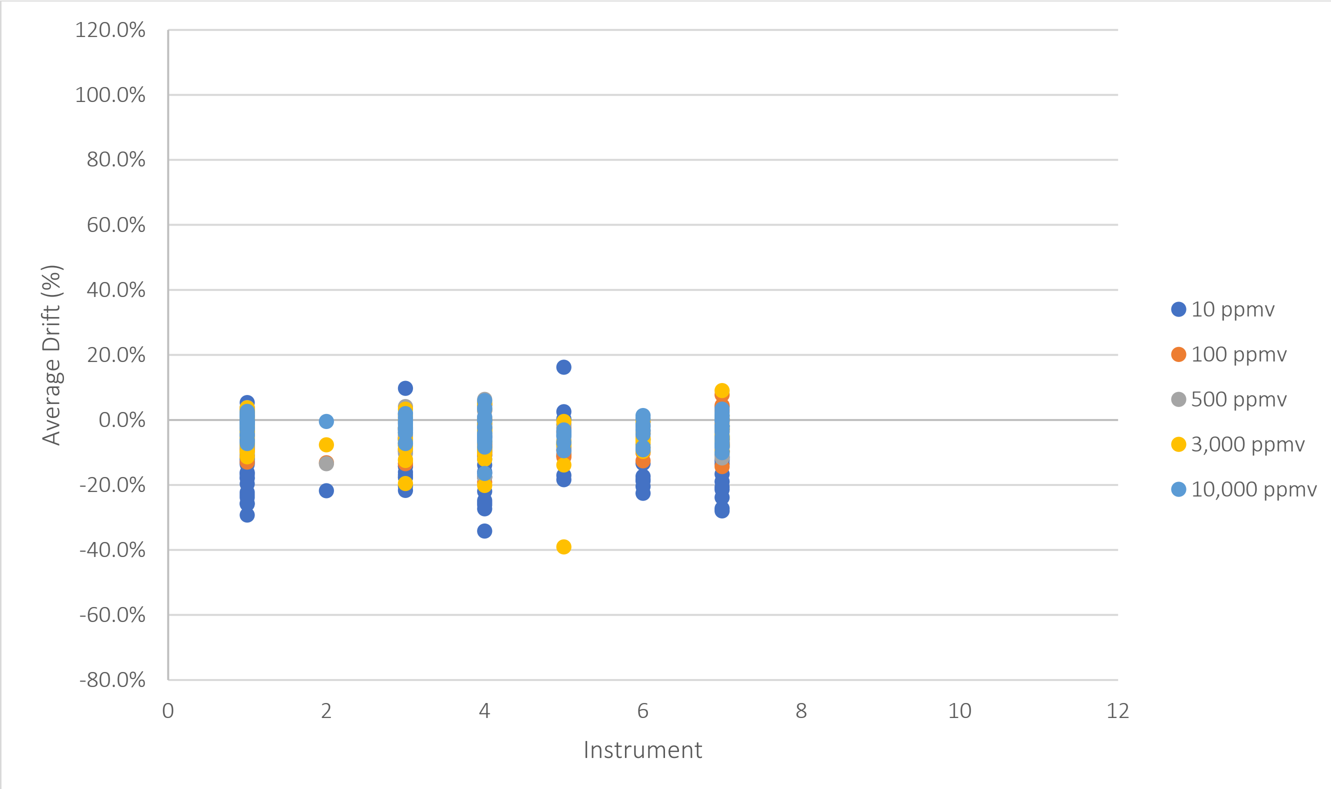


Figure III.73. Average Drift by Calibration Gas of Screening Instruments Used at Refinery E.

As indicated in the plots, the dispersion in drift varied by petroleum refinery and screening instrument.

Number of Screening Measurements Potentially Impacted by Drift

Prior to initiating screening at Refinery A, drift targets for the standard were established to understand what would be acceptable and whether re-screening of components was required.

A drift target of ± 10 percent for all standards was established. However, during screening at Refinery A, it was determined that meeting this target for the 10 ppmv standard was too difficult and this target was increased to ± 25 percent for the 10 ppmv standard while the ± 10 percent target was maintained for the other standards.

In addition, as screened components could not be readily re-located (except for Refinery C that had affixed physical identification tags on all heavy liquid service components), components were not re-screened if an instrument did not meet a drift target. Rather, additional components beyond the targeted number of Study components were screened at each refinery to meet the target number in case some components were excluded after an analysis of drift.

The percentage and number of screening measurements whose screening instrument met a drift target varies by both the target and gas standard. The following tables provide an indication of the number of components that would be excluded if a drift target were used to exclude components from the Study.

Table III-75. *Percentage of Total Screening Measurements whose Screening Instrument Met Drift Target*

Drift Target	Met Drift Target for All Span Gases (percentage of total)				
(10 ppmv / All Others)	Refinery A	Refinery B	Refinery C	Refinery D	Refinery E
± 25% / ± 10 %	78%	90%	85%	83%	75%
± 25% / ± 12.5 %	79%	91%	89%	88%	85%
± 25% / ± 15 %	81%	91%	89%	89%	91%
± 25% / ± 20 %	82%	91%	89%	89%	93%
± 25% / ± 25 %	82%	91%	89%	91%	93%

Table III-76. *Number of Screening Measurements whose Screening Instrument Did Not Meet Drift Target*

Drift Target	Did Not Meet Drift Target for All Span Gases (total number of components)					
(10 ppmv / All Others)	Refinery A	Refinery B	Refinery C	Refinery D	Refinery E	Total
± 25% / ± 10 %	465	216	314	379	589	1,282
± 25% / ± 12.5 %	442	187	235	272	356	863
± 25% / ± 15 %	398	187	235	261	197	693
± 25% / ± 20 %	368	187	233	261	167	661
± 25% / ± 25 %	368	187	233	217	167	617

Table III-77. *Percentage of Measurements whose Screening Instrument Met Drift Target of All Gases Except 10 ppmv*

Drift Target	Met Drift Target for All Span Gases Except 10 PPMV				
(10 ppmv / All Others)	Refinery A	Refinery B	Refinery C	Refinery D	Refinery E
± 25% / ± 10 %	12%	0%	0%	4%	4%
± 25% / ± 12.5 %	15%	6%	0%	4%	6%
± 25% / ± 15 %	15%	6%	0%	4%	6%
± 25% / ± 20 %	15%	6%	0%	4%	6%
± 25% / ± 25 %	16%	6%	0%	4%	7%

Table III-78. Percentage of Measurements whose Screening Instrument Met Drift Target of All Gases or All Except 10 ppmv

Drift Target (10 ppmv / All Others)	Met Drift Target for All or All Except 10 PPMV Span Gases				
	Refinery A	Refinery B	Refinery C	Refinery D	Refinery E
± 25% / ± 10 %	89%	90%	85%	87%	78%
± 25% / ± 12.5 %	93%	97%	89%	92%	90%
± 25% / ± 15 %	95%	97%	89%	93%	97%
± 25% / ± 20 %	97%	97%	89%	93%	98%
± 25% / ± 25 %	98%	97%	89%	95%	100%

Table III-79. Number of Measurements whose Instrument Did Not Meet Drift Target for All Gases or All Except for 10 ppmv

Drift Target (10 ppmv / All Others)	Did Not Meet Drift Target for All or All Except 10 PPMV Span Gases					
	Refinery A	Refinery B	Refinery C	Refinery D	Refinery E	Total
± 25% / ± 10 %	219	216	314	287	500	1,101
± 25% / ± 12.5 %	140	64	235	180	224	639
± 25% / ± 15 %	96	64	235	169	65	469
± 25% / ± 20 %	66	64	233	169	35	437
± 25% / ± 25 %	34	64	233	125	5	363

Table III-80. Percentage of Measurements whose Screening Instrument Met Drift Target of Screening Range

Drift Target (10 ppmv / All Others)	Met Drift Target of Screening Range				
	Refinery A	Refinery B	Refinery C	Refinery D	Refinery E
± 25% / ± 10 %	83%	92%	89%	91%	93%
± 25% / ± 12.5 %	83%	92%	89%	91%	93%
± 25% / ± 15 %	83%	92%	89%	91%	93%
± 25% / ± 20 %	83%	92%	89%	91%	91%
± 25% / ± 25 %	83%	92%	89%	91%	91%

Table III-81. Number of Measurements whose Instrument Did Not Meet Drift Target for Screening Range

Drift Target (10 ppmv / All Others)	Met Drift Target of Screening Range					
	Refinery A	Refinery B	Refinery C	Refinery D	Refinery E	Total
± 25% / ± 10 %	360	157	233	204	500	937
± 25% / ± 12.5 %	359	157	233	204	224	661
± 25% / ± 15 %	358	157	233	204	65	502
± 25% / ± 20 %	358	157	233	204	35	472
± 25% / ± 25 %	358	157	233	204	5	442

Counts of measurements taken by screening instruments that experienced drift by field screening instrument drift percentage range, calibration gas, and refinery are presented in Figure III.74, Figure III.75, Figure III.76, and Figure III.77.

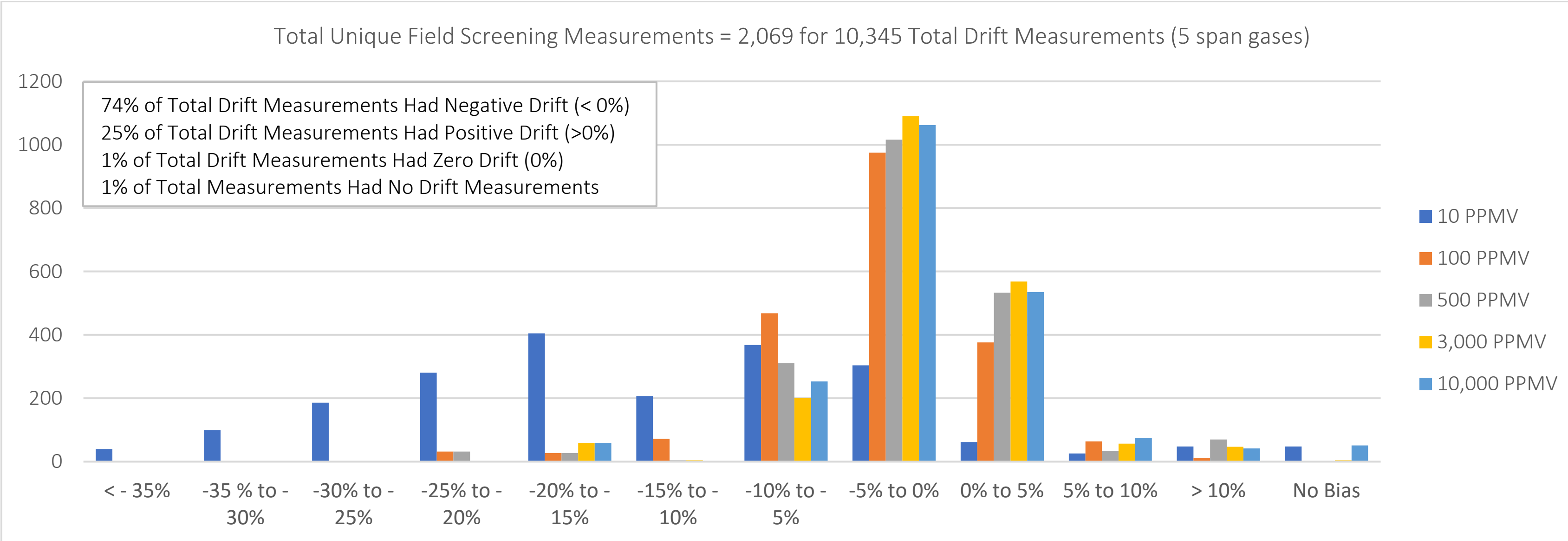


Figure III.74. Count of Measurements by Field Screening Instrument Drift Percentage and Calibration Gas at Refinery A.

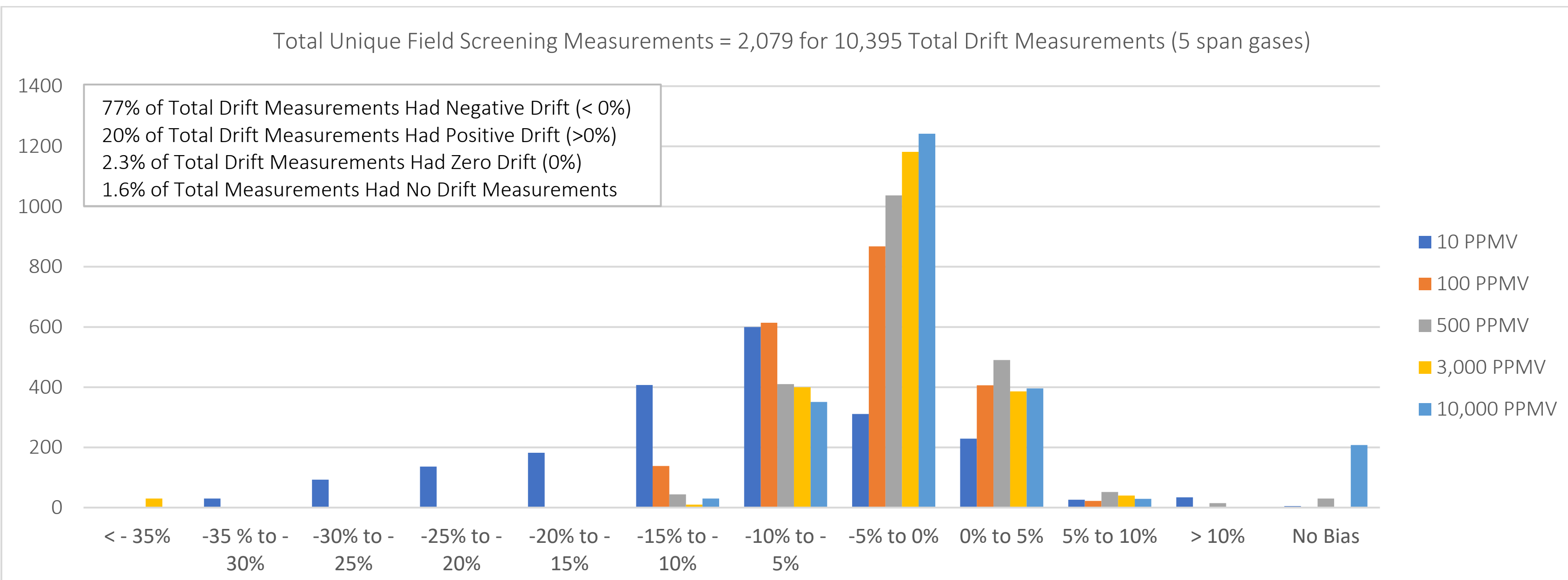


Figure III.75. Count of Measurements by Field Screening Instrument Drift Percentage and Calibration Gas at Refinery B.

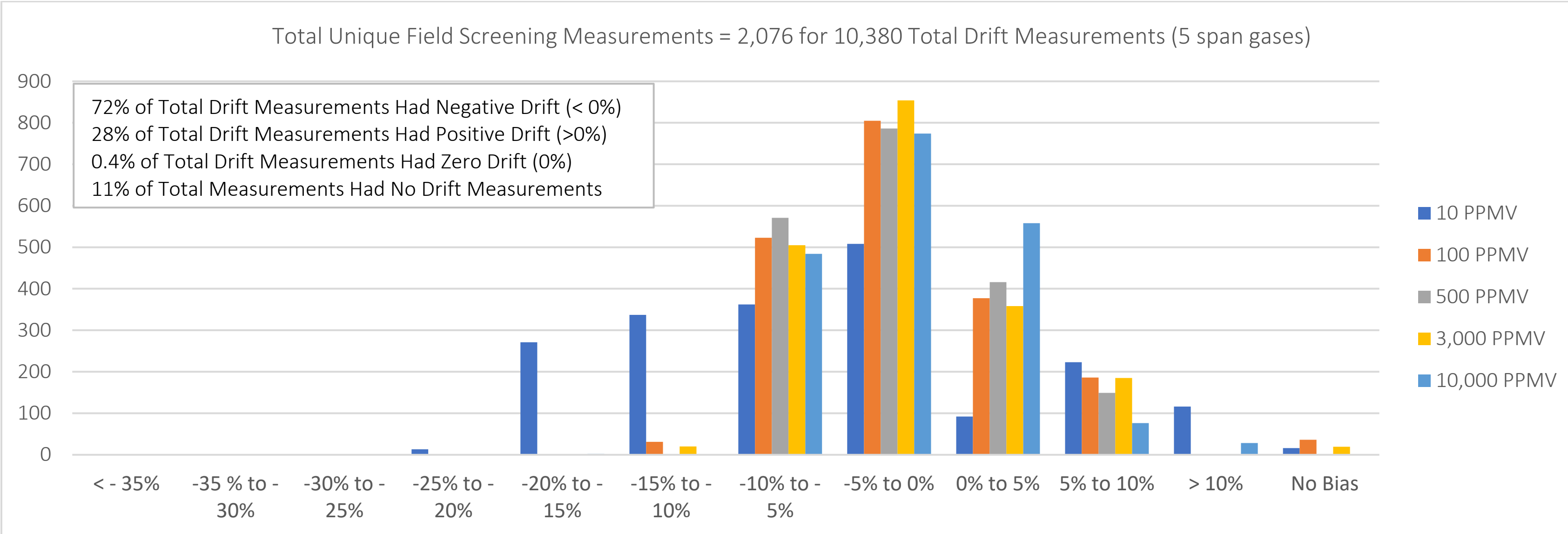


Figure III.76. Count of Measurements by Field Screening Instrument Drift Percentage and Calibration Gas at Refinery C.

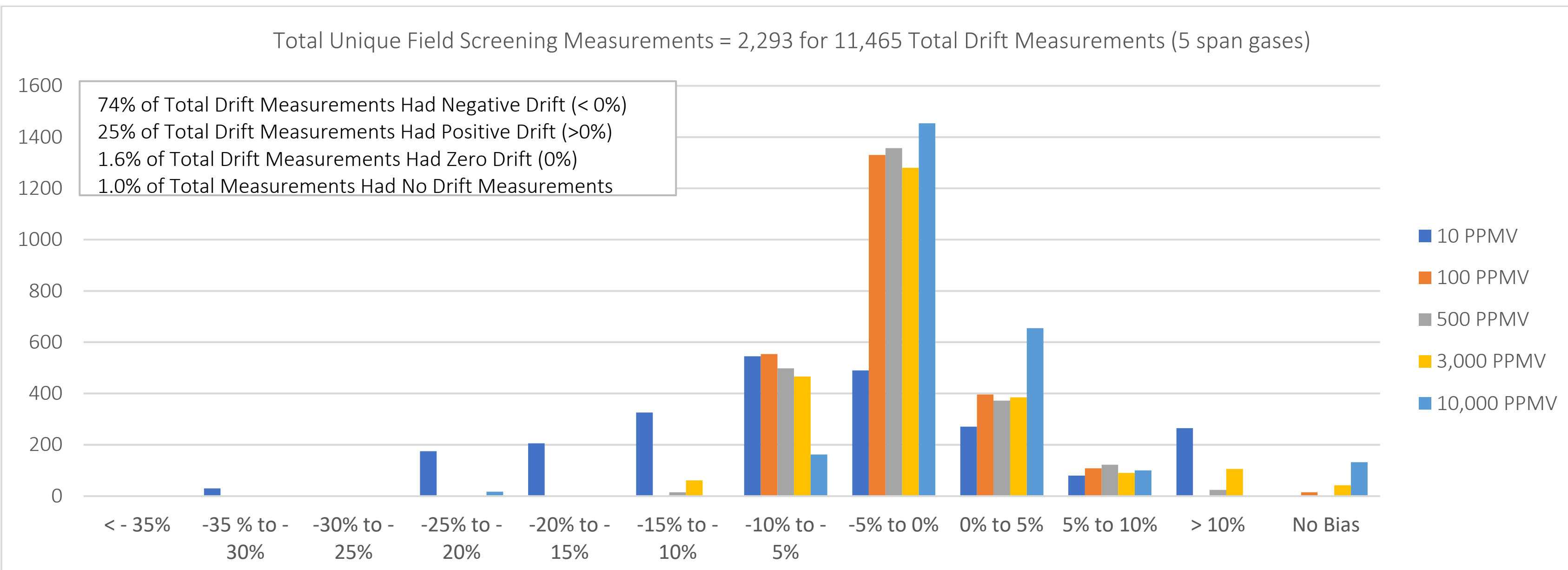


Figure III.77. Count of Measurements by Field Screening Instrument Drift Percentage and Calibration Gas at Refinery D.

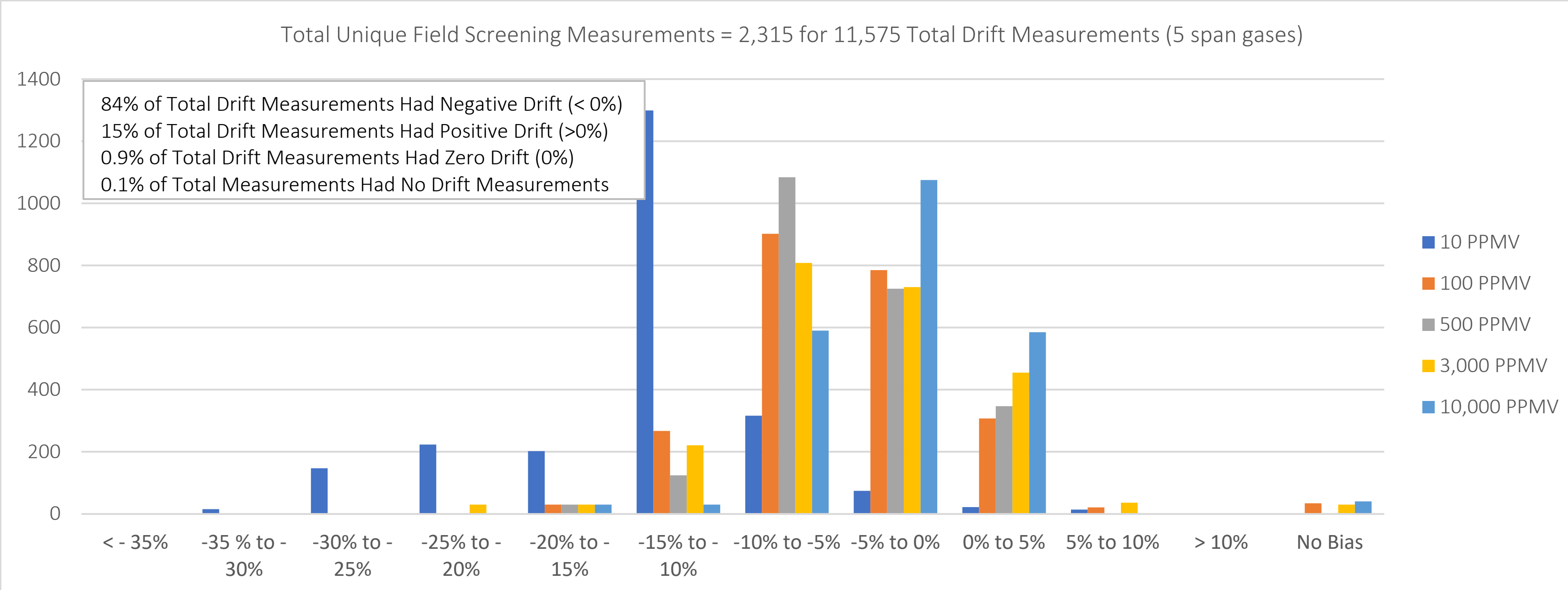


Figure III.78. Count of Measurements by Field Screening Instrument Drift Percentage and Calibration Gas at Refinery E.

III.v.2. Mass Emissions Sampling

Several quality assurance activities and quality control procedures were employed during sampling including:

- use of same model screening instrument for taking pre-bag measurements,
- equipment (screening instrument, sampling pump) calibrations,
- conducting drift tests of screening instruments,
- use of standard gases for both calibration and drift tests,
- checking screening instrument internal pump flow rate,
- minimum flow rates (dry gay meter, sample pumps, sample train),
- minimum sample volume,
- minimum sample bag vacuum,
- use of same sample media,
- use of clean sample lines,
- taking background samples at each petroleum refinery,
- repeated sampling,
- duplicate sampling,
- training of sampling personnel,
- use of standardized field data forms (see Appendix C-1 for an example),
- field spike recovery studies, and
- taking digital photographs of sampled components pre-sample, during sampling, and post-sampling.

Minimum Sampling Specifications

Quality assurance targets for minimum sampling specifications were outlined prior to sampling. These included:

- a minimum sample bag vacuum (0.001 to 0.1 inches H_2O),
- minimum sample train flow rate (1.0 liters per minute),
- minimum sample volume (12.0 liters), and
- minimum dry gas meter flow rate (5.0 liters per minute).

Sampling ranges for each of the above items by refinery are provided in Table III-82 and Table III-83.

***Table III-82**. Sampling Ranges of Sample Vacuum Pressure and Sorbent Media by Refinery*

Refinery	Initial Bag Vacuum [1] (Inches H_2O)		Bag Vacuum [2] (Inches H_2O)		Sample Flow @ STP [3] (Liters/minute)		Sample Run Time (minutes)		Sample Volume @ STP [3] (Liters)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
A	N/A [4]	N/A [4]	0.001	0.15	0.28	0.32	40.00	51.00	11.32	15.74
B	0.001	2.00	0.001	0.25	0.89	1.01	12.00	14.00	10.86	13.77
C	0.01	0.12	0.01	0.13	0.89	1.01	13.00	14.00	11.60	13.45
D	0.001	0.20	0.001	0.12	0.90	1.06	12.00	13.00	11.35	13.70
E	0.01	0.11	0.01	2.00	0.88	1.03	13.00	13.00	11.45	13.34

Notes:

1. The sample tent (bag) vacuum prior to initiating sampling

2. The sample bag vacuum after sampling began
3. STP = Standard temperature (21 degrees Celsius), standard pressure (760 mm Hg)
4. Initial bag vacuum at Refinery A was not recorded and is therefore, unknown

Table III-83. Dry Gas Meter Sampling Ranges by Refinery

Refinery	Dry Gas Meter Flow @ STP (3) (Liters/minute)		Dry Gas Meter Volume @ STP (3) (Liters)		Total Run Volume @ STP (3) (Liters)	
	Min	Max	Min	Max	Min	Max
A	3.66	8.08	153.56	369.88	166.89	385.61
B	1.09	7.64	13.10	91.71	35.88	116.87
C	0.65	6.83	8.48	88.78	33.10	115.12
D	1.61	7.14	20.92	92.78	48.22	119.17
E	5.16	6.92	67.11	89.94	91.12	115.30

Notes:
1. STP = Standard temperature (21 degrees Celsius), standard pressure (760 mm Hg)

The minimum bag vacuum requirement (0.001 inches H_2O) was met by all samples. However, a pressure gauge with a resolution of 0.005 inches H_2O was used in sampling. It is not clear how lower measurements were identified.

The minimum sampling rate of 1.0 liters per minute was not met at Refinery A or the other refineries but was within 11 percent for all but Refinery A.

A minimum sample volume of 12.0 liters was not met in several cases but was within 10 percent.

There were nine components where the dry gas meter flow did not meet the minimum flow rate requirement (5 liters/minute): A013, B01, C09, D09, D011, D025, D027, D045, and D052.

Field Spike Recovery Studies

Field spike recovery studies were conducted at each of the five refineries. Spikes with known amounts of specified compounds were introduced in the field either sequentially or in parallel with sampling of a component.

Summaries of these results are listed in Table III-84.

Table III-84. Field Spike Recovery Sample Results

			Recovery Percentage (%) by Compound (by carbon number)																					
Refinery	*Sample*	*Spike*	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}	Minimum	Maximum
A	A004		119	164	183	165	147	196	528	350	219	83	-4	105	107	115	90	113	112	112	109	105	-4	528
A	A005		80	102	99	108	111	85	177	73	-34	-112	-142	57	86	94	94	96	92	89	84	80	-142	177
A	A006		92	85	115	119	120	120	110	110	118	141	107	93	99	100	95	93	90	87	82	78	78	141
A	A007		91	85	101	125	163	355	195	-70	39	-101	-17	63	89	97	94	95	91	105	82	78	-101	355
A	A015		89	96	70	109	-2	-279	-284	-210	-177	-25	100	129	100	99	94	91	88	84	79	75	-284	129
A	A012	*Low*	99	115	118	129	133	135	135	145	144	140	124	122	118	115	112	108	104	101	96	91	91	145
A	A015	*High*	102	118	114	126	118	114	114	173	215	273	138	125	121	119	116	113	109	106	101	97	97	273
A	A020	*High*	92	107	106	128	134	137	143	157	310	526	153	126	123	121	117	115	111	108	103	98	92	526
A	A029	*Low*	106	116	122	136	152	145	137	126	129	149	143	135	132	129	125	122	119	115	111	106	106	152
A	A032	*Low*	107	123	125	130	140	141	136	134	138	153	136	131	127	124	120	117	113	109	104	99	99	153
A	A035	*High*	105	119	109	113	114	90	36	-45	-99	160	90	119	115	112	109	108	106	103	100	95	-99	160
A	A084	*Low*	85	143	185	108	113	119	119	119	117	115	114	110	107	105	102	99	96	92	88	83	83	185
B	B009		83	103	113	125	133	137	136	133	135	138	128	95	120	118	115	115	111	110	103	99	83	138
B	B014		90	105	115	133	136	140	140	140	136	135	132	131	129	126	123	120	116	112	107	103	90	140
B	B025		91	105	114	123	104	106	128	135	125	121	119	123	121	121	117	115	111	108	103	99	91	135
B	B035		107	118	126	116	114	114	111	110	111	109	107	102	99	95	91	86	82	77	71	66	66	126
B	B038		105	113	121	115	115	115	113	111	111	109	108	105	102	99	95	92	87	83	78	73	73	121
B	B051		104	110	116	133	135	130	127	128	138	136	135	135	132	130	127	124	120	117	113	110	104	138
C	C003	*Low*	103	110	120	128	130	131	132	132	134	132	129	123	120	117	113	110	107	103	98	94	94	134
C	C015	*Low*	81	84	88	133	138	165	301	153	154	141	139	133	130	128	124	121	117	114	108	103	81	301
C	C024	*Low*	75	83	85	132	136	142	141	141	141	139	137	130	126	123	119	116	112	108	103	98	75	142
C	C039	*Low*	94	101	105	138	144	148	148	148	148	145	142	135	131	128	124	121	116	113	107	103	94	148
C	C042	*Low*	108	122	130	135	141	151	160	146	147	144	141	133	130	127	123	120	116	111	107	102	102	160
C	C051	*Low*	105	117	128	135	155	156	146	153	139	136	132	124	120	117	113	110	107	103	98	94	94	156
D	D014	*High*	125	129	125	137	98	28	93	107	108	116	114	113	111	109	107	105	102	99	95	91	28	137
D	D031	*Low*	110	117	129	125	124	126	125	125	125	123	121	118	114	111	106	102	97	92	88	83	83	129
D	D042	*High*	112	108	116	111	129	67	64	138	299	212	145	122	117	115	111	109	106	102	98	94	64	299
D	D049	*High*	95	102	107	126	125	114	107	129	122	113	117	121	120	118	115	112	109	105	101	98	95	129
D	D054	*Low*	108	96	99	159	130	132	131	124	130	127	125	117	105	116	115	111	107	104	100	95	95	159
D	D057	*Low*	95	114	129	124	126	128	126	126	126	124	124	123	120	118	114	111	108	105	103	99	95	129
D	D072	*High*	90	112	119	63	81	90	100	100	97	98	96	94	91	89	85	81	76	72	67	62	62	119
E	E012	*Low*	99	115	118	129	133	135	135	145	144	140	124	122	118	115	112	108	104	101	96	91	99	115
E	E015	*High*	102	118	114	126	118	114	114	173	215	273	138	125	121	119	116	113	109	106	101	97	102	118
E	E020	*High*	92	107	106	128	134	137	143	157	310	526	153	126	123	121	117	115	111	108	103	98	92	107
E	E029	*Low*	106	116	122	136	152	145	137	126	129	149	143	135	132	129	125	122	119	115	111	106	106	116
E	E032	*Low*	107	123	125	130	140	141	136	134	138	153	136	131	127	124	120	117	113	109	104	99	107	123
E	E035	*High*	105	119	109	113	114	90	36	-45	-99	160	90	119	115	112	109	108	106	103	100	95	105	119
E	E084	*Low*	85	143	185	108	113	119	119	119	117	115	114	110	107	105	102	99	96	92	88	83	85	143
		Minimum	75	83	70	63	-2	-279	-284	-210	-177	-112	-142	57	86	89	85	81	76	72	67	62	-284	119
		Maximum	125	164	185	165	163	355	528	350	310	526	153	135	132	130	127	124	120	117	113	110	106	528

Replicate Sampling

Replicate samples were taken with each primary sample. Replicate samples at Refinery A and some at Refinery B were taken sequentially after the primary sample using the primary sampling line (there was a secondary sampling line that was used for field spikes). Sequential sampling introduced an additional variable (operational changes over time) as a possible cause for potential differences between primary and replicate sample results.

Replicate sampling at the other petroleum refineries were taken in parallel using a secondary sample line at the same time as the primary sample.

A comparison of primary sample results with replicate sample results can be made by plotting the results against each other as shown in Figure III.79.

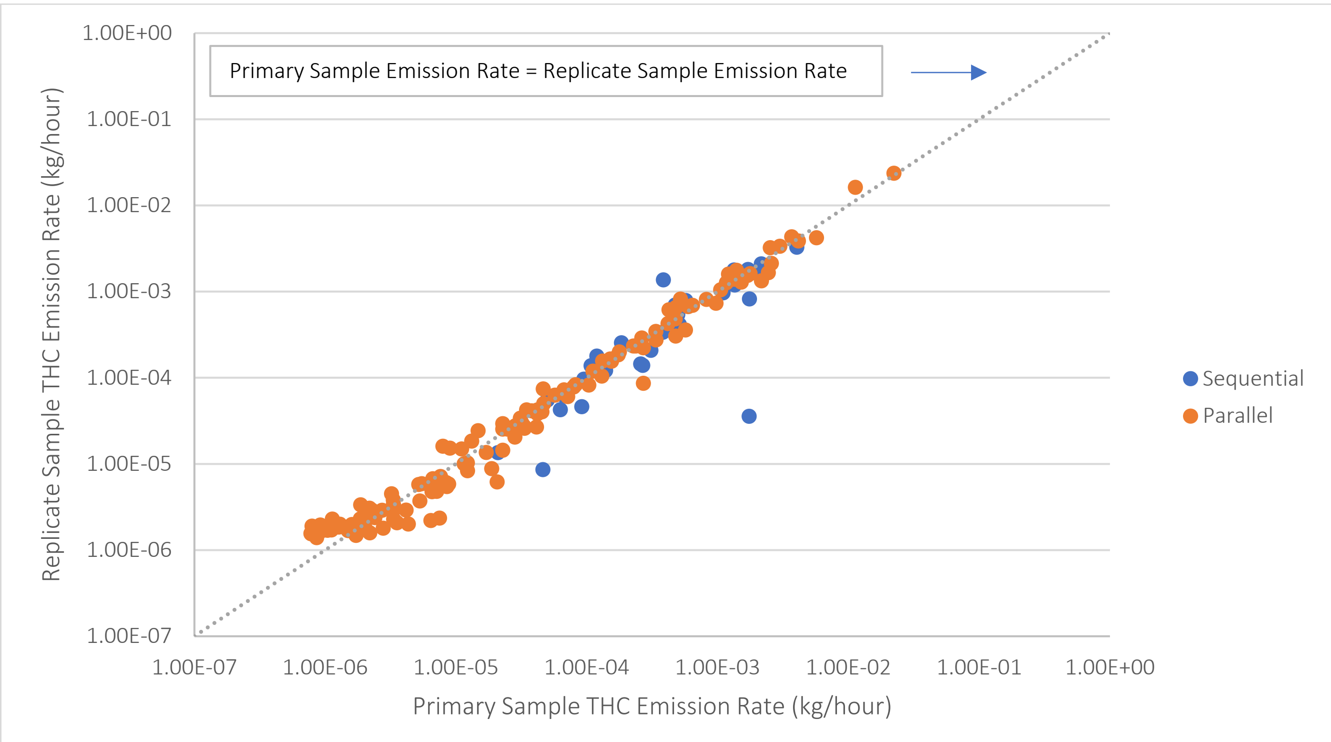


Figure III.79. Primary versus Replicate Sample Results for Both Sequential and Parallel Replicate Sampling

As demonstrated in Figure III.79, measurements of replicate samples taken sequentially after primary samples show a greater separation from primary sample measurements. There was one component (A09) whose primary and replicate sample results differed by two orders of magnitude and whose relative difference (primary results – replicate results / average of the two) was 192 percent. For this component, approximately 75 minutes elapsed between the start of primary sampling and the start of replicate sampling.

The relative difference between each primary and replicate sample pair is plotted with the average of the two samples in Figure III.80 . A difference of zero would indicate the primary sample and replicate sample results were approximately equal.

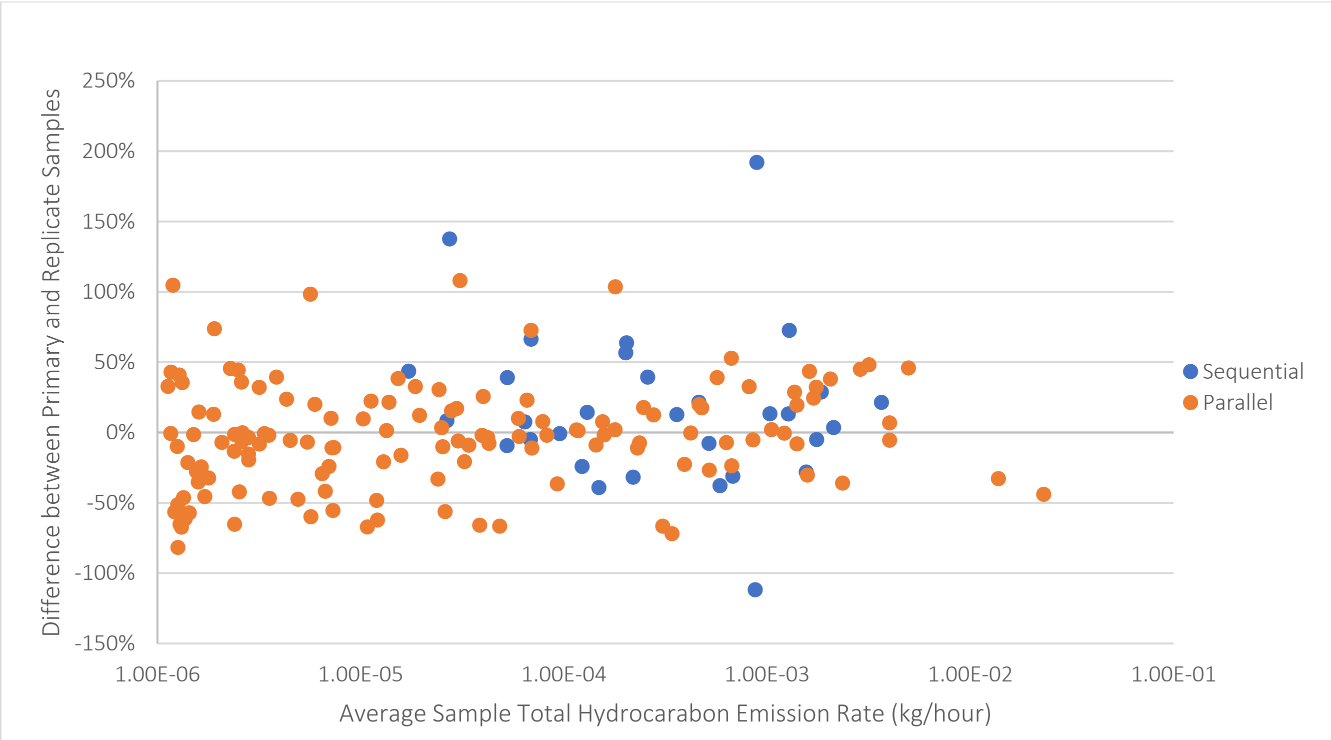


Figure III.80. Average of Primary and Replicate Sample Results versus Percent Differences of Primary and Replicate Samples.

Most primary and replicate sample results were within ± 50 percent of each other.

The two data points (the uppermost and lowermost data points) with the largest difference had an average emission rate of 1.00E-03 kg/hour and a differed by 192 percent and –112 percent. Replicate sampling in both instances (Sample A09 and A017) was done sequentially.

Repeated Sampling

At least one component at each petroleum refinery had repeated sampling done.

There were eleven components that were sampled multiple times (not including replicate sampling). These components were: A-901, A-1050, A-1259, A-1730, B-0551, B-0632, B-0818, B-1124, C-21210, D-0596, and E-2200.

Except for Component A-1050, each component was sampled twice with each sampling having both a primary and replicate sample.

Component A-1050 was sampled four times.

The following figure plots the average of the primary and replicate samples for each repeated sample pair against each other.

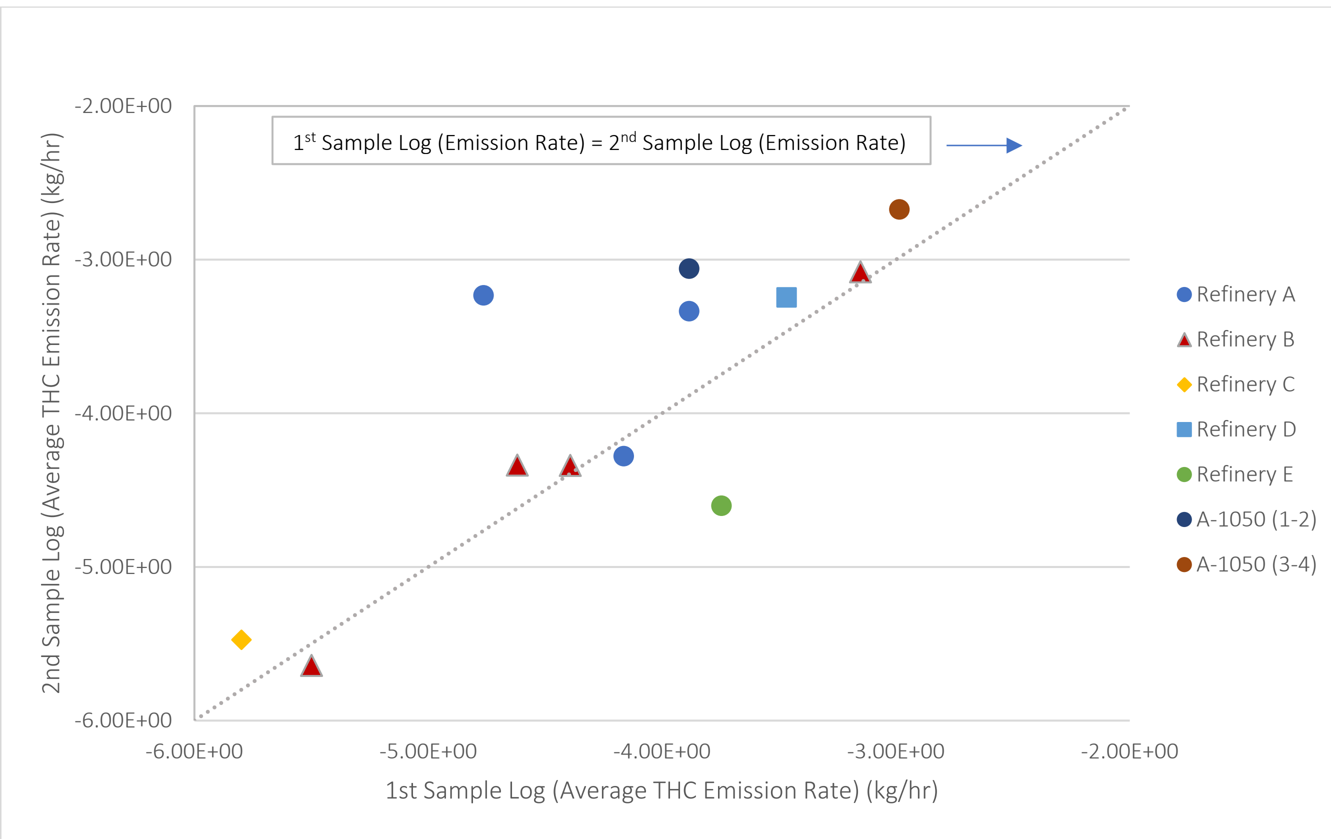


Figure III.81. Comparison of results of repeated sampling

Repeated sample results at Refinery B showed close alignment while results for components A-1730 and E-2200 had the largest difference between sample pairs.

Component A-1050 was sampled four times (each with a primary and replicate sample) with three and four days in between sampling.

Plotting the pre-bag screening values with the averages of the primary and replicate samples for each of the four repeated samples of component A-1050 shows an increase in the average sample results with each repeated sample (see **Figure III.82**).

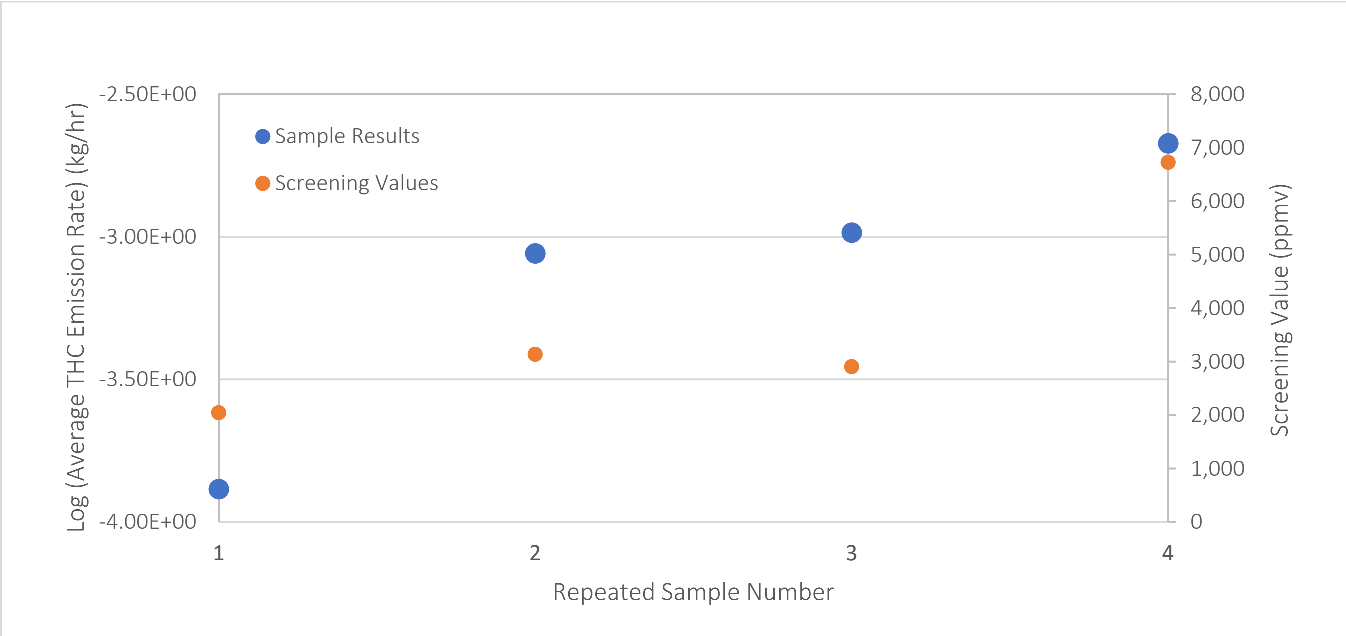


Figure III.82*. Comparison of results of repeated sampling of component A-1050.*

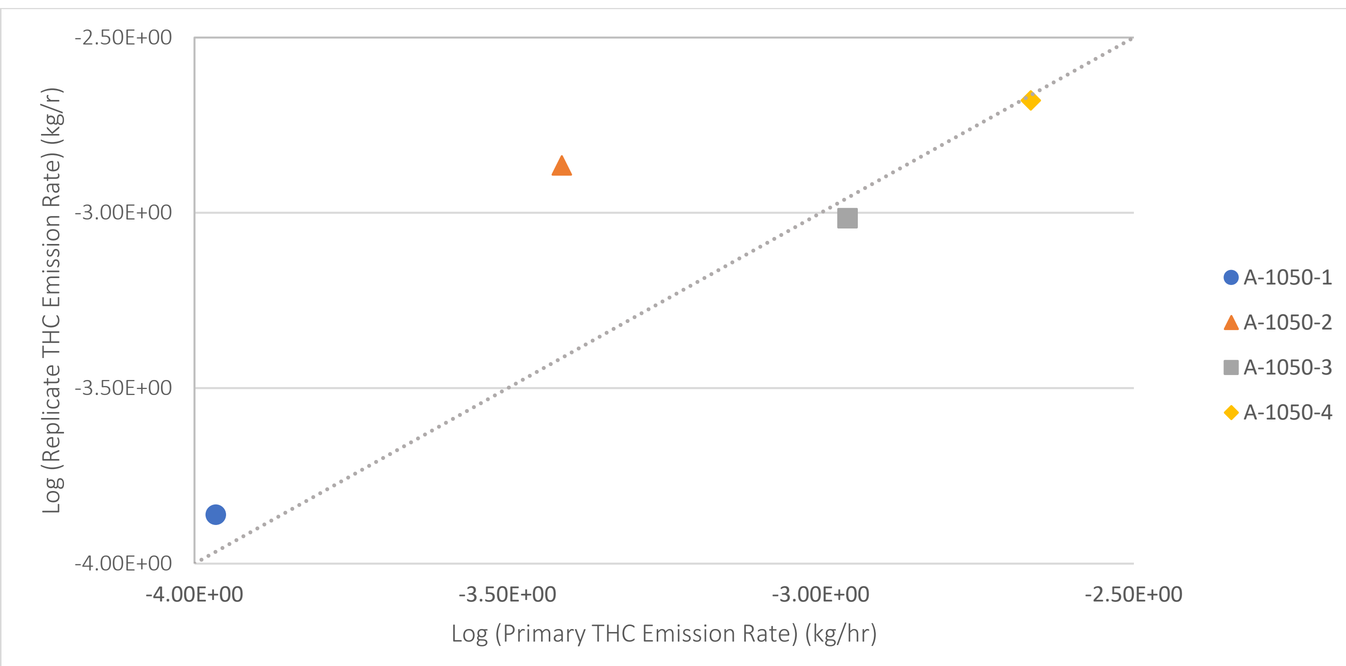


Figure III.83*. Primary versus replicate sample results of repeated sampling of component A-1050.*

III.v.3. Laboratory

The third-party laboratory (Enthalpy Analytical, LLC) performed several quality control activities as stipulated by the test methods employed as well as by the laboratory's own internal standards.

For each set of spikes prepared for field spike recovery studies, the laboratory retained two spikes for use as laboratory control samples. The results of laboratory control samples can ascertain the laboratory's ability to recover known amounts of compounds.

Laboratory recoveries of C_5 to C_{30} compounds varied between 28 percent (C_5 n-Pentane) to 191 percent (C_{22}, C_{23}, and C_{24} compounds). The minimum and maximum recoveries by refinery are provided in Table III-85. Detailed recoveries by laboratory control sample are provided in Appendix C-2.

Table III-85. Laboratory Control Sample Recoveries Summary

Refinery	Count of Laboratory Control Samples	Minimum (%)	Maximum (%)
Refinery A	17	28	191
Refinery B	7	78	163
Refinery C	9	71	128
Refinery D	12	76	143
Refinery E	9	64	130
All	54	28	191

For selected component samples, the laboratory prepared an additional aliquot of the sample for processing, testing, and analysis independent of the initial sample aliquot. A comparison of results with the initial aliquot results provides an indication of the laboratory's precision and repeatability.

A summary of laboratory duplicates results by refinery is outlined in Table III-86.

Table III-86. Laboratory Duplicates Percent Difference Ranges for Compounds Detected Above Detection Level by Refinery

Refinery	Count of Lab Duplicate Samples	Percent Difference of Detects (1)	
		Minimum (%)	Maximum (%)
Refinery A	13	0.01	49
Refinery B	8	0.05	14
Refinery C	7	0.16	5
Refinery D	13	0.03	43
Refinery E	10	0.09	29
All	51	0.01	49

Notes:
1. Range of percentage difference between duplicate and sample for where the compound of interest was detected above a detection level.

A summary of laboratory results by compound is listed in Table III-87.

Table III-87. *Laboratory Duplicates Percent Difference Ranges for Compounds Detected Above Detection Level by Compound*

Compound	Count of Duplicates	Count of Detects [1]	Percent Difference of Detects [2]	
			Minimum (%)	Maximum (%)
n-Pentane (C_5)	51	8	0.2	24.8
n-Hexane (C_6)	51	10	2.1	47.2
n-Heptane (C_7)	51	10	0.1	28.9
n-Octane (C_8)	51	20	0.03	15.6
n-Nonane (C_9)	51	23	0.02	29.8
n-Decane (C_{10})	51	27	0.1	6.6
n-Undecane (C_{11})	51	30	0.04	10.0
n-Dodecane (C_{12})	51	31	0.1	21.0
n-Tridecane (C_{13})	51	29	0.1	11.5
n-Tetradecane (C_{14})	51	30	0.2	11.6
n-Pentadecane (C_{15})	51	27	0.01	11.7
n-Hexadecane (C_{16})	51	19	0.2	28.9
n-Heptadecane (C_{17})	51	16	0.2	24.8
n-Octadecane (C_{18})	51	12	0.3	10.0
n-Nonadecane (C_{19})	51	11	0.6	12.3
n-Eicosane (C_{20})	51	11	0.1	14.7
n-Heneicosane (C_{21})	51	8	0.9	17.9
n-Docosane (C_{22})	51	10	0.3	34.0
n-Tricosane (C_{23})	51	8	0.3	22.8
n-Tetracosane (C_{24})	51	8	0.8	26.2
n-Pentacosane (C_{25})	6	2	7.5	29.5
n-Hexacosane (C_{26})	6	2	7.0	33.0
n-Heptacosane (C_{27})	6	2	6.0	36.9
n-Octacosane (C_{28})	6	1	40.8	40.8
n-Nonacosane (C_{29})	6	1	45.9	45.9
n-Triacotane (C_{30})	6	1	49.0	49.0

Notes:

1. Count of duplicate samples where the compound of interest was detected above a detect level.
2. Range of percentage difference between duplicate and sample for where the compound of interest was detected above a detection level.

IV. Discussion

In this section, the findings outlined in the Results Section and relevant appendices are discussed.

i. Study Coverage

The Study investigated emissions from components by multiple categories including by petroleum refinery, component type, process unit, stream material, operating temperature (using external component temperature as a surrogate), operating pressure, as well as several others.

Petroleum Refinery

Components at all five Bay Area petroleum refineries were included within the Study. Components of similar type, subtype, stream material, and operating conditions were evaluated at each petroleum refinery. Where differences existed between the five petroleum refineries was in the types of process units / areas where connectors and valves were screened, screening personnel, as well as the types of components that were sampled for mass emissions measurements.

Component Types

At the initiation of the Study, four component types were identified for inclusion within the Study:

- pump seals,
- valves,
- connectors, and
- pressure relief valves that relieved to atmosphere.

Almost all accessible pumps and pump seals were screened as part of the Study while approximately six percent of the total estimated valve population and approximately two percent of the total estimated connector population was screened.

Some pressure relief devices including pressure relief valves were screened. However, these components did not relieve to atmosphere and were categorized as connectors.

Because of the lack of atmospheric relieving pressure relief valves that were evaluated within the Study, there is insufficient information to understand or derive an average emission rate for pressure relief valves that handle heavy liquid materials and relieve to atmosphere.

Process Units

Since it was deemed practical and feasible to screen all pump seals at each petroleum refinery, almost all process units are covered within the Study.

However, valves and non-pump associated connectors were only evaluated within selected process units.

A maximum number of two process units per petroleum refinery was initially targeted to study emissions from connectors and valves. The number of process units was expanded until the targeted number of screened components was met.

The distribution of screening values was found to vary by process unit / area (see Figure III.10). However, as shown in Table III-72, non-pump associated connectors and valves were screened in only a fraction of the total number of process units / areas.

Because of this, results may differ if more or different process units are studied.

ii. Screening

Other than the specifics of a component, screening results are dependent upon:

- screening instrument response,
- screening distance,
- screening time,
- screening pace, and
- screening instrument drift.

Screening Instrument Response

Screening instrument response (the difference between the measured concentration and the actual concentration of a leak) was found to vary depending upon the stream material, the leak magnitude, and the temperature of the stream material.

In general, screening instruments responded quicker to leaks from components handling lighter materials (kerosene, diesel, jet), at lower temperatures, with large screening values.

Leaks from components handling heavier, hotter streams had slower instrument responses. In addition, after screening such components, screening instruments took longer to return to background levels.

Therefore, if insufficient time was spent screening a leak, measured screening values may be lower than actual. If screening instruments were not permitted to return to background levels before a subsequent measurement, measured screening values may be higher than actual.

Approximately 94 percent of screening values were less than 10 ppmv. Therefore, there is a greater potential impact on average emission rates from screening too fast and not measuring the actual leak concentration than not allowing screening instruments to return to background levels.

Although not investigated, one potential explanation for the observed difference in screening instrument response to different process streams and process stream temperatures may be gas/vapor phase streams condensing within the screening instrument (probe, probe filter, tubing, etc.).

Screening Distance

Screening distance was found in several previous studies (1980 EPA Study, API Publication Number 332, etc.) to have a significant impact on the measured screening value. The differences between screening values when screening at the surface versus at 1 centimeter from the surface could be three to four times higher, depending on the instrument.

Within API Publication Number 332, the Western States Petroleum Association found results that indicated a screening value of 10,000 ppmv at the surface would correspond to a screening value of less than 3,000 ppmv when screened at one centimeter from the surface with an FID screening instrument (the same type used in the Study). If components were screened at greater distances from the surface, measured screening values would be lower.

The Study required screening components at the surface of the component where leaks would occur. However, unlike the 1980 EPA Study where an offset device was used to ensure screening values were taken at one centimeter, the Study did not include a mechanism for determining the actual distance a component was screened at if not at the surface.

The screening field notes include three known areas where components were not screened at the surface:

- where insulation or scaffolding prevented access,
- where a grate, metal plate, or guard was surrounding a pump seal shaft, or
- where a pump seal had steam injection,

If a component could not be screened at all because of insulation, it was noted in field screening sheets. However, there were multiple entries where components could not be screened completely.

When a grate, plate, or guard is present; the typical grate or guard surrounds a pump rotating shaft at an offset distance of several inches with some pump shafts having a grate or guard at eight or ten inches offset. In these instances, because screening was not conducted at the surface of the seal, measured screening values are expected to be much lower than would have otherwise been measured.

For steam injected pump seals, some pumps were found to have high steam injection rates where steam was billowing out from the seal, which prevented screening at a distance any closer than several feet away. One such pump was found to have a screening value of 760 ppmv at over a foot or more of distance. Because of the distance at which the screening measurement was taken and the findings of previous studies, a screening value of well over 10,000 ppmv was expected. This pump was also leaking a steady stream of hydrocarbons into a pool that collected at the base of the pump.

Screening Time

For a given leak, the maximum leak concentration is expected to remain relatively constant within a short duration. Screening time is not expected to impact the actual leak concentration but rather what is measured. Screening a component for longer will not change the actual leak concentration (i.e., screening measurements will not exceed actual values) but screening too quickly is likely to result in a measurement that does not reflect the actual leak concentration.

Overall, screening conducted by refinery personnel at Refineries B, C, D, and E was quicker than screening conducted by Air District personnel at Refinery A and Refinery B. Some of the difference may be attributed the differences in screening between components in gas and light liquid service, in which Air District personnel have most experience, and in components in heavy liquid service.

Screening Pace

Screening pace differs from screening time in that screening pace accounts for the size of a component. Larger components will require more time to screen and detect the location of a maximum leak. Screening pace varied by refinery with screening pace found to be longer at Refinery A and Refinery B where the Air District conducted screening. Because of the variation in stream materials, stream temperatures, and leak magnitude; screening instrument response varied sometimes from process line to process line as components in different streams and temperatures were screened.

Prior to screening at Refinery A, the Air District evaluated screening instrument response times to several different materials at different temperatures (see Table II-11) and found that screening instrument response times varied by material and temperature. This was also found during screening at Refinery A. During training, all screening personnel were instructed that screening pace would need to be adjusted based on field conditions, but that screening should not occur any faster than four seconds per inch of component surface screened. An attempt was made to determine if there was a minimum screening pace per stream material and temperature using the screened data set, but it was difficult to differentiate a minimum screening pace based on screening instrument response from the potential impact of screening personnel (whether they were screening too fast or screening longer than necessary).

To understand and determine a screening pace based on stream material and stream temperature of a component, the work carried out and depicted in Table II-11 would need to be expanded.

Screening Drift

Screening instruments were found to experience significant drift. Individual screening instruments at each refinery experienced varying levels of drift (see Figure III.69 through Figure III.73 and Appendix C-2).

However, except for the 500 ppmv standard at Refinery D, the entire confidence interval for each standard on average was negative suggesting a negative bias in screening results.

Prior to screening, maximum drift targets were established as ± 10 percent for each standard. While screening at Refinery A, the maximum drift target for the 10 ppmv calibration gas was increased to ± 25 percent.

There are several potential ways to address the negative bias in screening results. One way is to simply exclude components that did not meet a maximum drift criterion. The number of potential components that would be excluded by varying maximum drift criteria is shown in Table III-76, Table III-79, and Table III-81.

As shown in Table III-76, excluding components that were screened with an instrument that did not pass the maximum drift criterion for all calibration gases would result in discarding up to 1,282 screening measurements (approximately 12 percent of all screening measurements).

Another solution would be to adjust screening values by the amount of drift experienced either using an average applied to all screening values or the drift experienced by the screening instrument used to take a measurement. The first approach would be less accurate than the second. However, there were often dozens of screening measurements taken with a screening instrument in between when an instrument was calibrated and when it was drift tested. The first measurement after calibration may have caused an instrument to drift or the last measurement may have caused it. Adjusting all screening measurements by the drift measured at the end of a screening session was found to increase average emission rates by between one and nine percent, depending upon the component type.

However, the screening instruments used to take pre-bag screening measurements used in the regression analysis also experienced similar drift. Rather than adjust both the pre-bag screening measurements and the screening data set, screening instrument drift was attributed to measurement error, which was addressed by simulation as explained in Appendix D-1.

iii. Mass Emissions Sampling

Mass emissions sampling at the five refineries differed in various ways that may account for some of the differences in results.

Sampling Rates

The sampling rates for samples taken at Refinery A were approximately one-third the rate for samples taken at the other four refineries (~ 0.30 liter/minute versus ~1.0 liter/minute). The corresponding sample run time for samples at Refinery A was approximately three times longer than samples taken at the other refineries. The difference in sampling run times meant that a given volume of sample had different retention times within the sorbent media and that the potential sample variation due to potential process changes also differed.

Sampling Media

Other than the cannister samples, all samples were taken with coconut charcoal sorbent tube media while components at Refinery A were also sampled with a XAD resin tube. Per the sorbent manufacturer (SKC), XAD tubes are used to adsorb soluble organic compounds while charcoal sorbent tubes are used for primarily non-polar compounds. The reduction in the number of sorbent tubes (from three to two) increased the likelihood of breakthrough which was indicated by the third-party laboratory as likely occurring with sample C004.

Background Influence

There were 39 samples where holes in tent enclosures were made by sampling personnel to “vent bag”. If ambient air was drawn into the enclosure, it may have introduced a bias to the sample. However, in addition to a component sample, background samples were also taken, and background sample measurements subtracted from component sample measurements. Therefore, a potential bias should have been mitigated. However, if rather than pulling in ambient air, sample air was exhausted out of the tent enclosure, it may have impacted sample results if the sample air were not homogenous but rather stratified.

As shown in the Appendix B-3 plots of sample results by refinery and sample number, the background concentrations of hydrocarbons varied by refinery. Refinery A had the most background samples with results measured above the detection limit as well as the greatest background measurements in magnitude. Background sample A023 had results that dwarfed those of the component sample with peaks centered around C_{13} as Tridecane and a C_{13} peak concentration of 188,818 µg/m^3.

However, most background concentrations measured during screening were below 10 ppmv with the highest background concentration measured to be 29 ppmv as shown in Table B-1-2 of Appendix B-1.

Sampling Limitations

There were several limitations that prevented sampling of all selected components including accessibility, change in leak magnitude, and component external temperature.

Some components that were initially selected for sampling were found to be inaccessible at the time of sampling, most often due to scaffolding that was erected in between screening and sampling.

Other components were not sampled because either the leak location could not be identified, or the magnitude of the leak changed such that it fell out of the screening value range that was the basis for selecting the component for sampling.

Neither of the above reasons is likely to influence Study results as there was not an apparent connection between the components other than the reason for not sampling.

However, there was a temperature limitation where components with external temperatures above a certain temperature (approximately 400 degrees Fahrenheit) were not sampled and this may have impacted Study results.

As shown in Section III.iv.1 Regression Analysis and in Appendix D-1, mass emissions were found to correlate with temperature. If higher temperature components could have been sampled, the regression analysis and resulting emissions estimated may differ from current estimates.

Sample Shipment Periods

There were varying time periods between when a sample was taken and when it was sent to the third-party laboratory. Some samples were sent the same day as sampling while others were shipped up to 15 days in after sampling. In general, there is an increased risk of sample contamination or sample volatilization (loss of sample) the more time that elapses between when a sample is taken and when it is analyzed.

Field Spike Recoveries

Field spike recoveries – where known amounts of different analytes were introduced into the sampling train and then the amount recovered in the laboratory compared to the amount introduced – widely varied by petroleum refinery and by compound (see Table III-84). The largest differences in recoveries occurred in the initial samples at Refinery A and attenuated by the field spike recovery samples at Refinery E. This may be attributed to sampling technique as the same sampling personnel were used at all five petroleum refineries.

However, there were certain compounds where field recoveries were especially poor or too great at all five petroleum refineries: C_9 to C_{15} compounds.

Replicate Sampling

With every component sample, a primary and replicate sample was taken. Replicate samples taken at Refinery A and some at Refinery B were taken sequentially after the primary sample while replicate samples taken at the other petroleum refineries were taken in parallel with the primary sample. The greatest difference between primary and replicate samples was shown to be where replicate samples were taken sequentially (Figure III.79 and Figure III.80) where operational differences occurring between the time a primary sample and replicate sample were taken could not be discounted as the cause for the difference.

Repeated Sampling

As demonstrated in Figure III.81, measured emissions from a component tended to increase with sequential sampling. This may be because sampling technique improved with familiarity of the component by sampling personnel, because of a change in process conditions, or a physical impact of bagging on the component and the leak.

Sampling technique would be expected to improve with repeated sampling of a component as sampling personnel would have a greater understanding of where to affix and position sampling materials.

Changing process conditions could explain the trend as 11 components is a small statistical sample size to discount random variation.

Another possibility is that the process of sampling a component (affixing a tent enclosure, pulling a vacuum, sampling, etc.) impacts a component leak. This may be likely if there were accumulated, solidified material on the component around the location of the leak. However, such material does not appear to be present when viewing the bagging photographs (Appendix E) of the components that were repeatedly sampled.

Lighter Compounds

All samples were analyzed for C_5 to C_{24} compounds while any collected condensate was analyzed for C_5 to C_{30} compounds. These compounds were selected as they were likely to be present in stream materials designed as heavy liquid (having an initial boiling point greater than 302 degrees Fahrenheit). Lighter compounds (C_1 to C_5) were not expected to be present in significant amounts in heavy liquid streams and therefore, samples were not required to be analyzed for these compounds to reduce sampling and laboratory costs.

However, to verify whether this assumption was correct, the Air District sampled four components handling different stream materials (recycled gas oil, light gas oil / heavy gas oil, diesel, and fractionator bottoms) in two different process units (fluidized catalytic cracking unit, hydrotreater) at Refinery A. Samples were analyzed for C_1 to C_{30} compounds.

If the total mass of the C_1 to C_4 compounds exceeded five percent of the total mass of all 30 analyzed compounds from each component, then these results would either be applied to the other samples by use of a scaling factor or samples would need to include the C_1 to C_4 compounds.

As shown in Table III-44 and Figure III.36 to Figure III.43, total emissions of C_1 to C_4 compounds were a fraction of the total emissions from each component (less than one percent). Therefore, it was assumed that the other component leaks that were sampled had negligible amounts of C_1 to C_4 compounds and these results were not included in the average emissions rate analysis.

iv. Laboratory

Laboratory reports that accompanied sample results noted several potential issues that may affect results.

Sampling Media

Multiple sample media were received by the laboratory with cracked or broken tube end caps (Samples B015, D03A2, D04A2, D023A1, D034) or broken tube (A017A1 XAD tube).

Breakthrough

Sample breakthrough was noted as likely occurring with sample C004 where the back half of the second sorbent tube was found to have a significant catch for pentane (~10.7 percent of the total catch).

Sample C004 had the highest measured pre-bag screening value (28,300 ppmv) of all sampled components and had a post-test screening measurement that flamed out the screening instrument, which typically occurs at screening values of 100,000 ppmv or greater.

Measured emissions from sample C004 were the second greatest of all samples and may have been the greatest if an additional sorbent tube were used such as the XAD tube.

Recoveries

Laboratory control sample recoveries varied by petroleum refinery but similar to field spike recoveries, laboratory control sample recoveries for Refinery A differed from the other four refineries with a minimum of 28 percent and a maximum of 191 percent for Refinery A and a minimum of between 64 percent to 78 percent and a maximum between 130 percent to 163 percent for the other petroleum refineries (Table III-85).

v. Analyses

During the analysis of screening and sampling results, multiple considerations and decisions were made that may have impacted Study results.

Component Categorization

The component types of multiple components were revised from what was entered by screening and/or sampling personnel within field data sheets to align with the component type definitions used within this Study.

Entries for pressure relief devices or pressure relief valves that did not relieve to atmosphere were reclassified as connectors. This was determined through visual inspection of digital photographs taken of a component during screening or sampling as well as through discussions with the relevant petroleum refinery.

Entries for pump housing that were initially classified as a pump seal were revised to connectors. In addition, there were multiple samples of pump components but unless the seal(s) was being sampled, these entries were revised to connectors (these were either the pump housing or connectors such as bull plugs off the pump housing).

Prior to the Study, after discussions with sampling personnel, it was determined to classify a valve as both the valve stem and valve bonnet flange. Typically, the valve bonnet flange is considered by the Air District as a connector. However, because it would be difficult to only enclose a valve stem without also enclosing the valve bonnet flange, it was decided that for the purpose of the Study, both the valve stem and valve bonnet flange would be considered a valve. However, if a sample only included a valve bonnet flange and did not include the valve stem, this sample was considered a connector as the valve stem is considered the defining feature of a valve and the location where leaks most often occur.

Leak Detection and Repair

The purpose of a leak detection and repair program is to routinely look for leaks and repair any found leaks. As such, both component leak frequency and component leak magnitude are expected to decrease when enrolled within an inspection program. This has been demonstrated in previous EPA studies.

There were 97 screened components that were identified as being in heavy liquid service but included within a leak detection and repair program. Three components were at Refinery B while the remainder were at Refinery A. Of the 97, three were pump seals, 41 were connectors, and 53 were valves. The highest screening value measured for pump seals was 65 ppmv. However, there were two connector screening values of over 1,000 ppmv (1797 ppmv and 5024 ppmv). For valves, the highest screening value measured was 500 ppmv.

To determine whether including these components would bias results low (as would be expected), an analysis was done including and excluding these components.

As shown in Table III-73, including these components did not impact average emissions for pump seals, which was anticipated from the low number of such pump seal components and the low magnitude of measured screening values.

However, including the valves and connectors increased the average emission rates for valves by 12 percent and for connectors by one percent. Because these components were monitored within a leak detection and repair program, it is hypothesized that emissions from these components would have been higher had they not been routinely monitored.

Steam Quenched Pump Seals

Steam quenched pumps use pressurized steam quenching to prevent solid material from forming (e.g., coke formation) on the seal as well as either heat or cool a seal depending on the temperature of the material. The steam acts as a barrier fluid for preventing hydrocarbon leaks. However, field personnel encountered examples of steam quenched pumps with steam billowing out of the seals.

At low injection rates, steam acts as barrier for preventing equipment leaks. However, at high injection rates (over pressurization) seal failure can occur and steam may carry initiate leaks. This was found to be the case for one steam quenched pump seal. However, this pump seal leak could not be sampled or even screened near the seal because of the steam, which caused screening instruments to malfunction. Neither the Air District nor petroleum refinery subject matter experts could determine a method to sample this pump seal leak.

Turning off steam quenching has two problems: safety and emissions representativeness.

First, it may be unsafe for a pump to turn off a steam quenching system, even for short durations, as it may cause a rotating shaft to seize, cause coke formation, and/or initiate a fire.

Second, the steam quenching system itself may be the cause of a leak or affecting the magnitude of a leak. The results from turning of a steam quenching system and screening and/or sampling may not be representative of the actual emissions. This is more likely the case where steam prevents screening at or near the pump seal because the steam may be causing and masking a leak. However, if screening could be conducted at the surface without interference from steam, it would not be necessary to turn off the steam quenching.

This Study and previous studies have shown that most fugitive emissions derive from a small percentage of components and that leaks are not normally distributed. If this pump could have been sampled, because it had a screening value of 760 ppm at over a foot or more from the surface and had a steady hydrocarbon stream leaking from the seal, it is conceivable that it the mass emissions from this pump seal would have dominated the average emission rate found for pump seals.

Not all steam quenched pumps had steam billowing out of the seals that prevented screening. Some pumps were able to be screened. Screeners made a best attempt at screening at the pump seal surface and where steam was present screened as close as they could without damaging the screening instrument. However, the distance at which screeners took measurements was not recorded.

Because fugitive leaks are not normally distributed, emissions are skewed, and the inability to sample the steam quenched pump seal found to have the greatest screening value; steam quenched pump seals were treated as a separate category of pump seals and excluded from the average emissions rate analysis.

It is recommended that emissions from such pump seals be evaluated in a future study when such pump seals may be sampled and measured without turning off the steam quenching system.

Non-Process Lube Oil Components

Components handling non-process lube oil (e.g., pump seal pots and lubricating systems) were excluded from the average emissions rate analysis as emissions from these components will be evaluated in a separate study, the Lube Oil Study.

Gaseous Phase Components

While screening at Refinery D, multiple components were found have significant measured screening values including two that had screening values greater than 10,000 ppmv. These components were found to be handling material that had an initial boiling point greater than 302 degrees Fahrenheit but in the gaseous phase. These components were not including the Refinery D's leak detection and monitoring program. It was found that some refineries were including these within their LDAR programs while others were not. In an agreement submitted to the Air District by the five petroleum refineries, they agreed to include all such component within their LDAR programs. As such, these components were excluded from the average emission rate analysis.

Pump Seals / Pump Housing

Entries for pumps varied by refinery. At Refineries B, C, D, and E; separate entries were made for pump seals and pump housing. However, at Refinery A, screening personnel entered one entry for both the pump seal and pump housing and entered the maximum screening value found at either the pump seal or pump housing. Some of these entries had comments from screening personnel as to the location of the maximum leak. Entries that had comments noting pump housing were revised to connectors. Otherwise, they were left as pump seals. Where a comment was made noting the location as a pump seal, this choice was obvious. However, there were 103 entries that included a screen measurement but did not include a comment as to the location of the leak. It was decided that the location of a leak was more probable to be at the pump seal then at the pump housing.

Component Size

As components vary in shape and configuration, it was decided to use the process line diameter to have components compared on the same basis. Component size was used as a surrogate for an approximation of the amount of potential length of component surface where a leak may occur. Using the process line diameter, length was estimated by using the equation for estimating the circumference of a circle. This approximation would be closest for flanges and least accurate for valves with welded bonnet flanges where leaks would occur at the valve stem, in which case the diameter of the valve stem should be used.

Large Leakers

During the Study, there was a concern that because of the Study design (only two process units were initially selected for screening of connectors and valves), the screening portion may not adequately represent the true distribution of leaks and may exclude potentially significant leaks resulting in lower emissions estimates than actual.

The use of a Forward Looking InfraRed (FLIR) optical camera to scan each process unit at each petroleum refinery was explored. However, there were several concerns with this approach:

- the operator skill needed to correctly position the camera at each leak point for a valid reading,
- potential interference or masking of leaks by steam, clouds of which are ubiquitous within each petroleum refinery, and
- the high threshold for identifying leaks, potentially missing moderate to significant leaks.

Believing that the likelihood of such leaks was limited to a few process lines, one petroleum refinery manager offered to use their subject matter experts to identify process lines within their petroleum refinery through knowledge of their operating conditions and physical chemistry calculations. However, this effort was halted when the petroleum refinery personnel determined more process lines than expected would be affected and it became a daunting task.

Ultimately, this effort ceased once several components with leaks were discovered with screening values above 10,000 ppmv were identified.

However, as shown in Appendix D-1, there is a high probability that the Study did not capture large connector or valve leaks (i.e., the distribution of screening values for the screened connectors and valves does not reflect the actual distribution). This may be attributed to the selection process for connectors and valves.

Screening a portion of every process unit with heavy liquids service components at each petroleum refinery through stratified random sampling is likely to result in a distribution that is closer to actual.

Regression Equations

As discussed within Appendix D-1, screening value, operating temperature, and operating pressure were found to be correlated to measured sample emissions. However, because approximately 30 percent of the screened component data set (see Table B-1-1 of Appendix B) was missing entries for operating pressure, operating pressure was not included as an additional variable within developed regression equations.

Temperature

Temperature was found to correlate with measured sample emissions and was used as a variable within derived regression equations. However, because sampling personnel could not sample components with external temperatures above a given threshold, there is a wider range of component temperatures within the screening data set than in the sampling data set. Because of this, the regression equations use a cutoff for temperature (the highest temperature measured for a sampled component). If components with higher temperatures could have been sampled, it is likely that either the regression equations and/or emissions results would be different.

vi. Comparison to Previous Studies

There have been several studies where emissions from components in heavy liquid service have been evaluated. The two studies whose results are in use currently are the 1980 EPA Study and the 1993 EPA Study, whose results were revised and incorporated into CAPCOA's 1999 "Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities".

In the 1980 EPA Study, average emission factors were derived that are currently in use for estimating emissions from components in heavy liquid service that are not monitored within an LDAR program.

In the 1993 EPA Study and subsequent revisions within the 1999 CAPCOA Guidelines, correlation equations were derived for estimating emissions from components that are routinely monitored and repaired within an LDAR program.

IV.vi.1. 1980 EPA Study

There were multiple differences between the 1980 EPA Study and the Heavy Liquids Study in study design, methodology, and analysis which make a comparison between the two studies difficult.

Study Design

The significant differences in study design between the 1980 EPA Study and the Heavy Liquids Study was the number of components that were studied as well as how those components were selected.

Both studies screened components and sampled some portion of the screened components. The difference in the number of screened and sampled components by study is presented in Table IV-1.

Table IV-1. Comparison of Number of Components Screened and Sampled Between 1980 Study and Heavy Liquids Study

Component Type	Number of Components Screened		Number of Components Sampled	
	1980 [1]	Study	1980 [4]	Study
Valves	485	5,349	32	70
Connectors	Unknown [2] (2,094 Maximum Possible)	4,710	Unknown [5] (62 Maximum Possible)	61
Pump Seals	292	734	66	32 [6]
Pressure Relief Valves	0 [3]	30	0 [3]	0
Total	777 (2,871 Maximum Possible)	10,823	98 (160 Maximum Possible)	163

Notes:

1. Source: Table 5-1 of EPA 1980 Volume 1. Only includes components in heavy liquid service.
2. 2094 flanges in all streams (gas, light liquid, and heavy liquid) were noted as being screened. The specific number of flanges in heavy liquid service that were screened is not known.
3. Per the "Pressure Relief Devices" section on Page 61 of 1980 EPA Volume 1, only pressure relief valves in gas service were selected for testing.
4. Source: Table 5-4 of EPA 1980 Volume 1. Only includes components in heavy liquid service.
5. 62 flanges in all streams (gas, light liquid, and heavy liquid) were noted as being sampled. The specific number of flanges in heavy liquid service that were sampled is not known.
6. Includes one sample of an agitator seal

Comparison of Screening Results

The 1980 EPA Study did not provide screening results for connectors (flanges only) in different stream services so the screening results for only valves and pump seals are provided in the following table.

Table IV-2. Comparison of Number Components within Different Screening Ranges Between 1980 Study and Current Study

Component Type [1]	Screening Range [2] (ppmv)	Number of Components within Screening Measurements within Listed Range			
		1980 [3]		Study	
		Number	Percent	Number	Percent
Valves	0	335	69.1	365	6.8
	1 - 200	121	25.0	4,902	91.6
	201 – 1,000	21	4.3	48	0.9
	1,000 – 10,000	7	1.4	31	0.6
	> 10,000	1	0.2	3	0.1
	All	**485**	**100**	**5,349**	**100**
Pump Seals	0	114	39.0	26	3.5
	1 - 200	115	39.4	690	94.0
	201 – 1,000	24	8.2	14	1.9
	1,000 – 10,000	28	9.6	3	0.4
	> 10,000	11	3.8	1	0.1
	All	**292**	**100**	**734**	**100**

Notes:
1. The 1980 Study only listed flanges in all streams (did not provide for only heavy liquid service)
2. For comparison's purposes, the screening ranges are those that were listed within the 1980 Study.
3. Source: Table 5-3 of EPA 1980 Volume 1

The results listed in Table IV-2 do not account for differences in screening instruments between the 1980 EPA Study and the Heavy Liquids Study. In the 1980 EPA Study, a Bacharach Threshold Limit Value (TLV) Sniffer was used to screen instruments. The TLV Sniffer is a type of catalytic combustion analyzer, which differs in operating principle from a flame ionization detector, used in the Heavy Liquids Study.

The specific model instrument used in the Heavy Liquids Study was the Thermo Fisher Scientific TVA 2020 model instrument.

As discussed in Section I.iii.5 (**API Publication Number 332**), the Western States Petroleum Association and the American Petroleum Association carried out a study to understand differences in measured screening values by four different screening instruments including the Bacharach TLV Sniffer and a Thermo Fisher Scientific Foxboro TVA 1000. The TVA 1000 was an earlier model instrument than the TVA 2020. The study found measured screening values varied by instrument and derived equations (see Table I-15) for converting screening values between the four different instruments.

Using these equations, the screening values measured during the Heavy Liquids Study may be converted so that they are on the same basis as those in the 1980 EPA Study. Additionally, the 1980 EPA Study reported maximum screening values that were not corrected for background. The following table provides the results of both adjustments.

Table IV-3. Comparison of Screening Results of the 1980 Study and Current Study on the Same Basis

Component Type [1]	Screening Range [2] (ppmv)	Number of Components within Screening Measurements within Listed Range			
		1980 [3]		Study	
		Number	Percent	Number	Percent
Valves	0	335	69.1	689	12.9
	1 - 200	121	25.0	4,601	86.0
	201 – 1,000	21	4.3	8	0.8
	1,000 – 10,000	7	1.4	1	0.3
	> 10,000	1	0.2	0	0.0
	All	485	100	5,349	100
Pump Seals	0	114	39.0	43	5.9
	1 - 200	115	39.4	682	92.9
	201 – 1,000	24	8.2	7 [4]	1.0
	1,000 – 10,000	28	9.6	1	0.1
	> 10,000	11	3.8	1 [4]	0.1
	All	292	100	734	100

Notes:

1. The 1980 Study only listed flanges in all streams (did not provide for only heavy liquid service)
2. For comparison's purposes, the screening ranges are those that were listed within the 1980 Study.
3. Source: Table 5-3 of EPA 1980 Volume 1
4. Component A-477 was measuring 760 ppmv at over a foot distance from the seal and had a steady stream of hydrocarbons leaking and forming a pool at the base of the pump.

Comparison of Regression Equations

Both studies developed regression equations to estimate emissions from screened components that were not sampled.

The 1980 EPA Study proposed a linear equation of the following form:

$$\log_{10} L = B_o + B_1 \log_{10} M \qquad [III\text{-}2]$$

where:

L = nonmethane hydrocarbon leak rate (lb/hour)

B_o, B_1 = constants, regression intercept and regression coefficient (slope), respectively

M = maximum screening value (ppmv)

The Study proposed a similar linear equation with an additional term:

$$\log_{10} L = B_o + B_1 \log_{10} M + B_2 T \qquad [III\text{-}3]$$

where:

L = nonmethane hydrocarbon leak rate (kg/hour)

B_o, = constant, intercept

B_1, B_2 = constants, regression coefficients

M = maximum screening value (ppmv)

T = component temperature (degrees Fahrenheit)

Along with the additional variable, the regression equations have different screening values as the input.

The 1980 EPA Study utilized the maximum screening value recorded for a component without adjustment for ambient background concentrations.

The regression equations derived for the Heavy Liquids Study use the net screening value where the screening value of the ambient atmosphere within several feet of the component is subtracted from a component's maximum screening value.

Further, as discussed previously, a different model screening instrument (TLV Sniffer) was used in the 1980 EPA Study than the Heavy Liquids Study (TVA 2020) and a previous WSPA study identified differences in screening values by different screening instruments.

Repeated (duplicate) measurements were taken at each of the five petroleum refineries. However, the Air District only measured emissions at two of the five petroleum refineries whereas Tricord measured emissions at all five petroleum refineries and comprised the majority (over 90 percent) of the total bagged measurements available for analysis. Although measures were implemented to minimize potential differences between bagging conducted by the Air District and Tricord, there may still be differences in the measurements due to personnel, equipment, and bagging techniques.

To understand these differences, bagged data was analyzed under eight scenarios depending on:

- the component leak concentration measured right before bagging,
- whether the measurement is an initial or duplicate measurement of a component, and
- the party that conducted the bagging.

Scenario	Description	Screening Values
1	All measurements, including duplicates	0 ≤ ppmv < 10,000
2	No duplicate measurements, use first chronological bagged measurement	0 ≤ ppmv < 10,000
3	No duplicate measurements, use first Tricord measurement of any duplicates	0 ≤ ppmv < 10,000
4	No duplicate measurements, use first Tricord measurement of any duplicates, no Air District measurements	0 ≤ ppmv < 10,000
5	All measurements, including duplicates	10 < ppmv < 10,000
6	No duplicate measurements, use first chronological bagged measurement	10 < ppmv < 10,000
7	No duplicate measurements, use first Tricord measurement of any duplicates	10 < ppmv < 10,000
8	No duplicate measurements, use first Tricord measurement of any duplicates, no Air District measurements	10 < ppmv < 10,000

With these caveats, the regression parameters by component type between two studies are listed in the following tables. Regression parameters for eight different regression scenarios are shown to provide an indication of the variability depending upon which bagged samples are included in the regression analysis for the Heavy Liquids Study.

Table IV-4. Regression Parameters for Valves and Connectors for the 1980 Study and Heavy Liquids Study

Scenario	Regression Coefficients			Regression Standard Errors			Adjusted R^2	Data Pairs (N)
	Intercept	Screening Value	Temperature	Intercept	Screening Value	Temperature		
1980 Study (1) (Valves) (2)	-9.82	2.26	N/A	1.12	0.34	N/A	0.96 (3)	4
1	-7.415	1.088	0.00261	0.117	0.044	0.00027	0.842	141
2	-7.454	1.116	0.00255	0.120	0.047	0.00029	0.846	130
3	-7.472	1.122	0.00263	0.117	0.045	0.00029	0.857	128
4	-7.498	1.128	0.00273	0.117	0.046	0.00030	0.861	126
5	-7.251	1.029	0.00275	0.132	0.048	0.00029	0.818	127
6	-7.274	1.050	0.00269	0.135	0.050	0.00031	0.824	117
7	-7.294	1.056	0.00278	0.131	0.048	0.00030	0.838	115
8	-7.323	1.064	0.00288	0.130	0.049	0.00032	0.844	113

Notes:

1. Source: Table 5-7 of EPA 1980 EPA Volume 1
2. The 1980 Study developed regression equations for flanged but only in light liquid / two phase service.
3. This is the R^2 and not the adjusted R^2 value, which was not provided in the 1980 Study

Table IV-5. *Regression Parameters for Pump Seals for the 1980 Study and Heavy Liquids Study*

Scenario	Regression Coefficients			Regression Standard Errors			Adjusted R^2	Data Pairs (N)
	Intercept	Screening Value	Temperature	Intercept	Screening Value	Temperature		
1980 Study [(1)]	-3.08	0.57	N/A	0.77	0.23	N/A	0.29 [(2)]	17
1	-8.000	1.426	0.00441	0.403	0.184	0.00139	0.726	33
2	-7.978	1.411	0.00443	0.415	0.193	0.00141	0.713	31
3	-8.146	1.524	0.00438	0.384	0.182	0.00129	0.769	31
4	-8.142	1.519	0.00438	0.392	0.186	0.00131	0.766	30
5	-7.729	1.233	0.00620	0.380	0.191	0.00172	0.760	30
6	-7.704	1.214	0.00624	0.391	0.201	0.00176	0.750	28
7	-7.862	1.332	0.00607	0.354	0.184	0.00157	0.808	28
8	-7.860	1.329	0.00607	0.362	0.189	0.00160	0.806	27

Notes:
1. Source: Table 5-7 of EPA 1980 Volume 1
2. This is the R^2 and not the adjusted R^2 value, which was not provided in the 1980 Study

The 1980 EPA Study did not derive a separate regression equation for connectors (flanges) in heavy liquid service. Regression equations for valves and pump seals were derived but were derived with less data pairs (four for valves, 17 for pump seals) than were used in the Heavy Liquids Study.

As shown in Appendix D-1, the differences among the scenario fits were found to be indistinguishable statistically.

Screening instruments were seen to experience the largest average drift with the 10 ppmv calibration gas (see Tables C-2-1 through C-2-5 of Appendix C-2). Thus, screening measurements less than 10 ppmv were determined to not be as accurate as larger measurements.

Differences were found between measurements conducted by the Air District and by TRICORD for the same component. However, the Air District and TRICORD only sampled three of the same components, which was an insufficient number to determine whether the differences in measurements was the result of a bias within the sampling or attributed to differences in the process at the time of sampling.

As such, measurements of one or another sampling team could not be excluded, or bias adjusted.

In addition, to mitigate the potential impact that bagging may have on a leak, it was decided that the first sample should be used when multiple samples were taken of the same component, except where the first sample had a known issue (e.g., broken sample tube), in which case, the first valid sample was used.

Therefore, Scenario 6 (no duplicate measurements, use of first sample taken where a component was sampled multiple times) was used in determining average emission factors.

Comparison of Average Emission Factors

A comparison of study results by component type is provided in **Table IV-6**.

Table IV-6. Average Emissions Rates and Confidence Intervals by Component Type and Study

Component Type	1980 EPA Study [1]		Heavy Liquids Study	
	Emission Factor (kg/hour/component)	95% Confidence Interval (kg/hour/component)	Emission Factor (kg/hour/component)	90% Confidence Interval (kg/hour/component)
Connectors [2]	2.54E-04	(9.07E-05, 1.13E-03)	9.4E-06	(6.6E-06, 1.60E-05)
Valves	2.27E-04	(9.07E-05, 6.80E-04)	2.84E-05	(1.80E-05, 4.43E-05)
Pump Seals	2.09E-02	(8.62E-03, 4.99E-02)	1.18E-04	(4.82E-05, 4.87E-04)

Notes:

1. Source: Table 5-6 of EPA 1980 Volume 1 (converted to metric units)
2. The 1980 EPA Study listed values for flanges handling all process streams (gas, light liquid, and heavy liquid)

As shown in the table, results from the Heavy Liquids Study were both lower than those found in the 1980 EPA Study as well as had as had narrower confidence intervals than resulted from the 1980 EPA Study. This is easier shown when plotted in **Figure IV.1** and in **Figure IV.2**.

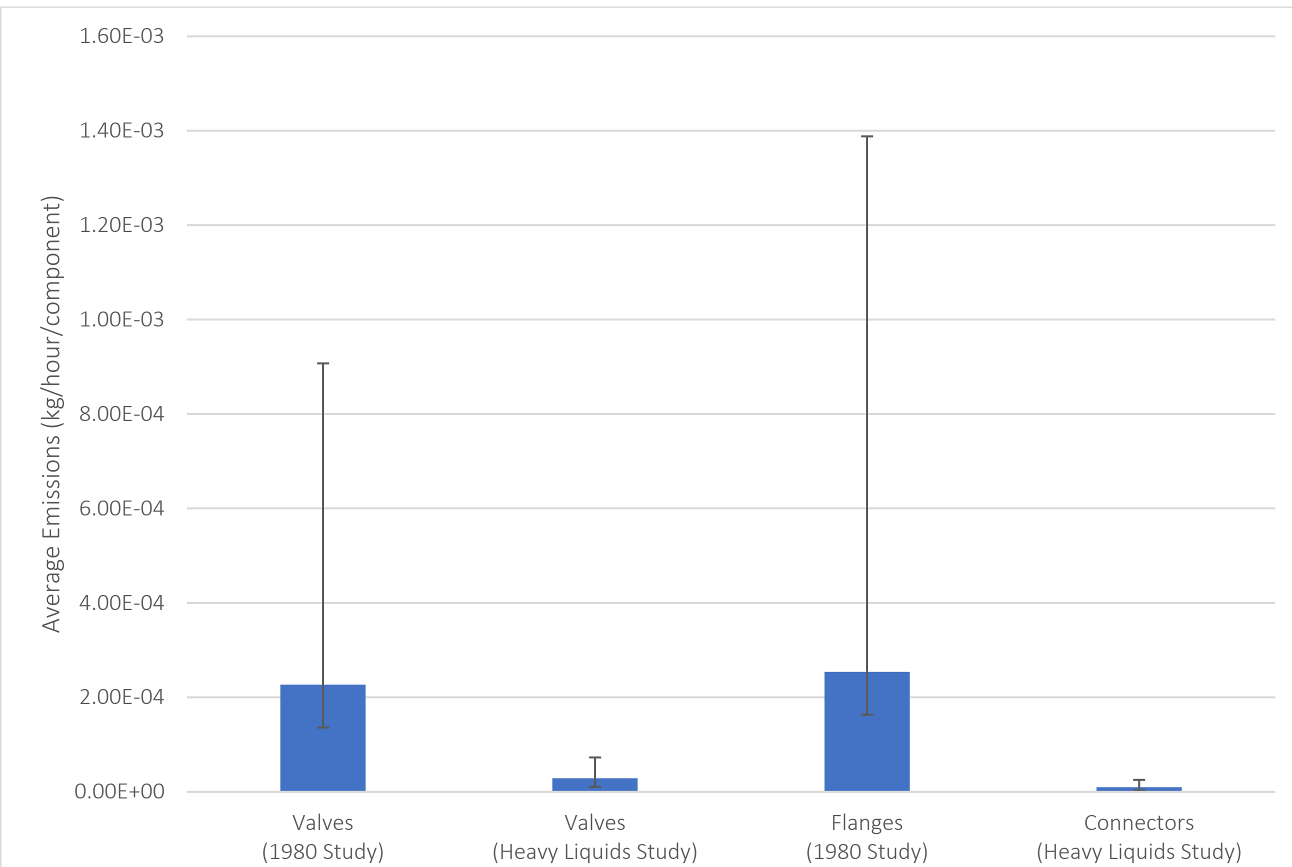


Figure IV.1. Plots of 1980 Study and Study Average Emission Rates and Confidence Interval for Valves and Connectors

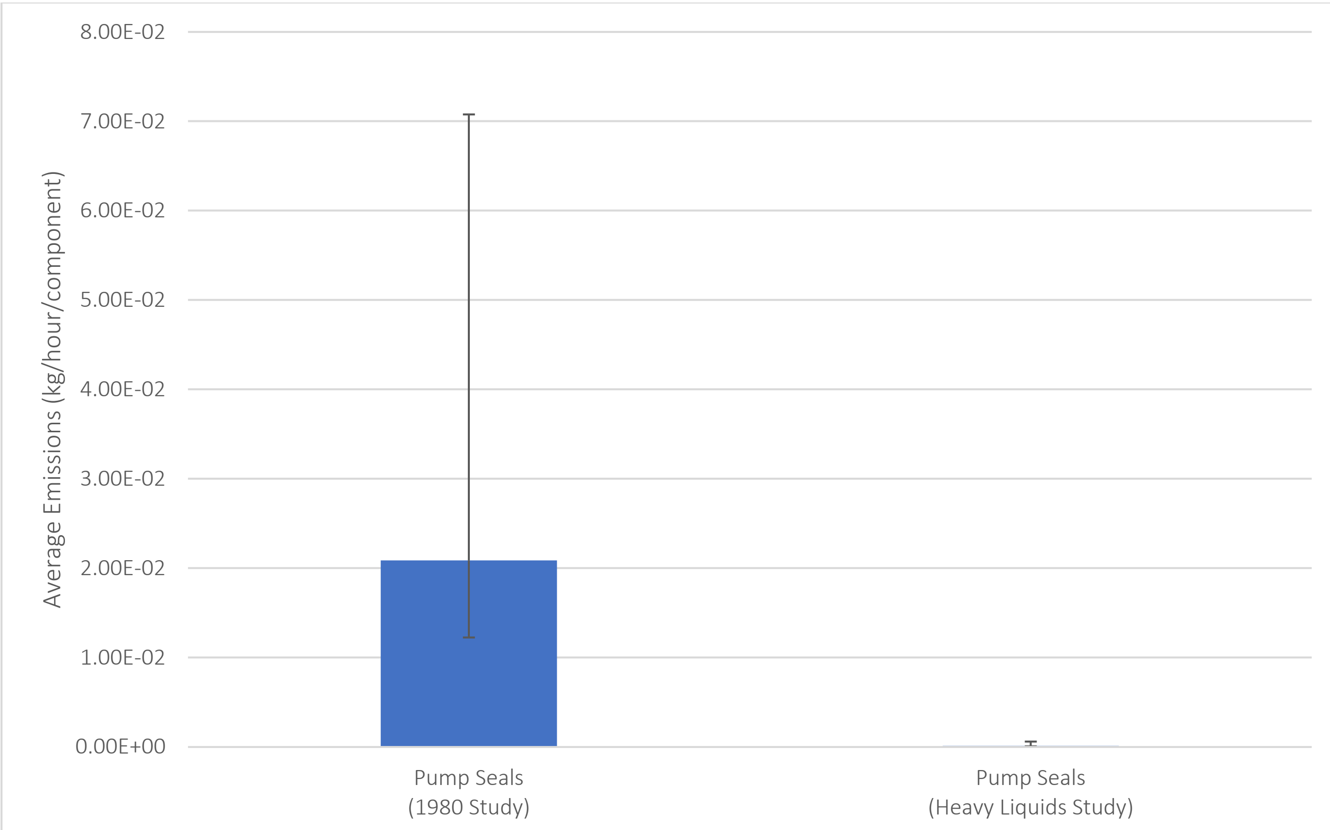


Figure IV.2. Plots of 1980 Study and Study Average Emission Rates and Confidence Interval for Pump Seals

As shown in **Table IV-6**, **Figure IV.1**, and **Figure IV.2**; average emission rates for valves, connectors, and pump seals from the Heavy Liquids Study were found to be much lower than those found in the 1980 EPA Study.

The 1980 EPA Study listed an average emission rate for flanges rather than all connector types and grouped flanges of all service types (gas, light liquid, and heavy liquid) together. This would be expected to produce a higher average emission rate than if including all connector types and only those in heavy liquid service.

As discussed previously, there is a greater probability of missing large leakers, which may increase average emission rates for both valves and connectors.

A comparison of results between the 1980 Study and the Heavy Liquids Study is difficult because of the number of methodological differences.

The following table identifies some of the significant methodological differences between the 1980 EPA Study and the Heavy Liquids Study.

Table IV-7. Some of the Methodological Differences Between the 1980 EPA Study and the Heavy Liquids Study

Phase	Item	1980 EPA Study	Current Study
Study Design	Process Units / Components	In each refinery: 6 to 9 process units	Pump Seals: All targeted Pressure Relief Valves: All targeted Connectors: Only two process units* Valves: Only two process units* * Expanded as necessary
	Component Selection	Individual components selected from piping and instrumentation diagrams prior to screening	Process lines selected by facility drawings prior to screening
Screening	Instrument	Bacharach TLV Sniffer (Catalytic combustion analyzer)	Thermo Fisher Scientific TVA-2020 (Flame ionization detector)
	Calibration	Two-Point (500 – 525, 2000 ppmv)	Six-Point (Zero, 10, 100, 500, 3,000, 10,000 ppmv)
	Personnel	EPA Contractor Personnel	Refinery A: Air District Personnel Refinery B (partial): Air District Personnel Refineries B, C, D, and E: Refinery Personnel
Sampling	Bagging	Total Hydrocarbons: Vacuum Method Species: Blow-Through Method	Total Hydrocarbon: Vacuum Method Species: Vacuum Method
Laboratory	Laboratory	Mobile Laboratory (Located Onsite)	Third-Party (Located in North Caroline)
	Quantitative Analysis	Gas Chromatograph resolved hydrocarbon mixtures into two peaks (methane, non-methane)	Gas Chromatograph resolved hydrocarbon mixtures into 20 peaks (C_5 to C_{24}) for all samples and 26 peaks (C_5 to C_{30}) for condensate samples

Any differences in the results of the Heavy Liquids Study and the 1980 EPA Study cannot be differentiated from methodological reasons, equipment technology (e.g., valve stem packing or gasket materials), or refinery maintenance, inspection, and repair practices (either regulatory driven or corporate policy).

Identifying the specific reason(s) for differences in results was deemed outside the scope of the Study.

IV.vi.2. 1993 Refinery Study / 1999 CAPCOA Guidelines

The 1993 Refinery Study and 1999 CAPCOA Guidelines did not produce average emission factors for non-monitored components in heavy liquid service. Rather, they incorporated the average emission factors from the 1980 EPA Study.

Further, because the intent of the 1993 Refinery Study was to derive new correlation equations rather than average emissions, a random sampling of components was not done. Rather, components within given screening ranges were located and then sampled. Therefore, the 1993 Refinery Study screening results would not be a representative sample as a comparison to those found in the Heavy Liquids Study.

IV.vi.3. WSPA Study / API Publication Number 337

Although the 1996 API Study published proposed average emission factors for components in heavy liquid service, it did not include sampling of components for mass emissions but rather used screening results with correlation equations derived in another study, the 1993 Refinery Study.

The 1996 API Study compiled screening data from four Southern California petroleum refineries and conducted screening at two Washington state petroleum refineries. The results of both efforts are shown in Table I-18 and Table I-19.

As discussed previously, a separate WSPA / API study (see Section I.iii.5 **API Publication Number 332**) determined that measured screening results vary by the specific model screening instrument used.

However, API Publication Number 337 only listed the specific model screening instrument used (Foxboro OVA 108) for one of the California petroleum refineries. Therefore, a comparison of screening results on the same basis as was done with the 1980 EPA Study could not be done.

vii. Potential for Re-Evaluating Average Emission Factor

The results of this Study are dependent upon the categories of components that were Studied. Average emission factors (kg/hour/component) derived in this Study represent emissions from those components that were studied.

The intent of this Study was to evaluate emissions from components in heavy liquid service that are not routinely monitored for leaks and repaired as such components would be expected to have lower emissions than non-monitored components.

Emissions from components that are routinely monitored and repaired are currently estimated using monitoring results and a set of correlation equations outlined in CAPCOA's 1999 "Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities".

If in the future, certain categories of components that are currently not routinely monitored and repaired are required to be routinely monitored for leaks and any found leaks required to be repaired, it may be necessary to re-evaluate the average emission factors.

Since emissions from these components were included in the data set used to derive the average emission factors, emissions from such components may be double counted as they would be included in the average emission factors used to estimate emissions from non-monitored components as well as reported in the emissions estimates of monitored components.

To prevent this, emissions from such components would need to be removed from the data set used to derive the average emission factors and the average emission factors would need to be re-derived.

However, average emission factors represent the average emissions from such components across all five petroleum refineries and not necessarily the emissions of a single component. Emissions from a given component may be higher or lower than the average emission factor but not in the aggregate.

Therefore, unless all components in given category of components were routinely monitored and repaired at all such facilities, revising the average emission factors would not be applicable.

viii. Future Studies

There were multiple lessons learned from this Study where either something was not considered prior to the Study but would have strengthened results or improvements could be made in the steps and approaches taken.

There were also additional areas and categories of components identified that may warrant future evaluation.

Suggested improvements in study design:

- sample a minimum number and diversity (component types) of components at every process unit within each petroleum refinery under study,
- consider using a stratified random sampling technique,
- categorize and number components by category of interest (process unit, process stream, operating temperature, operating pressure, size, etc.) on petroleum refineries and randomly select individual components for inclusion.

Suggested improvements in screening technique and information collection:

- use a standard tool to measure screening distance (if not at interference) as well as to measure at 1 centimeter from the interface,
- pre-establish objective metrics for different vibration amounts (none, low, medium, high),
- use of portable vibration monitor,
- use of electronic means for recording screening values (like handhelds used in LDAR programs),
- record the number of pump seals by pump and pump subtype,
- use heated equipment to prevent potential condensation within the screening instrument,
- determine instrument response times to various materials at different temperatures before study and provide to screening personnel for use in screening, and
- for each selected process line (where stream materials and operating temperatures are the same), determine response time to a known leak and use that time for all measurements of that process line.

Suggested improvements in sampling technique and information collection:

- use bagging materials that can withstand temperatures greater than the maximum temperature of study components (in the current Study, 1,000 degrees Fahrenheit).

Potential categories of components or areas for further emissions study:

- emissions from components handling non-process oil (Lube Oil Study),
- emissions from pumps with steam-injection seals,
- emissions from components other than connectors, pump seals, valves, or pressure relief devices,
- components in proximity to LDAR monitored components, and
- material, age, or type of gasket, packing, or sealing materials used in components.

V. Conclusions

The following conclusions may be made from the Heavy Liquids Study:

Results:

- Average emission rates at the five petroleum refineries for valves, connectors, and pump seals in heavy liquid service were lower than previously relied upon assumptions.
- Average emission rates were derived for valves, connectors, and pump seals in heavy liquid service as presented in the following table:

Component Type	Emission Factor (kg/hour/component)	90% Confidence Interval (kg/hour/component)
Connectors	9.40E-06	(6.60E-06, 1.60E-05)
Valves	2.84E-05	(1.80E-05, 4.43E-05)
Pump Seals	1.18E-04	(4.82E-05, 4.87E-04)

- Lighter compounds (C_1 to C_4) were found to comprise only a small portion (less than one percent) of measured emissions although the sample size was limited (emissions from only four components in two process units at one refinery were evaluated).
- Screening values, operating temperature, and operating pressure were found to correlate with measured emissions. However, because of the number of missing operating pressure information for screened components, regression equations were developed using only screening value and temperature.
- Significant differences were found in the responses of screening instruments when screening components in heavy liquid service by process stream material and process stream temperature. Heavier streams typically required longer screening and recovery times for the same component type, subtype, and size.

Issues Uncovered:

- Study design may have impacted results (there is a greater probability of missing large leakers).
- Screening of heavy liquid streams causes screening instruments to drift low (measured screening values are lower than actual).
- Screening pace was faster at Refineries B, C, D, and E, which may have impacted measured screening values (and resulting estimated emissions).
- Study results are dependent upon the petroleum refineries including all components that handle material with an initial boiling point greater than 302 degrees Fahrenheit in the gaseous phase within their leak detection and repair programs.

Recommendations:

- Several improvements (see Section IV. viii. **Future Studies**) were identified for future studies including in study design, screening, and sampling techniques.

- Results include emissions from components in heavy liquid service that are currently not in Air District emissions inventories including:
    - components associated with storage tanks and blending areas,
    - components in process units that do not have components in gas or light liquid service, and
    - components in process units that are not currently covered by the existing estimation methodology.

  Because there is no current methodology for estimating the number of such components, methodologies for estimating these components will need to be developed.
- There were several component types for which average emission rates could not be derived either because there were insufficient numbers, their emissions could not be evaluated, or they are recommended for inclusion in a future study:
    - pressure relief valves that relieve to atmosphere (insufficient numbers),
    - pump seals with steam or hot oil quenching systems (emissions could not be measured),
    - components handling non-process lube oil (included in a future study).

VI. Contributions

The following individuals contributed to the Study without whom, the Study could not have been completed.

Bay Area Air Quality Management District		
Name	Title*	Contribution
Compliance and Enforcement Division		
Chris Crowley	Air Quality Inspector	Pilot Refinery Field Screener
Bert Dare	Air Quality Instrument Specialist (retired)	Screening Instrumentation
Linda Duca	Senior Air Quality Inspector	Field Screening Lead
Edward Giacometti	Manager of Compliance & Enforcement	Study Design – Screening Portion
Jeff Gove	Director of Compliance & Enforcement	Study Design – Screening Portion
Paul Grazzini	Air Quality Specialist	Screening Instrument Calibrations Oversight of Third-Party Auditors
Wayne Kino	Deputy Air Pollution Control Officer	Study Design – Screening Portion
Quentin Malloy	Air Quality Inspector	Pilot Refinery Field Screener
Ron Pilkington	Supervising Air Quality Inspector	Supervised Field Screening
Raymond Salalila	Air Quality Inspector	Pilot Refinery Field Screener
John Swanson	Senior Air Quality Inspector	Pilot Refinery Field Screener
Almira Van	Air Quality Inspector	Pilot Refinery Field Screener
Michael Wedl	Temporary Air Quality Inspector	Auditor – Observing Screening by Refinery Personnel
Simon Winer	Senior Air Quality Inspector	Pilot Refinery Field Screener
Ying Yu	Air Quality Inspector	Pilot Refinery Field Screener
Engineering Division		
Damian Breen	Deputy Air Pollution Control Officer	Direction, Oversight
Pamela Leong	Director of Engineering	Direction, Study Design
Jim Karas	Director of Engineering (retired)	Direction
Greg Stone	Supervising Air Quality Engineer (retired)	Protocol Review
Jaime Williams	Director of Engineering (left Air District)	Protocol Review
Meteorology and Measurement Division		
Jeffrey Aaseth	Air Quality Instrument Specialist	Pilot Refinery Field Sampler
Robert Bartley	Manager (retired)	Sampling Protocol Development
Jerry Bovee	Manager	Study Design – Sampling Portion
George Bradbury	Air Quality Instrument Specialist	Equipment Setup Pilot Refinery Field Sampler
Hiroshi Doi	Supervising Air Quality Instrument Specialist	Equipment Procurement

Bay Area Air Quality Management District		
Marco Hernandez	Principal Air Quality Engineer	Pilot Refinery Field Sampler Laboratory – QC Review
Elaine Ko	Supervising Air Quality Engineer	Study Design – Sampling Portion Sampling Oversight and Review Laboratory Oversight and Review
Charles McClure	Supervising Air Quality Engineer (retired)	Study Design – Sampling Portion
Pon Phithaksounthone	Senior Air Quality Engineer	Sampling / Laboratory – QA/QC Review Contractor Field Testing Oversight
Waiman Pon	Air Quality Instrument Specialist	Screening Instrument Calibrations Sampling / Laboratory – QA/QC Review
Eric Stevenson	Director (retired)	Study Design – Sampling Portion
Michael Wiley	Air Quality Instrument Specialist	Pilot Refinery Field Sampler
Planning Division		
David Fairley	Statistician (retired)	Study Design Statistical Analyses
Legal Division		
Adan Schwartz	Senior Assistant Counsel	Legal Guidance
Administrative Resources		
Cynthia Zhang	Purchasing Agent	Third-Party Auditors Contract Lead
Human Resources		
Judy Yu	Manager	Third-Party Auditor Contracting General Assistance
*The title column includes the title(s) of personnel at time of contribution to the Study.		

In addition to the individuals listed in the table above, there were numerous personnel at the following organizations that contributed their time and expertise to this Study:

- Chevron Richmond Refinery,
- Phillips 66 San Francisco Refinery,
- Shell Martinez Refinery,
- Tesoro Golden Eagle Refinery,
- Valero Benicia Refinery,
- Western States Petroleum Association,
- Tamura Environmental,
- Tricord Consulting,
- Enthalpy Analytical, and
- Bureau Veritas.

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APPENDIX A
Methodology

APPENDIX A-1
Screening Methodology

EPA Method 21

While we have taken steps to ensure the accuracy of this Internet version of the document, it is not the official version. Please refer to the official version in the FR publication, which appears on the Government Printing Office's eCFR website:
(http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr60_main_02.tpl)

Method 21 - Determination of Volatile Organic Compound Leaks

1.0 Scope and Application

1.1 Analytes.

Analyte	CAS No.
Volatile Organic Compounds (VOC)	No CAS number assigned.

1.2 Scope. This method is applicable for the determination of VOC leaks from process equipment. These sources include, but are not limited to, valves, flanges and other connections, pumps and compressors, pressure relief devices, process drains, open-ended valves, pump and compressor seal system degassing vents, accumulator vessel vents, agitator seals, and access door seals.

1.3 Data Quality Objectives. Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods.

2.0 Summary of Method

2.1 A portable instrument is used to detect VOC leaks from individual sources. The instrument detector type is not specified, but it must meet the specifications and performance criteria contained in Section 6.0. A leak definition concentration based on a reference compound is specified in each applicable regulation. This method is intended to locate and classify leaks only, and is not to be used as a direct measure of mass emission rate from individual sources.

3.0 Definitions

3.1 *Calibration gas* means the VOC compound used to adjust the instrument meter reading to a known value. The calibration gas is usually the reference compound at a known concentration approximately equal to the leak definition concentration.

3.2 *Calibration precision* means the degree of agreement between measurements of the same known value, expressed as the relative percentage of the average difference between the meter readings and the known concentration to the known concentration.

3.3 *Leak definition concentration* means the local VOC concentration at the surface of a leak source that indicates that a VOC emission (leak) is present. The leak definition is an instrument meter reading based on a reference compound.

3.4 *No detectable emission* means a local VOC concentration at the surface of a leak source, adjusted for local VOC ambient concentration, that is less than 2.5 percent of the specified leak definition concentration. that indicates that a VOC emission (leak) is not present.

3.5 *Reference compound* means the VOC species selected as the instrument calibration basis for specification of the leak definition concentration. (For example, if a leak definition concentration is 10,000 ppm as methane, then any source emission that results in a local concentration that yields a meter reading of 10,000 on an instrument meter calibrated with methane would be classified as a leak. In this example, the leak definition concentration is 10,000 ppm and the reference compound is methane.)

3.6 *Response factor* means the ratio of the known concentration of a VOC compound to the observed meter reading when measured using an instrument calibrated with the reference compound specified in the applicable regulation.

3.7 *Response time* means the time interval from a step change in VOC concentration at the input of the sampling system to the time at which 90 percent of the corresponding final value is reached as displayed on the instrument readout meter.

4.0 Interferences[Reserved]

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Hazardous Pollutants. Several of the compounds, leaks of which may be determined by this method, may be irritating or corrosive to tissues (*e.g.*, heptane) or may be toxic (*e.g.*, benzene, methyl alcohol). Nearly all are fire hazards. Compounds in emissions should be determined through familiarity with the source. Appropriate precautions can be found in reference documents, such as reference No. 4 in Section 16.0.

6.0 Equipment and Supplies

A VOC monitoring instrument meeting the following specifications is required:

6.1 The VOC instrument detector shall respond to the compounds being processed. Detector types that may meet this requirement include, but are not limited to, catalytic oxidation, flame ionization, infrared absorption, and photoionization.

6.2 The instrument shall be capable of measuring the leak definition concentration specified in the regulation.

6.3 The scale of the instrument meter shall be readable to ±2.5 percent of the specified leak definition concentration.

6.4 The instrument shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be 0.10 to 3.0 l/min (0.004 to 0.1 ft^3 /min) when the probe is fitted with a glass wool plug or filter that may be used to prevent plugging of the instrument.

6.5 The instrument shall be equipped with a probe or probe extension or sampling not to exceed 6.4 mm (1/4in) in outside diameter, with a single end opening for admission of sample.

6.6 The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the National Electrical Code by the National Fire Prevention Association or other applicable regulatory code for operation in any explosive atmospheres that may be encountered in its use. The instrument shall, at a minimum, be intrinsically safe for Class 1, Division 1 conditions, and/or Class 2, Division 1 conditions, as appropriate, as defined by the example code. The instrument shall not be operated with any safety device, such as an exhaust flame arrestor, removed.

7.0 Reagents and Standards

7.1 Two gas mixtures are required for instrument calibration and performance evaluation:

7.1.1 Zero Gas. Air, less than 10 parts per million by volume (ppmv) VOC.

7.1.2 Calibration Gas. For each organic species that is to be measured during individual source surveys, obtain or prepare a known standard in air at a concentration approximately equal to the applicable leak definition specified in the regulation.

7.2 Cylinder Gases. If cylinder calibration gas mixtures are used, they must be analyzed and certified by the manufacturer to be within 2 percent accuracy, and a shelf life must be specified. Cylinder standards must be either reanalyzed or replaced at the end of the specified shelf life.

7.3 Prepared Gases. Calibration gases may be prepared by the user according to any accepted gaseous preparation procedure that will yield a mixture accurate to within 2 percent. Prepared standards must be replaced each day of use unless it is demonstrated that degradation does not occur during storage.

7.4 Mixtures with non-Reference Compound Gases. Calibrations may be performed using a compound other than the reference compound. In this case, a conversion factor must be determined for the alternative compound such that the resulting meter readings during source surveys can be converted to reference compound results.

8.0 Sample Collection, Preservation, Storage, and Transport

8.1 Instrument Performance Evaluation. Assemble and start up the instrument according to the manufacturer's instructions for recommended warm-up period and preliminary adjustments.

8.1.1 Response Factor. A response factor must be determined for each compound that is to be measured, either by testing or from reference sources. The response factor tests are required before placing the analyzer into service, but do not have to be repeated at subsequent intervals.

8.1.1.1 Calibrate the instrument with the reference compound as specified in the applicable regulation. Introduce the calibration gas mixture to the analyzer and record the observed meter reading. Introduce zero gas until a stable reading is obtained. Make a total of three measurements by alternating between the calibration gas and zero gas. Calculate the response factor for each repetition and the average response factor.

8.1.1.2 The instrument response factors for each of the individual VOC to be measured shall be less than 10 unless otherwise specified in the applicable regulation. When no instrument is available that meets this specification when calibrated with the reference VOC specified in the applicable regulation, the available instrument may be calibrated with one of the VOC to be measured, or any other VOC, so long as the instrument then has a response factor of less than 10 for each of the individual VOC to be measured.

8.1.1.3 Alternatively, if response factors have been published for the compounds of interest for the instrument or detector type, the response factor determination is not required, and existing results may be referenced. Examples of published response factors for flame ionization and catalytic oxidation detectors are included in References 1–3 of Section 17.0.

8.1.2 Calibration Precision. The calibration precision test must be completed prior to placing the analyzer into service and at subsequent 3-month intervals or at the next use, whichever is later.

8.1.2.1 Make a total of three measurements by alternately using zero gas and the specified calibration gas. Record the meter readings. Calculate the average algebraic difference between the meter readings and the known value. Divide this average difference by the known calibration value and multiply by 100 to express the resulting calibration precision as a percentage.

8.1.2.2 The calibration precision shall be equal to or less than 10 percent of the calibration gas value.

8.1.3 Response Time. The response time test is required before placing the instrument into service. If a modification to the sample pumping system or flow configuration is made that would change the response time, a new test is required before further use.

8.1.3.1 Introduce zero gas into the instrument sample probe. When the meter reading has stabilized, switch quickly to the specified calibration gas. After switching, measure the time required to attain 90 percent of the final stable reading. Perform this test sequence three times and record the results. Calculate the average response time.

8.1.3.2 The instrument response time shall be equal to or less than 30 seconds. The instrument pump, dilution probe (if any), sample probe, and probe filter that will be used during testing shall all be in place during the response time determination.

8.2 Instrument Calibration. Calibrate the VOC monitoring instrument according to Section 10.0.

8.3 Individual Source Surveys.

8.3.1 Type I—Leak Definition Based on Concentration. Place the probe inlet at the surface of the component interface where leakage could occur. Move the probe along the interface periphery while observing the instrument readout. If an increased meter reading is observed, slowly sample the interface where leakage is indicated until the maximum meter reading is obtained. Leave the probe inlet at this maximum reading location for approximately two times the instrument response time. If the maximum observed meter reading is greater than the leak definition in the applicable regulation, record and report the results as specified in the regulation reporting requirements. Examples of the application of this general technique to specific equipment types are:

8.3.1.1 Valves. The most common source of leaks from valves is the seal between the stem and housing. Place the probe at the interface where the stem exits the packing gland and sample the stem circumference. Also, place the probe at the interface of the packing gland take-up flange seat and sample the periphery. In addition, survey valve housings of multipart assembly at the surface of all interfaces where a leak could occur.

8.3.1.2 Flanges and Other Connections. For welded flanges, place the probe at the outer edge of the flange-gasket interface and sample the circumference of the flange. Sample other types of nonpermanent joints (such as threaded connections) with a similar traverse.

8.3.1.3 Pumps and Compressors. Conduct a circumferential traverse at the outer surface of the pump or compressor shaft and seal interface. If the source is a rotating shaft, position the probe inlet within 1 cm of the shaft-seal interface for the survey. If the housing configuration prevents a complete traverse of the shaft periphery, sample all accessible portions. Sample all other joints on the pump or compressor housing where leakage could occur.

8.3.1.4 Pressure Relief Devices. The configuration of most pressure relief devices prevents sampling at the sealing seat interface. For those devices equipped with an enclosed extension, or horn, place the probe inlet at approximately the center of the exhaust area to the atmosphere.

8.3.1.5 Process Drains. For open drains, place the probe inlet at approximately the center of the area open to the atmosphere. For covered drains, place the probe at the surface of the cover interface and conduct a peripheral traverse.

8.3.1.6 Open-ended Lines or Valves. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.7 Seal System Degassing Vents and Accumulator Vents. Place the probe inlet at approximately the center of the opening to the atmosphere.

8.3.1.8 Access door seals. Place the probe inlet at the surface of the door seal interface and conduct a peripheral traverse.

8.3.2 Type II—"No Detectable Emission". Determine the local ambient VOC concentration around the source by moving the probe randomly upwind and downwind at a distance of one to two meters from the source. If an interference exists with this determination due to a nearby emission or leak, the local ambient concentration may be determined at distances closer to the source, but in no case shall the distance be less than 25 centimeters. Then move the probe inlet to the surface of the source and determine the concentration as outlined in Section 8.3.1. The difference between these concentrations determines whether there are no detectable emissions. Record and report the results as specified by the regulation. For those cases where the regulation requires a specific device installation, or that specified vents be ducted or piped to a control device, the existence of these conditions shall be visually confirmed. When the regulation also requires that no detectable emissions exist, visual observations and sampling surveys are required. Examples of this technique are:

8.3.2.1 Pump or Compressor Seals. If applicable, determine the type of shaft seal. Perform a survey of the local area ambient VOC concentration and determine if detectable emissions exist as described in Section 8.3.2.

8.3.2.2 Seal System Degassing Vents, Accumulator Vessel Vents, Pressure Relief Devices. If applicable, observe whether or not the applicable ducting or piping exists. Also, determine if any sources exist in the ducting or piping where emissions could occur upstream of the control device. If the required ducting or piping exists and there are no sources where the emissions could be vented to the atmosphere upstream of the control device, then it is presumed that no detectable emissions are present. If there are sources in the ducting or piping where emissions could be vented or sources where leaks could occur, the sampling surveys described in Section 8.3.2 shall be used to determine if detectable emissions exist.

8.3.3 Alternative Screening Procedure.

8.3.3.1 A screening procedure based on the formation of bubbles in a soap solution that is sprayed on a potential leak source may be used for those sources that do not have continuously moving parts, that do not have surface temperatures greater than the boiling point or less than the freezing point of the soap solution, that do not have open areas to the atmosphere that the soap solution cannot bridge, or that do not exhibit evidence of liquid leakage. Sources that have these conditions present must be surveyed using the instrument technique of Section 8.3.1 or 8.3.2.

8.3.3.2 Spray a soap solution over all potential leak sources. The soap solution may be a commercially available leak detection solution or may be prepared using concentrated detergent and water. A pressure sprayer or squeeze bottle may be used to dispense the solution. Observe the potential leak sites to determine if any bubbles are formed. If no bubbles are observed, the source is presumed to have no detectable emissions or leaks as applicable. If any bubbles are observed, the instrument techniques of Section 8.3.1 or 8.3.2 shall be used to determine if a leak exists, or if the source has detectable emissions, as applicable.

9.0 Quality Control

Section	Quality control measure	Effect
8.1.2	Instrument calibration precision check	Ensure precision and accuracy, respectively, of instrument response to standard.
10.0	Instrument calibration	

10.0 Calibration and Standardization

10.1 Calibrate the VOC monitoring instrument as follows. After the appropriate warm-up period and zero internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value.

Note: If the meter readout cannot be adjusted to the proper value, a malfunction of the analyzer is indicated and corrective actions are necessary before use.

11.0 Analytical Procedures[Reserved]

12.0 Data Analyses and Calculations[Reserved]

13.0 Method Performance[Reserved]

14.0 Pollution Prevention[Reserved]

15.0 Waste Management[Reserved]

16.0 References

1. Dubose, D.A., and G.E. Harris. Response Factors of VOC Analyzers at a Meter Reading of 10,000 ppmv for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2–81051. September 1981.

2. Brown, G.E., *et al.* Response Factors of VOC Analyzers Calibrated with Methane for Selected Organic Compounds. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2–81–022. May 1981.

3. DuBose, D.A. *et al.* Response of Portable VOC Analyzers to Chemical Mixtures. U.S. Environmental Protection Agency, Research Triangle Park, NC. Publication No. EPA 600/2–81–110. September 1981.

4. Handbook of Hazardous Materials: Fire, Safety, Health. Alliance of American Insurers. Schaumberg, IL. 1983.

17.0 Tables, Diagrams, Flowcharts, and Validation Data[Reserved]

Example Screening Field Data Sheet

Refinery: ____________ Date/Time: ____________________ Temperature: __________ deg. F TVA SN: ________________

Inspector: ____________ Wind Speed/Direction: ____________________ Response Time (secs): ________________

ID #	Process Unit/Area	Sub-Area	Component Type	Component Subtype	Size inches	Stream Service	Vibration Amount (N, L, H)	Vibration Cyclic? (Y/N)	Elevation (G, P, T, O)	Operating Temp (deg. F)	Operating Pressure (psig)	Start Time	Stop Time	Background (ppmv)	Max Reading (ppmv)	Comments

Component Type: C = connector (non-flange), F = flange, V = valve, P = pump, PRD = pressure relief device

Vibration Amount: N = none, L = low, H = high

Cyclic Vibration: Does component experience cyclic (on/off) vibration?

Elevation*: G = ground, P = platform, T = top of column/vessel, O = other (ladder, etc.)

* If "O" is used for elevation, provide description in comments column

APPENDIX A-2
Mass Emissions Sampling Methodology

1995 EPA Protocol for Equipment Leaks
Chapter 4.0

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EPA-453/R-95-017
November 1995

Air

EPA

Protocol for Equipment Leak Emission Estimates

ESD

EPA-453/R-95-017

1995 Protocol for Equipment Leak Emission Estimates

Emission Standards Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

November 1995

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Publication No. EPA-453/R-95-017

FOREWORD

The EPA's protocol for estimating equipment leak emissions is the result of detailed information gathering and data analysis. The protocol was written to provide a thorough understanding of acceptable approaches to generating process unit-specific emission estimates. In preparing this document, the EPA has encouraged knowledgeable individuals in industry and the regulatory community to provide comments.

The EPA has put forth considerable effort to make this document as comprehensive as possible. However, it should be understood that not all details and topics pertaining to equipment leaks could feasibly be included in this document. Additionally, it should be understood that the procedures presented in this document are not necessarily suitable for all applications. There will be cases where it will be necessary for the user of the document to make a professional judgement as to the appropriate technical approach for collecting and analyzing data used to estimate equipment leak emissions.

Additional data on equipment leak emissions continues to be collected. It is the intent of the EPA to periodically update this document after analysis of the data warrants such an update. For example, data recently collected in the petroleum industry has been used to revise the existing refinery correlations, which are based on data collected in the late 1970s. Furthermore, as new techniques for collecting and analyzing data are developed, they will be included in updated versions of this document.

Mention of any manufacturer or company name within this document does not represent endorsement by the EPA.

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4.0 MASS EMISSION SAMPLING

4.1 INTRODUCTION

This chapter describes the procedures for "bagging" equipment to measure mass emissions of organic compounds. An equipment component is bagged by enclosing the component to collect leaking vapors. Measured emission rates from bagged equipment coupled with screening values can be used to develop unit-specific screening value/mass emission rate correlation equations. Unit-specific correlations can provide precise estimates of mass emissions from equipment leaks at the process unit. However, it is recommended that unit-specific correlations are only developed in cases where the existing EPA correlations do not give reasonable mass emission estimates for the process unit. The focus of the chapter is on bagging equipment containing organic compounds, but similar procedures can be applied to bag equipment containing inorganic compounds as long as there are comparable analytical techniques for measuring the concentration of the inorganic compound.

This chapter is divided into four sections. In section 4.2, the methods for bagging equipment are discussed. Considerations for bagging each equipment type are discussed in section 4.3. In section 4.4, techniques used in the laboratory analysis of bagged samples are discussed. Section 4.4 also includes a description of a rigorous calibration procedure for the portable monitoring device that must be followed. Finally, in section 4.5, quality assurance and quality control (QA/QC) guidelines are provided.

4.2 SAMPLING METHODS

The emission rate from an equipment component is measured by bagging the component--that is, isolating the component from ambient air to collect any leaking compound(s). A tent (i.e., bag) made of material impermeable to the compound(s) of interest is constructed around the leak interface of the piece of equipment. A known rate of carrier gas is induced through the bag and a sample of the gas from the bag is collected and analyzed to determine the concentration (in parts per million by volume [ppmv]) of leaking material. The concentration is measured using laboratory instrumentation and procedures. Mass emissions are calculated based on the measured concentration and the flow rate of carrier gas through the bag.

In some cases, it may be necessary to collect liquid leaking from a bagged equipment piece. Liquid can either be dripping from the equipment piece prior to bagging, and/or be formed as condensate within the bag. If liquid accumulates in the bag, then the bag should be configured so that there is a low point to collect the liquid. The time in which the liquid accumulates should be recorded. The accumulated liquid should then be taken to the laboratory and transferred to a graduated cylinder to measure the volume of organic material. Based on the volume of organic material in the cylinder (with the volume of water or nonorganic material subtracted out), the density of the organic material, and the time in which the liquid accumulated, the organic liquid leak rate can be calculated. Note that the density can be assumed to be equivalent to the density of organic material in the equipment piece, or, if sufficient volume is collected, can be measured using a hydrometer. It should be noted that in some cases condensate may form a light coating on the inside surface of the bag, but will not accumulate. In these cases, it can be assumed that an equilibrium between condensation and evaporation has been reached and that the vapor emissions are equivalent to total emissions from the source.

When bagging an equipment piece, the enclosure should be kept as small as practical. This has several beneficial effects:

- The time required to reach equilibrium is kept to a minimum;
- The time required to construct the enclosure is minimized;
- A more effective seal results from the reduced seal area; and
- Condensation of heavy organic compounds inside the enclosure is minimized or prevented due to reduced residence time and decreased surface area available for heat transfer.

Two methods are generally employed in sampling source enclosures: the vacuum method and the blow-through method. Both methods involve enclosing individual equipment pieces with a bag and setting up a sampling train to collect two samples of leaking vapors to be taken to the laboratory for analysis. Both methods require that a screening value be obtained from the equipment piece prior to and after the equipment piece is enclosed. The methods differ in the ways in which the carrier gas is conveyed through the bag. In the vacuum method, a vacuum pump is used to pull air through the bag. In the blow-through method, a carrier gas such as nitrogen (or other inert gas) is blown into the bag.

In general, the blow-through method has advantages over the vacuum method. These advantages are as follows.

(1) The blow-through method is more conducive to better mixing in the bag.

(2) The blow-through method minimizes ambient air in the bag and thus reduces potential error associated with background organic compound concentrations. (For this reason the blow-through method is especially preferable when measuring the leak rate from components with zero or very low screening values.)

(3) The blow-through method minimizes oxygen concentration in the bag (assuming air is not used as the carrier gas) and the risk of creating an explosive environment.

(4) In general, less equipment is required to set up the blow-through method sampling train.

However, the blow-through method does require a carrier gas source, and preferably the carrier gas should be inert and free of any organic compounds and moisture. The vacuum method does not require a special carrier gas.

Details of the sampling train of each of these bagging methods are discussed in sections 4.2.1 and 4.2.2, respectively. These sections also contain summaries of the steps of the sampling procedure for each method. For both methods, the approach described above for collecting and measuring liquid leak rates can be utilized. In addition to the sampling descriptions presented in the following sections, the quality control and assurance guidelines presented in section 4.5 must also be followed when bagging equipment.

4.2.1 Vacuum Method

The sampling train used in the vacuum method is depicted in figure 4-1. The train can be mounted on a portable cart, which can be moved around the process unit from component to component. The major equipment items in the sampling train are the vacuum pump used to draw air through the system, and the dry gas meter used to measure the flow rate of gas through the train. In previous studies that the EPA conducted, a 4.8-cubic feet per minute Teflon® ring piston-type vacuum pump equipped with a 3/4-horsepower, air-driven motor was used. Other equipment that may be used in the train includes valves, copper and stainless steel tubing, Teflon® tubing and tape, thermometer, pressure-reading device, liquid collection device, and air-driven diaphragm sampling pumps. It also may be necessary to use desiccant preceding the dry gas meter to remove any moisture.

The bag is connected by means of a bulkhead fitting and Teflon® tubing to the sampling train. A separate line is connected from the bag to a pressure-reading device to allow continuous monitoring of the pressure inside the bag. If a significant vacuum exists inside the bag when air is being pulled through, a hole is made in the opposite side of the bag from the outlet to the sampling train. This allows air to enter the bag more easily and, thus, reduces the vacuum in the enclosure. However, it is important to maintain a vacuum in the bag, since VOC could be lost through the hole if the bag became pressurized.

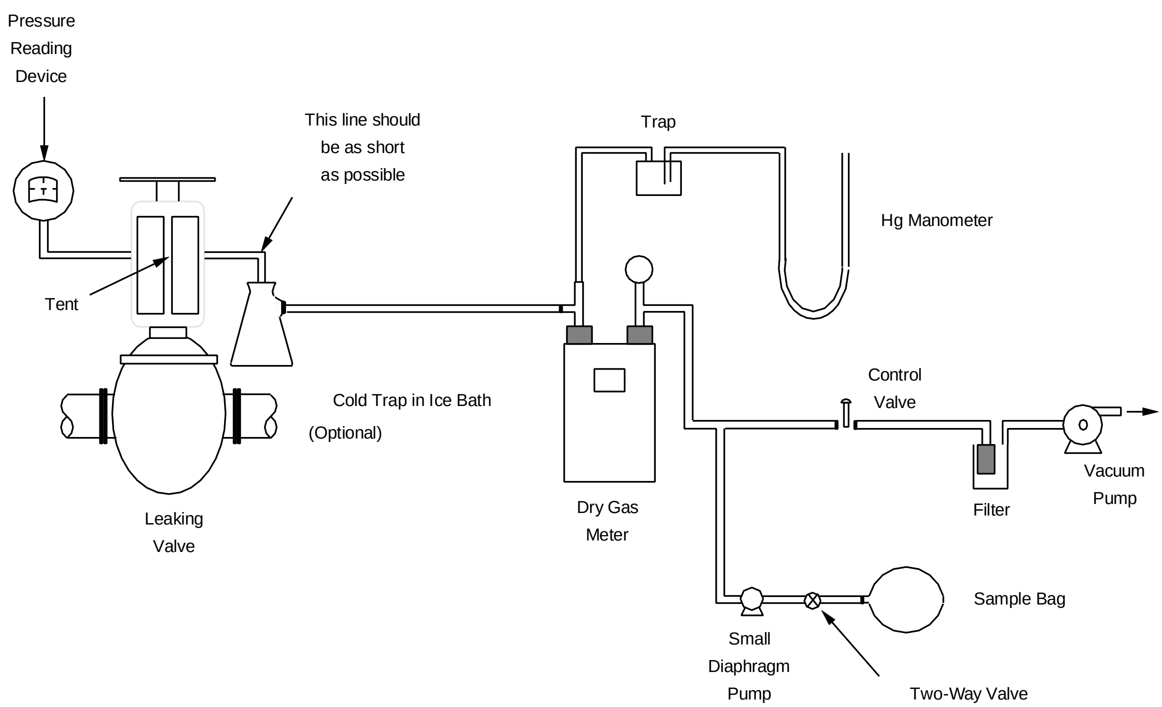

Figure 4-1. Sampling train for bagging a source using the vacuum method.

In practice, it has been found that only a very slight vacuum (0.1 inches of water) is present in the bag during most of the sampling, even in the absence of a hole through the bag wall. Sufficient air enters around the seals to prevent the development of a significant vacuum in the bag. A small diaphragm sampling pump can be used to collect two samples into sample bags or canisters, which are then transported to the laboratory for analysis.

The diaphragm pump can also be used to collect a background sample of the ambient air near the bagged component. The concentration in the background bag is subtracted from the average concentration in the sample bags when calculating the leak rate. Often this correction is insignificant (particularly for components with high leak rates or in cases where there is no detectable volatile organic compound (VOC) concentration measured by the portable monitoring device), and collection of a background bag is optional. However, in some cases collection of a background bag is important so that emission rates are not biased high.

Any liquid that accumulates in the bag should be collected using the approach described in section 4.2. Note that if there is a concern that condensation will occur in equipment downstream from the bag outlet, a cold trap can be placed as close to the bag outlet as possible to remove water or heavy organic compounds that may condense downstream. Any organic condensate that collects in the cold trap must be measured to calculate the total leak rate.

The flow rate through the system can be varied by throttling the flow with a control valve immediately upstream of the vacuum pump. Typical flow rates are approximately 60 liters per minute (ℓ/min) or less. A good flow rate to use is one in which a balance can be found between reaching equilibrium conditions and having a high enough concentration of organic compounds in the bag outlet to accurately measure the concentration in the laboratory. As the flow rate is decreased, the concentration of organic compounds increases in the gas flowing through the sampling system. The flow rate should be adjusted to avoid any operations with an explosive mixture of organic compounds in air. It may also be possible to increase the flow rate in order to minimize liquid condensation in the bag.

The flow rate should be set to a constant rate and kept at that rate long enough for the system to reach equilibrium. To determine if equilibrium conditions have been reached, a portable monitoring device can be used to indicate if the outlet concentration has stabilized.

It is not recommended that the vacuum method be used to measure the leak rate from equipment that have low screening values (approximately 10 ppmv or less), because considerable error can be introduced due to the background organic concentration in the ambient air that is pulled through the bag.

In summary, the vacuum sampling procedure consists of the following steps.

(1) Determine the composition of material in the designated equipment component, and the operating conditions of the component.

(2) Obtain and record a screening value with the portable monitoring instrument.

(3) Cut a bag from appropriate material (see section 4.3) that will easily fit over the equipment component.

(4) Connect the bag to the sampling train.

(5) If a cold trap is used, immerse the trap in an ice bath.

(6) Note the initial reading of the dry gas meter.

(7) Start the vacuum pump and a stopwatch simultaneously. Make sure a vacuum exists within the bag.

(8) Record the temperature and pressure at the dry gas meter.

(9) Observe the VOC concentration at the vacuum pump exhaust with the monitoring instrument. Make sure concentration stays below the lower explosive limit.

(10) Record the temperature, pressure, dry gas meter reading, outlet VOC concentration and elapsed time every 2 to 5 minutes (min).

(11) Collect 2 gas samples from the discharge of the diaphragm sampling pump when the outlet concentration stabilizes (i.e., the system is at equilibrium).

(12) Collect a background bag (optional).

(13) Collect any liquid that accumulated in the bag as well as in the cold trap (if used) in a sealed container.

(14) Take a final set of readings and stop the vacuum pump.

(15) Transport all samples to the laboratory, along with the data sheet.

(16) Remove the bag.

(17) Rescreen the source with the portable monitoring instrument and record.

Based on the data collected in the steps described above, mass emissions are calculated using the equation presented in table 4-1.

4.2.2 Blow-Through Method

The sampling train for the blow-through method is presented in figure 4-2. The temperature and oxygen concentrations are measured inside the bag with a thermocouple (or thermometer) and an oxygen/combustible gas monitor. The carrier gas is metered into the bag through one or two tubes (two tubes provide for better mixing) at a steady rate throughout the sampling period. The flow rate of the carrier gas is monitored in a gas rotameter calibrated to the gas. Typical flow rates are approximately 60 ℓ/min or less. It is preferable to use an inert gas such as nitrogen for the blow-through method so as to minimize the risk of creating an explosive environment inside the bag. Also, the carrier gas should be free of any organic compounds and moisture. The pressure in the bag should never exceed 1 pound per square inch gauge (psig).

The flow rate through the bag can be varied by adjusting the carrier gas regulator. As mentioned in section 4.2.1, a good flow rate to use is one in which a balance can be found between reaching equilibrium conditions and having a high enough

TABLE 4-1. CALCULATION PROCEDURES FOR LEAK RATE WHEN USING THE VACUUM METHOD

$$\text{Leak Rate (kg/hr)} = \frac{9.63 \times 10^{-10}\,(Q)(MW)(GC)(P)}{T + 273.15} + \frac{(\rho)(V_L)}{16.67(t)}$$

where:

9.63×10^{-10}	=	A conversion factor using the gas constant: $\frac{°K \times 10^6 \times \text{kg-mol} \times \text{min}}{\ell \times \text{hour} \times \text{mmHg}}$;
Q	=	Flow rate out of bag (ℓ/min);
MW[a]	=	Molecular weight of organic compound(s) in the sample bag[c] or alternatively in the process stream contained within the equipment piece being bagged (kg/kg-mol);
GC[b]	=	Sample bag organic compound concentration (ppmv) minus background bag organic compound concentration[c] (ppmv);
P	=	Absolute pressure at the dry gas meter (mmHg);
T	=	Temperature at the dry gas meter (°C);
ρ	=	Density of organic liquid collected (g/mℓ);
V_L	=	Volume of liquid collected (mℓ);
16.67	=	A conversion factor to adjust term to units of kilograms per hour (g × hr)/(kg × min)
t	=	Time in which liquid is collected (min); and

[a]For mixtures calculate MW as:

$$= \sum_{i=1}^{n} MW_i\, X_i \;/\; \sum_{i=1}^{n} X_i$$

where:

MW_i = Molecular weight of organic compound i;
X_i = Mole fraction of organic compound i; and
n = Number of organic compounds in mixture.

[b]For mixtures, the value of GC is the total concentration of all the organic compounds in the mixture.

[c]Collection of a background bag is optional. If a background bag is not collected, assume the background concentration is zero.

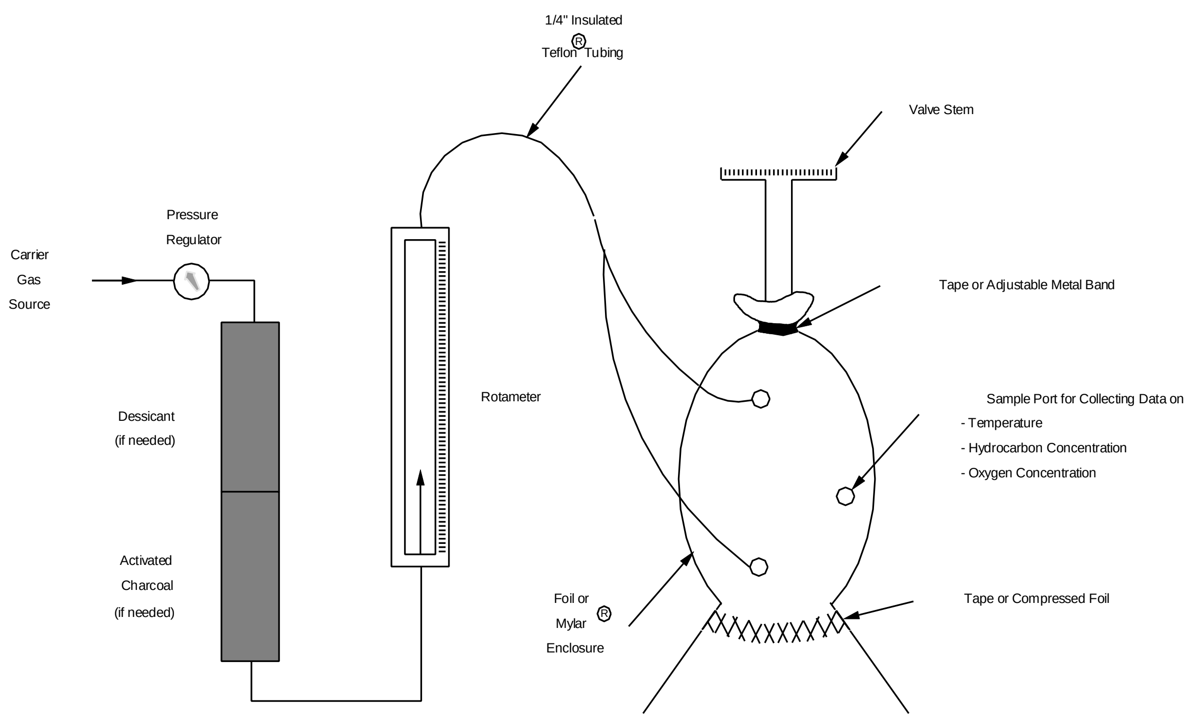

Figure 4-2. Equipment Required for the Blow-Through Sampling Technique

concentration of organic compounds in the bag outlet to accurately measure the concentration in the laboratory. Adjustments to the flow rate may also help minimize liquid condensation in the bag. Any liquid that does accumulate in the bag should be collected using the approach described in section 4.2.

The carrier gas flow rate should be set to a constant rate and kept at that rate long enough for the system to reach equilibrium. In addition to the carrier gas flow through the bag, some ambient air may enter the bag if it is not airtight. The oxygen measurements are used to determine the flow of ambient air through the bag. The oxygen measurements are also an indication of the quality of the bagging procedure (the lower the oxygen concentration the better). Once oxygen concentration falls below 5 percent, the portable monitoring instrument is used to check organic compound concentrations at several locations within the bag to ensure that the bag contents are at steady state.

Once the bag contents are at steady state, two gas samples are drawn out of the bag for laboratory analysis using a portable sampling pump. It may also be necessary to collect a background bag sample, particularly if the source had screened at zero and if there is still a detectable level of oxygen in the bag. However, collection of a background bag is optional.

In summary, the blow-through method consists of the following steps, which assume nitrogen is used as the carrier gas.

(1) Determine the composition of the material in the designated equipment component, and the operating conditions of the component.

(2) Screen the component using the portable monitoring instrument.

(3) Cut a bag that will easily fit over the equipment component.

(4) Connect tubing from the nearest nitrogen source to a rotameter stand.

(5) Run tubing from the rotameter outlet to a "Y" that splits the nitrogen flow into two pieces of tubing and insert the tubes into openings located on either side of the bag.

(6) Turn on the nitrogen flow and regulate it at the rotameter to a constant rate and record the time.

(7) After the nitrogen is flowing, wrap aluminum foil around those parts of the component where air could enter the bag-enclosed volume.

(8) Use duct tape, wire, and/or rope to secure the bag to the component.

(9) Put a third hole in the bag roughly equidistant from the two carrier gas-fed holes.

(10) Measure the oxygen concentration in the bag by inserting the lead from an oxygen meter into the third hole. Adjust the bag (i.e., modify the seals at potential leak points) until the oxygen concentration is less than 5 percent.

(11) Measure the temperature in the bag.

(12) Check the organic compound concentration at several points in the bag with the portable monitoring instrument to ensure that carrier gas and VOC are well mixed throughout the bag.

(13) Collect samples in sample bags or canisters by drawing a sample out of the bag with a portable sampling pump.

(14) Collect a background bag (optional).

(15) Remove the bag and collect any liquid that accumulated in the bag in a sealed container. Note the time over which the liquid accumulated.

(16) Rescreen the source.

Table 4-2 gives equations used to calculate mass emission rates when using the blow-through method. An adjustment is provided for the leak rate equation in table 4-2 to account for the total flow through the bag. This adjustment is recommended and represents an improvement over previous versions

TABLE 4-2. CALCULATION PROCEDURES FOR LEAK RATE WHEN USING THE BLOW-THROUGH METHOD

$$\text{Leak Rate (kg/hr)} = \left(\frac{1.219 \times 10^{-5}\,(Q)\,(MW)\,(GC)}{T + 273.15} + \frac{(\rho)\,(V_L)}{16.67\,(t)}\right) \times \left(\frac{10^6\,\text{ppmv}}{10^6\,\text{ppmv} - GC}\right)$$

where:

1.219×10^{-5} = A conversion factor taking into account the gas constant and assuming a pressure in the tent of 1 atmosphere:

$$\frac{{}^{o}K \times 10^6 \times \text{kg-mol}}{m^3};$$

Q = flow rate out of tent (m^3/hr);

$$= \frac{N_2 \text{ Flow Rate } (\ell/\text{min})}{1 - [\text{Tent Oxygen Conc. (volume \%)}/21]} \times \frac{[0.06\ (m^3/\text{min})]}{(\ell/\text{hr})}$$

MW[a] = Molecular weight of organic compounds in the sample bag or alternatively in the process stream contained within the equipment piece being bagged (kg/kg-mol);

GC[b] = Sample bag organic compound concentration (ppmv), corrected for background bag organic compound concentration (ppmv);[c]

T = Temperature in tent (°C);

ρ = Density of organic liquid collected (g/mℓ);

V_L = Volume of liquid collected (mℓ);

16.67 = A conversion factor to adjust term to units of Kilograms per hour (g × hr)/(kg × min); and

t = Time in which liquid is collected (min).

[a]For mixtures calculate MW as:

$$= \sum_{i=1}^{n} MW_i\, X_i \;/\; \sum_{i=1}^{n} X_i$$

where:

MW_i = Molecular weight of organic compound i;

TABLE 4-2. CALCULATION PROCEDURES FOR LEAK RATE WHEN USING THE BLOW-THROUGH METHOD (Continued)

X_i = Mole fraction of organic compound i; and
n = Number of organic compounds in mixture.

[b]For mixtures, the value of GC is the total concentration of all the organic compounds in the mixture.

[c]Collection of a background bag is optional. If a background bag is not collected, assume the background concentration is zero. To correct for background concentration, use the following equation:

$$\underset{(\text{ppmv})}{GC} = SB - \left(\frac{TENT}{21} \times BG\right)$$

where:

SB = Sample bag concentration (ppmv);
TENT = Tent oxygen concentration (volume %); and
BG = Background bag concentration (ppmv)

of this document for quantifying mass emissions from the blow through method.

4.3 SOURCE ENCLOSURE

In this section, choosing a bagging material and the approach for bagging specific equipment types are discussed. An important criteria when choosing the bagging material is that it is impermeable to the specific compounds being emitted from the equipment piece. This criteria is also applicable for sample gas bags that are used to transport samples to the laboratory. A bag stability test over time similar to the Flexible Bag Procedure described in section 5.3.2 of the EPA method 18 is one way to check the suitability of a bagging material.[1] After a bag has been used, it must be purged. Bags containing residual organic compounds that cannot be purged should be discarded. Mylar®, Tedlar®, Teflon®, aluminum foil, or aluminized Mylar® are recommended potential bagging materials. The thickness of the bagging material can range from 1.5 to 15 millimeters (mm), depending on the bagging configuration needed for the type of equipment being bagged, and the bagging material. Bag construction for individual sources is discussed in sections 4.3.1 through 4.3.5. For convenience, Mylar® will be used as an example of bagging material in the following discussions.

4.3.1 Valves

When a valve is bagged, only the leak points on the valve should be enclosed. Do not enclose surrounding flanges. The most important property of the valve that affects the type of enclosure selected for use is the metal skin temperature where the bag will be sealed. At skin temperatures of approximately 200 ^{o}C or less, the valve stem and/or stem support can be wrapped with 1.5- to 2.0-mm Mylar® and sealed with duct tape at each end and at the seam. The Mylar® bag must be constructed to enclose the valve stem seal and the packing gland seal.

When skin temperatures are in excess of 200 ^{o}C, a different method of bagging the valve should be utilized. Metal bands, wires, or foil can be wrapped around all hot points that would be in contact with the Mylar® bag material. Seals are then made against the insulation using duct tape or adjustable metal bands of stainless steel. At extremely high temperatures, metal foil can be used as the bagging material and metal bands used to form seals. At points where the shape of the equipment prevent a satisfactory seal with metal bands, the foil can be crimped to make a seal.

4.3.2 Pumps and Agitators

As with valves, a property of concern when preparing to sample a pump or agitator is the metal skin temperature at areas or points that are in contact with the bag material. At skin temperatures below 200 ^{o}C, Mylar® plastic and duct tape are satisfactory materials for constructing a bag around a pump or agitator seal. If the temperature is too high or the potential points of contact are too numerous to insulate, an enclosure made of aluminum foil can be constructed. This enclosure is sealed around the pump and bearing housing using silicone fabric insulting tape, adjustable metal bands, or wire.

The configuration of the bag will depend upon the type of pump. Most centrifugal pumps have a housing or support that connects the pump drive (or bearing housing) to the pump itself. The support normally encloses about one-half of the area between the pump and drive motor, leaving open areas on the sides. The pump can be bagged by cutting panels to fit these open areas. These panels can be made using thicker bagging material such as 14-mm Mylar®. In cases where supports are absent or quite narrow, a cylindrical enclosure around the seal can be made so that it extends from the pump housing to the motor or bearing support. As with the panels, this enclosure should be made with thicker bagging material to provide strength and rigidity.

Reciprocating pumps can present a somewhat more difficult bagging problem. If supports are present, the same type of two-panel Mylar® bag can be constructed as that for centrifugal pumps. In many instances, however, sufficiently large supports are not provided, or the distance between pump and driver is relatively long. In these cases, a cylindrical enclosure as discussed above can be constructed. If it is impractical to extend the enclosure all the way from the pump seal to the pump driver, a seal can be made around the reciprocating shaft. This can usually be best completed by using heavy aluminum foil and crimping it to fit closely around the shaft. The foil is attached to the Mylar® plastic of the enclosure and sealed with the duct tape.

In cases where liquid is leaking from a pump, the outlet from the bag to the sampling train should be placed at the top of the bag and as far away from spraying leaks as practical. A low point should be formed in the bag to collect the liquid so that the volume of the liquid can be measured and converted to a mass rate.

4.3.3 Compressors

In general, the same types of bags that are suitable for pumps can be directly applied to compressors. However, in some cases, compressor seals are enclosed and vented to the atmosphere at a high-point vent. If the seals are vented to a high-point vent, this vent line can be sampled. A Mylar® bag can be constructed and sealed around the outlet of the vent and connected to the sampling train. If the high-point vents are inaccessible, the vent lines from the compressor seal enclosures can be disconnected at some convenient point between the compressor and the normal vent exit. Sampling is then conducted at this intermediate point. In other cases, enclosed compressor seals are vented by means of induced draft blowers or fans. In these cases, if the air flow rate is know or can be determined, the outlet from the blower/fan can be sampled to determine the emission rate.

4.3.4 Connectors

In most cases, the physical configurations of connectors lend themselves well to the determination of leak rates. The same technique can be used for a connector whether it is a flanged or a threaded fitting. To bag a connector with a skin temperature below 200 ^{o}C, a narrow section of Mylar® film is constructed to span the distance between the two flange faces or the threaded fitting of the leaking source. The Mylar® is attached and sealed with duct tape. When testing connectors with skin temperatures above 200 ^{o}C, the outside perimeter of both sides of the connector are wrapped with heat-resistant insulating tape. Then, a narrow strip of aluminum foil can be used to span the distance between the connection. This narrow strip of foil can be sealed against the insulating tape using adjustable bands of stainless steel.

4.3.5 Relief Valves

Relief devices in gas/vapor service generally relieve to the atmosphere through a large-diameter pipe that is normally located at a high point on the process unit that it serves. The "horns" can be easily bagged by placing a Mylar® plastic bag over the opening and sealing it to the horn with duct tape. Because may of these devices are above grade level, accessibility to the sampling train may be limited or prevented. It is sometimes possible to run a long piece of tubing from the outlet connection on the bag to the sampling train located at grade level or on a stable platform.

As discussed previously in section 3.0, the purpose of pressure relief devices makes them inherently dangerous to sample, especially over a long period of time. If these equipment are to be sampled for mass emissions, special care and precautions should be taken to ensure the safety of the personnel conducting the field sampling.

4.4 ANALYTICAL TECHNIQUES

The techniques used in the laboratory analysis of the bagged samples will depend on the type of processes sampled. The following sections describe the analytical instrumentation and calibration, and analytical techniques for condensate. These are guidelines and are not meant to be a detailed protocol for the laboratory personnel. Laboratory personnel should be well-versed in the analysis of organic compound mixtures and should design their specific analyses to the samples being examined.

Also discussed is the calibration protocol for the portable monitoring instrument. When bagging data are collected, it is

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. Report No. EPA-453/R-95-017	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE 1995 Protocol for Equipment Leak Emission Estimates		5. REPORT DATA November 1995
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) David L. Epperson		8. PERFORMING ORGANIZATION REPORT NO. DCN: 95-652-015-55-05
9. PERFORMING ORGANIZATION NAME AND ADDRESS Radian Corporation P.O. Box 13000 Research Triangle Park, NC 27709		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. 68-D1-0117, WA 155
12. SPONSORING AGENCY NAME AND ADDRESS Director, Office of Air Quality Planning and Standards U.S. Environmental Protection Agency Research Triangle Park, N.C. 27711		13. TYPE OF REPORT AND PERIOD COVERED
		14. SPONSORING AGENCY EPA/200/04

15. SUPPLEMENTARY NOTES

Project Officer is David W. Markwordt, Mail Drop 13
(919)-541-0837

16. ABSTRACT

The report presents standard protocols for estimating mass emissions from equipment leaks. Different approaches for estimating equipment leak emissions are described and several topics relevant to estimating equipment leak emissions (such as speciating emissions) are addressed. Information on how to perform a screening survey at a process unit is presented. Information on how a process unit can collect equipment leak rate data by enclosing individual equipment pieces and measuring mass emissions is provided. Also, information if provided that can be used to estimate the control efficiency of equipment leak control techniques. The document will help facilities generate accurate plant-specific equipment leak emission estimates.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Synthetic Organic Chemical Manufacturing Petroleum Refining Organic Compounds	Fugitive Emissions Equipment Leaks Response Factors Screening Data Bagging Data Leak Detection and Repair	

18. DISTRIBUTION STATEMENT Release to Public	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 400
	20. SECURITY CLASS (This page) Unclassified	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

Sampling Procedure

Step 1
Perform pre-test quality control checks,

Step 2
Perform leak checks and capture information:

- System Leak Check (L/min)
- Use a calibrated FID to take a measurement (ppmv) of the system background
- Use a calibrated FID to take a measurement (ppmv) of the sample tubing background
- Sorbent Tube Leak Check (inch Hg/min)
- Complete standardized field data sheet
    - Equipment type
    - Equipment subtype
    - Line size
    - Stream phase (confirm heavy liquid)
    - Barometric pressure
    - Ambient temperature
    - Stream temperature
    - Component temperature
    - Stream description
    - Component Identification
    - Unit Identification
    - Date
    - Bagging Team
    - Screening Instrument Identification
    - Sample Pump A Identification
    - Sample Pump B Identification
    - Stream Pressure

Step 3

- Follow U.S. EPA Method 21 to identify the location of maximum leak.
- Record the FID measurement at eight seconds.
- Record the maximum FID measurement and the time needed to reach that value.

Step 4

- If the component was wet or dirty where the bag would be secured, the surface was wiped dry or clean with a cloth, carefully do not disturb the area of the leak.

Step 5

- Enclose component leak using sheets of Mylar and fit 3/8 inch and ¼ inch bulkhead fittings for the vacuum and sample lines, respectively.

Step 6

- Secure Mylar sheets to the component using either duct tape or aluminum foil (for hot or irregular surfaces) and/or high temperature tape to seal against ambient air ingress into the enclosure. Avoid sticking duct tape inside Mylar bag.

Step 7

- Use Teflon tubing to connect the 3/8-inch bulkhead fitting to a sample line attached to a portable bagging cart and the ¼ inch bulkhead fitting to a bag vacuum gauge.

Step 8

- Place the vacuum gauge on a level surface and adjust zero reading, as necessary.

Step 9

- Prepare sample media.
- Perform sorbent tube leak check and document results.

Step 10

- Turn on sample pump
- Verify bag vacuum,
- Record bag and dry gas meter pressure measurements and bag temperature.

Step 11

- Record sample pump volumes prior to start of sampling.
- Once total hydrocarbon concentrations have reached equilibrium, start sampling.

Step 12

- Use a stopwatch to measure the system flow rate at the dry gas meter (or rotary gas meter).
- Monitor total hydrocarbon concentration levels within the bag and at the outlet(s) of sample pump(s).
- Record bag and dry gas meter pressure measurements and bag temperature.

Step 13

- Stop sampling after sample run length (12 minutes) and record sample pump volumes.
- Remove sample tubes, place end caps on tubes, and place in a portable ice chest to maintain sample temperatures.

Step 14

- Turn off main pump and remove bag while checking for any accumulated condensate.

Step 15

- Take an additional screening measurement of the component, recording the measured values at eight seconds, and final concentrations (noting time to reach final concentration).

Example Sampling Field Data Form

DATA FORM FOR FUGITIVE EMISSIONS BAGGING TEST (VACUUM METHOD)

Equipment Type: ____________________ Component ID: ____________________

Equipment SubType: ____________________ Unit ID: ____________________

Line Size (inches): ____________________ Date: ____________________

Stream Phase: G/V, LL, HL Bagging Team: ____________________

Barometric Pressure (inHg): ____________________ TVA ID: ____________________

Ambient Temperature (°F): ____________________ Sample Pump A ID: ____________________

Component Temperature (°F): ____________________ Sample Pump B ID: ____________________

BAAQMD ppm: ____________________ Stream Temp/Pressure: ____________________

Stream Description: ____________________

Sample #: ____________________

Time Background __________ ppm 8 sec __________ ppm

______ Initial Screening Total Dwell ______ min ______ ppm AT __________

______ Initial Bag Vac. __________ in H_2O Initial DGM Vac. __________ in H_2O

______ Initial Bag Temp __________ °F ***Bag Concentrations:***

Time											
ppm											

Time											
ppm											

______ START RUN A @ 1 L/min Start Vol __________ L

______ START RUN B @ 1 L/min Start Vol __________ L

______ Bag Vac __________ in H_2O DGM Vac __________ in H_2O

______ Temperatures __________ Pump __________ Bag __________ DGM

______ 10L Time __________ M:S.F

______ STOP RUN A Vol A Total Vol __________ L

______ STOP RUN B Vol B Total Vol __________ L

______ Final Screening

Background __________ ppm 8 sec __________ ppm

Total Dwell __________ min ______ ppm At __________

Condensate Accumulation Start: ____________________ Final: __________

Amount: ______ mL Density: ____________________ g/mL

______ System Leak Check: __________ L/min

______ System Background: __________ ppm

______ Sample Tubing Background __________ ppm

______ Sorbent Tube Leak Check @ 5” Hg __________ in Hg/min

APPENDIX A-3
Laboratory Methodology

EPA Method 18

METHOD 18—MEASUREMENT OF GASEOUS ORGANIC COMPOUND EMISSIONS BY GAS CHROMATOGRAPHY

NOTE: This method is not inclusive with respect to specifications (*e.g.*, equipment and supplies) and procedures (*e.g.*, sampling and analytical) essential to its performance. Some material is incorporated by reference from other methods in this part. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of at least the following additional test methods: Method 1, Method 2, Method 3.

NOTE: This method should not be attempted by persons unfamiliar with the performance characteristics of gas chromatography, nor by those persons who are unfamiliar with source sampling. Particular care should be exercised in the area of safety concerning choice of equipment and operation in potentially explosive atmospheres.

1.0 Scope and Application

1.1 Analyte. Total gaseous organic compounds.

1.2 Applicability.

1.2.1 This method is designed to measure gaseous organics emitted from an industrial source. While designed for ppm level sources, some detectors are quite capable of detecting compounds at ambient levels, *e.g.*, ECD, ELCD, and helium ionization detectors. Some other types of detectors are evolving such that the sensitivity and applicability may well be in the ppb range in only a few years.

1.2.2 This method will not determine compounds that (1) are polymeric (high molecular weight), (2) can polymerize before analysis, or (3) have very low vapor pressures at stack or instrument conditions.

1.3 Range. The lower range of this method is determined by the sampling system; adsorbents may be used to concentrate the sample, thus lowering the limit of detection below the 1 part per million (ppm) typically achievable with direct interface or bag sampling. The upper limit is governed by GC detector saturation or column overloading; the upper range can be extended by dilution of sample with an inert gas or by using smaller volume gas sampling loops. The upper limit can also be governed by condensation of higher boiling compounds.

1.4 Sensitivity. The sensitivity limit for a compound is defined as the minimum detectable concentration of that compound, or the concentration that produces a signal-to-noise ratio of three to one. The minimum detectable concentration is determined during the presurvey calibration for each compound.

2.0 Summary of Method

The major organic components of a gas mixture are separated by gas chromatography (GC) and individually quantified by flame ionization, photoionization, electron capture, or other appropriate detection principles. The retention times of each separated component are compared with those of known compounds under identical conditions. Therefore, the analyst confirms the identity and approximate concentrations of the organic emission components beforehand. With this information, the analyst then prepares or purchases commercially available standard mixtures to calibrate the GC under conditions identical to those of the samples. The analyst also determines the need for sample dilution to avoid detector saturation, gas stream filtration to eliminate particulate matter, and prevention of moisture condensation.

3.0 Definitions [Reserved]

4.0 Interferences

4.1 Resolution interferences that may occur can be eliminated by appropriate GC column and detector choice or by shifting the retention times through changes in the column flow rate and the use of temperature programming.

4.2 The analytical system is demonstrated to be essentially free from contaminants by periodically analyzing blanks that consist of hydrocarbon-free air or nitrogen.

4.3 Sample cross-contamination that occurs when high-level and low-level samples or standards are analyzed alternately is best dealt with by thorough purging of the GC sample loop between samples.

4.4 To assure consistent detector response, calibration gases are contained in dry air. To adjust gaseous organic concentrations when water vapor is present in the sample, water vapor concentrations are determined for those samples, and a correction factor is applied.

4.5 The gas chromatograph run time must be sufficient to clear all eluting peaks from the column before proceeding to the next run (in order to prevent sample carryover).

5.0 Safety

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method. The analyzer users manual should be consulted for specific precautions to be taken with regard to the analytical procedure.

6.0 Equipment and Supplies

6.1 Equipment needed for the presurvey sampling procedure can be found in section 16.1.1.

6.2 Equipment needed for the integrated bag sampling and analysis procedure can be found in section 8.2.1.1.1.

6.3 Equipment needed for direct interface sampling and analysis can be found in section 8.2.2.1.

6.4 Equipment needed for the dilution interface sampling and analysis can be found in section 8.2.3.1.

6.5 Equipment needed for adsorbent tube sampling and analysis can be found in section 8.2.4.1.

7.0 Reagents and Standards

7.1 Reagents needed for the presurvey sampling procedure can be found in section 16.1.2.

8.0 Sample Collection, Preservation, Storage, and Transport

8.2 Final Sampling and Analysis Procedure. Considering safety (flame hazards) and the source conditions, select an appropriate sampling and analysis procedure (Section 8.2.1, 8.2.2, 8.2.3 or 8.2.4). In situations where a hydrogen flame is a hazard and no intrinsically safe GC is suitable, use the flexible bag collection technique or an adsorption technique.

8.2.1 Integrated Bag Sampling and Analysis.

8.2.1.1 Evacuated Container Sampling Procedure. In this procedure, the bags are filled by evacuating the rigid air-tight container holding the bags. Use a field sample data sheet as shown in Figure 18-10. Collect triplicate samples from each sample location.

8.2.1.1.1 Apparatus.

8.2.1.1.1.1 Probe. Stainless steel, Pyrex glass, or Teflon tubing probe, according to the duct temperature, with Teflon tubing of sufficient length to connect to the sample bag. Use stainless steel or Teflon unions to connect probe and sample line.

8.2.1.1.1.2 Quick Connects. Male (2) and female (2) of stainless steel construction.

8.2.1.1.1.3 Needle Valve. To control gas flow.

8.2.1.1.1.4 Pump. Leakless Teflon-coated diaphragm-type pump or equivalent. To deliver at least 1 liter/min.

8.2.1.1.1.5 Charcoal Adsorption Tube. Tube filled with activated charcoal, with glass wool plugs at each end, to adsorb organic vapors.

8.2.1.1.1.6 Flowmeter. 0 to 500-ml flow range; with manufacturer's calibration curve.

8.2.1.1.2 Sampling Procedure. To obtain a sample, assemble the sample train as shown in Figure 18-9. Leak-check both the bag and the container. Connect the vacuum line from the needle valve to the Teflon sample line from the probe. Place the end of the probe at the centroid of the stack or at a point no closer to the walls than 1 in., and start the pump. Set the flow rate so that the final volume of the sample is approximately 80 percent of the bag capacity. After allowing sufficient time to purge the line several times, connect the vacuum line to the bag, and evacuate until the rotameter indicates no flow. Then position the sample and vacuum lines for sampling, and begin the actual sampling, keeping the rate proportional to the stack velocity. As a precaution, direct the gas exiting the rotameter away from sampling personnel. At the end of the sample period, shut off the pump, disconnect the sample line from the bag, and disconnect the vacuum line from the bag container. Record the source temperature, barometric pressure, ambient temperature, sampling flow rate, and initial and final sampling time on the data sheet shown in Figure 18-10. Protect the bag and its container from sunlight. Record the time lapsed between sample collection and analysis, and then conduct the recovery procedure in Section 8.4.2.

8.2.1.2 Direct Pump Sampling Procedure. Follow 8.2.1.1, except place the pump and needle valve between the probe and the bag. Use a pump and needle valve constructed of inert material not affected by the stack gas. Leak-check the system, and then purge with stack gas before connecting to the previously evacuated bag.

8.2.1.3 Explosion Risk Area Bag Sampling Procedure. Follow 8.2.1.1 except replace the pump with another evacuated can (see Figure 18-9a). Use this method whenever there is a possibility of an explosion due to pumps, heated probes, or other flame producing equipment.

8.2.1.4 Other Modified Bag Sampling Procedures. In the event that condensation is observed in the bag while collecting the sample and a direct interface system cannot be used, heat the bag during collection and maintain it at a suitably elevated temperature during all subsequent operations. (Note: Take care to leak-check the system prior to the dilutions so as not to create a potentially explosive atmosphere.) As an alternative, collect the sample gas, and simultaneously dilute it in the bag.

8.2.1.4.1 First Alternative Procedure. Heat the box containing the sample bag to 120 °C (±5 °C). Then transport the bag as rapidly as possible to the analytical area while maintaining the heating, or cover the box with an insulating blanket. In the analytical area, keep the box heated to 120 °C (±5 °C) until analysis. Be sure that the method of heating the box and the control for the heating circuit are compatible with the safety restrictions required in each area.

8.2.1.4.2 Second Alternative Procedure. Prefill the bag with a known quantity of inert gas. Meter the inert gas into the bag according to the procedure for the preparation of gas concentration standards of volatile liquid materials (Section 10.1.2.2), but eliminate the midget impinger section. Take the partly filled bag to the source, and meter the source gas into the bag through heated sampling lines and a heated flowmeter, or Teflon positive displacement pump. Verify the dilution factors before sampling each bag through dilution and analysis of gases of known concentration.

8.2.1.5 Analysis of Bag Samples.

8.2.1.5.1 Apparatus. Same as section 8.1. A minimum of three gas standards are required.

8.2.1.5.2 Procedure.

8.2.1.5.2.1 Establish proper GC operating conditions as described in section 10.2, and record all data listed in Figure 18-7. Prepare the GC so that gas can be drawn through the sample valve. Flush the sample loop with calibration gas mixture, and activate the valve (sample pressure at the inlet to the GC introduction valve should be similar during calibration as during actual sample analysis). Obtain at least three chromatograms for the mixture. The results are acceptable when the peak areas for the three injections agree to within 5 percent of their average. If they do not agree, run additional samples or correct the analytical techniques until this requirement is met. Then analyze the other two calibration mixtures in the same manner. Prepare a calibration curve as described in section 10.2.

8.2.1.5.2.2 Analyze the three source gas samples by connecting each bag to the sampling valve with a piece of Teflon tubing identified with that bag. Analyze each bag sample three times. Record the data in Figure 18-11. If certain items do not apply, use the notation “N.A.” If the bag has been maintained at an elevated temperature as described in section 8.2.1.4, determine the stack gas water content by Method 4. After all samples have been analyzed, repeat the analysis of the mid-level calibration gas for each compound. Compare the average response factor of the pre- and post-test analysis for each compound. If they differ by >5percent, analyze the other calibration gas levels for that compound, and prepare a calibration curve using all the pre- and post-test calibration gas mixture values. If the two response factor averages (pre-and post-test) differ by less than 5 percent from their mean value, the tester has the option of using only the pre-test calibration curve to generate the concentration values.

8.2.1.5.2.3 Analyze the two field audit samples as described in Section 9.2 by connecting each bag containing an audit gas mixture to the sampling valve. Calculate the results; record and report the data to the audit supervisor.

8.2.1.6 Determination of Bag Water Vapor Content. Measure the ambient temperature and barometric pressure near the bag. From a water saturation vapor pressure table, determine and record the water vapor content of the bag as a decimal figure. (Assume the relative humidity to be 100 percent unless a lesser value is known.) If the bag has been maintained at an elevated temperature as described in section 8.2.1.4, determine the stack gas water content by Method 4.

8.2.1.8 Emission Calculations. From the calibration curve described in section 8.2.1.5, select the value of C_s that corresponds to the peak area. Calculate the concentration C_c in ppm, dry basis, of each organic in the sample using Equation 18-5 in section 12.6.

8.2.2 Direct Interface Sampling and Analysis Procedure. The direct interface procedure can be used provided that the moisture content of the gas does not interfere with the analysis procedure, the physical requirements of the equipment can be met at the site, and the source gas concentration falls within the linear range of the detector. Adhere to all safety requirements with this method.

8.2.2.1 Apparatus.

8.2.2.1.1 Probe. Constructed of stainless steel, Pyrex glass, or Teflon tubing as dictated by duct temperature and reactivity of target compounds. A filter or glass wool plug may be needed if particulate is present in the stack gas. If necessary, heat the probe with heating tape or a special heating unit capable of maintaining a temperature greater than 110 °C.

8.2.2.1.2 Sample Lines. 6.4-mm OD (or other diameter as needed) Teflon lines, heat-traced to prevent condensation of material (greater than 110 °C).

8.2.2.1.3 Quick Connects. To connect sample line to gas sampling valve on GC instrument and to pump unit used to withdraw source gas. Use a quick connect or equivalent on the cylinder or bag containing calibration gas to allow connection of the calibration gas to the gas sampling valve.

8.2.2.1.4 Thermocouple Readout Device. Potentiometer or digital thermometer, to measure source temperature and probe temperature.

8.2.2.1.5 Heated Gas Sampling Valve. Of two-position, six-port design, to allow sample loop to be purged with source gas or to direct source gas into the GC instrument.

8.2.2.1.6 Needle Valve. To control gas sampling rate from the source.

8.2.2.1.7 Pump. Leakless Teflon-coated diaphragm-type pump or equivalent, capable of at least 1 liter/minute sampling rate.

8.2.2.1.8 Flowmeter. Of suitable range to measure sampling rate.

8.2.2.1.9 Charcoal Adsorber. To adsorb organic vapor vented from the source to prevent exposure of personnel to source gas.

8.2.2.1.10 Gas Cylinders. Carrier gas, oxygen and fuel as needed to run GC and detector.

8.2.2.1.11 Gas Chromatograph. Capable of being moved into the field, with detector, heated gas sampling valve, column required to complete separation of desired components, and option for temperature programming.

8.2.2.1.12 Recorder/Integrator. To record results.

8.2.2.2 Procedure. Calibrate the GC using the procedures in section 8.2.1.5.2.1. To obtain a stack gas sample, assemble the sampling system as shown in Figure 18-12. Make sure all connections are tight. Turn on the probe and sample line heaters. As the temperature of the probe and heated line approaches the target temperature as indicated on the thermocouple readout device, control the heating to maintain a temperature greater than 110 °C. Conduct a 3-point calibration of the GC by analyzing each gas mixture in triplicate. Generate a calibration curve. Place the inlet of the probe at the centroid of the duct, or at a point no closer to the walls than 1 m, and draw source gas into the probe, heated line, and sample loop. After thorough flushing, analyze the stack gas sample using the same conditions as for the calibration gas mixture. For each run, sample, analyze, and record five consecutive samples. A test consists of three runs (five samples per run times three runs, for a total of fifteen samples). After all samples have been analyzed, repeat the analysis of the mid-level calibration gas for each compound. For each calibration standard, compare the pre- and post-test average response factors (RF) for each compound. If the two calibration RF values (pre- and post-analysis) differ by more than 5 percent from their mean value, then analyze the other calibration gas levels for that compound and determine the stack gas sample concentrations by comparison to both calibration curves (this is done by preparing a calibration curve using all the pre- and post-test calibration gas mixture values.) If the two calibration RF values differ by less than 5 percent from their mean value, the tester has the option of using only the pre-test calibration curve to generate the concentration values. Record this calibration data and the other required data on the data sheet shown in Figure 18-11, deleting the dilution gas information.

NOTE: Take care to draw all samples and calibration mixtures through the sample loop at the same pressure.

8.2.2.3 Determination of Stack Gas Moisture Content. Use Method 4 to measure the stack gas moisture content.

8.2.2.5 Emission Calculations. Same as section 8.2.1.8.

8.2.3 Dilution Interface Sampling and Analysis Procedure. Source samples that contain a high concentration of organic materials may require dilution prior to analysis to prevent saturating the GC detector. The apparatus required for this direct interface procedure is basically the same as that described in the section 8.2.2, except a dilution system is added between the heated sample line and the gas sampling valve. The apparatus is arranged so that either a 10:1 or 100:1 dilution of the source gas can be directed to the chromatograph. A pump of larger capacity is also required, and this pump must be heated and placed in the system between the sample line and the dilution apparatus.

8.2.3.1 Apparatus. The equipment required in addition to that specified for the direct interface system is as follows:

8.2.3.1.1 Sample Pump. Leakless Teflon-coated diaphragm-type that can withstand being heated to 120 °C and deliver 1.5 liters/minute.

8.2.3.1.2 Dilution Pumps. Two Model A-150 Komhyr Teflon positive displacement type delivering 150 cc/minute, or equivalent. As an option, calibrated flowmeters can be used in conjunction with Teflon-coated diaphragm pumps.

8.2.3.1.3 Valves. Two Teflon three-way valves, suitable for connecting to Teflon tubing.

8.2.3.1.4 Flowmeters. Two, for measurement of diluent gas.

8.2.3.1.5 Diluent Gas with Cylinders and Regulators. Gas can be nitrogen or clean dry air, depending on the nature of the source gases.

8.2.3.1.6 Heated Box. Suitable for being heated to 120 °C, to contain the three pumps, three-way valves, and associated connections. The box should be equipped with quick connect fittings to facilitate connection of: (1) the heated sample line from the probe, (2) the gas sampling valve, (3) the calibration gas mixtures, and (4) diluent gas lines. A schematic diagram of the components and connections is shown in Figure 18-13. The heated box shown in Figure 18-13 is designed to receive a heated line from the probe. An optional design is to build a probe unit that attaches directly to the heated box. In this way, the heated box contains the controls for the probe heaters, or, if the box is placed against the duct being sampled, it may be possible to eliminate the probe heaters. In either case, a heated Teflon line is used to connect the heated box to the gas sampling valve on the chromatograph.

NOTE: Care must be taken to leak-check the system prior to the dilutions so as not to create a potentially explosive atmosphere.

8.2.3.2 Procedure.

8.2.3.2.1 Assemble the apparatus by connecting the heated box, shown in Figure 18-13, between the heated sample line from the probe and the gas sampling valve on the chromatograph. Vent the source gas from the gas sampling valve directly to the charcoal filter, eliminating the pump and rotameter. Heat the sample probe, sample line, and heated box. Insert the probe and source thermocouple at the centroid of the duct, or to a point no closer to the walls than 1 m. Measure the source temperature, and adjust all heating units to a temperature 0 to 3 °C above this temperature. If this temperature is above the safe operating temperature of the Teflon components, adjust the heating to maintain a temperature high enough to prevent condensation of water and organic compounds (greater than 110 °C). Calibrate the GC through the dilution system by following the procedures in section 8.2.1.5.2.1. Determine the concentration of the diluted calibration gas using the dilution factor and the certified concentration of the calibration gas. Record the pertinent data on the data sheet shown in Figure 18-11.

8.2.3.2.2 Once the dilution system and GC operations are satisfactory, proceed with the analysis of source gas, maintaining the same dilution settings as used for the standards.

8.2.3.2.3 Analyze the audit samples using either the dilution system, or directly connect to the gas sampling valve as required. Record all data and report the results to the audit supervisor.

8.2.3.3 Determination of Stack Gas Moisture Content. Same as section 8.2.2.3.

8.2.3.4 Quality Assurance. Same as section 8.2.2.4.

8.2.3.5 Emission Calculations. Same as section 8.2.2.5, with the dilution factor applied.

8.2.4 Adsorption Tube Procedure. Any commercially available adsorbent is allowed for the purposes of this method, as long as the recovery study criteria in section 8.4.3 are met. Help in choosing the adsorbent may be found by calling the distributor, or the tester may refer to National Institute for Occupational Safety and Health (NIOSH) methods for the particular organics to be sampled. For some adsorbents, the principal interferent will be water vapor. If water vapor is thought to be a problem, the tester may place a midget impinger in an ice bath before the adsorbent tubes. If this option is chosen, the water catch in the midget impinger shall be analyzed for the target compounds. Also, the spike for the recovery study (in section 8.4.3) shall be conducted in both the midget impinger and the adsorbent tubes. The combined recovery (add the recovered amount in the impinger and the adsorbent tubes to calculate R) shall then meet the criteria in section 8.4.3.

NOTE: Post-test leak-checks are not allowed for this technique since this can result in sample contamination.

8.2.4.1 Additional Apparatus. The following items (or equivalent) are suggested.

8.2.4.1.1 Probe. Borosilicate glass or stainless steel, approximately 6-mm ID, with a heating system if water condensation is a problem, and a filter (either in-stack or out-of-stack, heated to stack temperature) to remove particulate matter. In most instances, a plug of glass wool is a satisfactory filter.

8.2.4.1.2 Flexible Tubing. To connect probe to adsorption tubes. Use a material that exhibits minimal sample adsorption.

8.2.4.1.3 Leakless Sample Pump. Flow controlled, constant rate pump, with a set of limiting (sonic) orifices.

8.2.4.1.4 Bubble-Tube Flowmeter. Volume accuracy within 1 percent, to calibrate pump.

8.2.4.1.5 Stopwatch. To time sampling and pump rate calibration.

8.2.4.1.6 Adsorption Tubes. Precleaned adsorbent, with mass of adsorbent to be determined by calculating breakthrough volume and expected concentration in the stack.

8.2.4.1.7 Barometer. Accurate to 5 mm Hg, to measure atmospheric pressure during sampling and pump calibration.

8.2.4.1.8 Rotameter. O to 100 cc/min, to detect changes in flow rate during sampling.

8.2.4.2 Sampling and Analysis.

8.2.4.2.1 Calibrate the pump and limiting orifice flow rate through adsorption tubes with the bubble tube flowmeter before sampling. The sample system can be operated as a “recirculating loop” for this operation. Record the ambient temperature and barometric pressure. Then, during sampling, use the rotameter to verify that the pump and orifice sampling rate remains constant.

8.2.4.2.2 Use a sample probe, if required, to obtain the sample at the centroid of the duct or at a point no closer to the walls than 1 m. Minimize the length of flexible tubing between the probe and adsorption tubes. Several adsorption tubes can be connected in series, if the extra adsorptive capacity is needed. Adsorption tubes should be maintained vertically during the test in order to prevent channeling. Provide the gas sample to the sample system at a pressure sufficient for the limiting orifice to function as a sonic orifice. Record the total time and sample flow rate (or the number of pump strokes), the barometric pressure, and ambient temperature. Obtain a total sample volume commensurate with the expected concentration(s) of the volatile organic(s) present and recommended sample loading factors (weight sample per weight adsorption media). Laboratory tests prior to actual sampling may be necessary to predetermine this volume. If water vapor is present in the sample at concentrations above 2 to 3 percent, the adsorptive capacity may be severely reduced. Operate the gas chromatograph according to the manufacturer's instructions. After establishing optimum conditions, verify and document these conditions during all operations. Calibrate the instrument and then analyze the emission samples.

8.2.4.3 Standards and Calibration. If using thermal desorption, obtain calibration gases using the procedures in section 10.1. If using solvent extraction, prepare liquid standards in the desorption solvent. Use a minimum of three different standards; select the concentrations to bracket the expected average sample concentration. Perform the calibration before and after each day's sample analyses using the procedures in section 8.2.1.5.2.1.

8.2.4.4 Quality Assurance.

8.2.4.4.1 Determine the recovery efficiency of the pollutants of interest according to section 8.4.3.

8.2.4.4.2 Determination of Sample Collection Efficiency (Optional). If sample breakthrough is thought to be a problem, a routine procedure for determining breakthrough is to analyze the primary and backup portions of the adsorption tubes separately. If the backup portion exceeds 10 percent of the total amount (primary and back-up), it is usually a sign of sample breakthrough. For the purposes of this method, only the recovery efficiency value (Section 8.4.3) is used to determine the appropriateness of the sampling and analytical procedure.

8.2.4.4.3 Volume Flow Rate Checks. Perform this check immediately after sampling with all sampling train components in place. Use the bubble-tube flowmeter to measure the pump volume flow rate with the orifice used in the test sampling, and record the result. If it has changed by more than 5 but less than 20 percent, calculate an average flow rate for the test. If the flow rate has changed by more than 20 percent, recalibrate the pump and repeat the sampling.

8.2.4.4.4 Calculations. Correct all sample volumes to standard conditions. If a sample dilution system has been used, multiply the results by the appropriate dilution ratio. Correct all results according to the applicable procedure in section 8.4.3. Report results as ppm by volume, dry basis.

8.3 Reporting of Results. At the completion of the field analysis portion of the study, ensure that the data sheets shown in Figure 18-11 have been completed. Summarize this data on the data sheets shown in Figure 18-15.

8.4 Recovery Study. After conducting the presurvey and identifying all of the pollutants of interest, conduct the appropriate recovery study during the test based on the sampling system chosen for the compounds of interest.

8.4.1 Recovery Study for Direct Interface or Dilution Interface Sampling. If the procedures in section 8.2.2 or 8.2.3 are to be used to analyze the stack gas, conduct the calibration procedure as stated in section 8.2.2.2 or 8.2.3.2, as appropriate. Upon successful completion of the appropriate calibration procedure, attach the mid-level calibration gas for at least one target compound to the inlet of the probe or as close as possible to the inlet of the probe, but before the filter. Repeat the calibration procedure by sampling and analyzing the mid-level calibration gas through the entire sampling and analytical system in triplicate. The mean of the calibration gas response sampled through the probe shall be within 10 percent of the analyzer response. If the difference in the two means is greater than 10 percent, check for leaks throughout the sampling system and repeat the analysis of the standard through the sampling system until this criterion is met.

8.4.2 Recovery Study for Bag Sampling.

8.4.2.1 Follow the procedures for the bag sampling and analysis in section 8.2.1. After analyzing all three bag samples, choose one of the bag samples and tag this bag as the spiked bag. Spike the chosen bag sample with a known mixture (gaseous or liquid) of all of the target pollutants. The theoretical concentration, in ppm, of each spiked compound in the bag shall be 40 to 60 percent of the average concentration measured in the three bag samples. If a target compound was not detected in the bag samples, the concentration of that compound to be spiked shall be 5 times the limit of detection for that compound. Store the spiked bag for the same period of time as the bag samples collected in the field. After the appropriate storage time has passed, analyze the spiked bag three times. Calculate the average fraction recovered (R) of each spiked target compound with the equation in section 12.7.

8.4.2.2 For the bag sampling technique to be considered valid for a compound, $0.70 \leq R \leq 1.30$. If the R value does not meet this criterion for a target compound, the sampling technique is not acceptable for that compound, and therefore another sampling technique shall be evaluated for acceptance (by repeating the recovery study with another sampling technique). Report the R value in the test report and correct all field measurements with the calculated R value for that compound by using the equation in section 12.8.

8.4.3 Recovery Study for Adsorption Tube Sampling. If following the adsorption tube procedure in section 8.2.4, conduct a recovery study of the compounds of interest during the actual field test. Set up two identical sampling trains. Collocate the two sampling probes in the stack. The probes shall be placed in the same horizontal plane, where the first probe tip is 2.5 cm from the outside edge of the other. One of the sampling trains shall be designated the spiked train and the other the unspiked train. Spike all of the compounds of interest (in gaseous or liquid form) onto the adsorbent tube(s) in the spiked train before sampling. The mass of each spiked compound shall be 40 to 60 percent of the mass expected to be collected with the unspiked train. Sample the stack gas into the two trains simultaneously. Analyze the adsorbents from the two trains utilizing identical analytical procedures and instrumentation. Determine the fraction of spiked compound recovered (R) using the equations in section 12.9.

8.4.3.1 Repeat the procedure in section 8.4.3 twice more, for a total of three runs. In order for the adsorbent tube sampling and analytical procedure to be acceptable for a compound, $0.70 \leq R \leq 1.30$ (R in this case is the average of three runs). If the average R value does not meet this criterion for a target compound, the sampling technique is not acceptable for that compound, and therefore another sampling technique shall be evaluated for acceptance (by repeating the recovery study with another sampling technique). Report the R value in the test report and correct all field measurements with the calculated R value for that compound by using the equation in section 12.8.

9.0 Quality Control

9.1 Miscellaneous Quality Control Measures

Section	**Quality control measure**	**Effect**
8.4.1	Recovery study for direct interface or dilution interface sampling	Ensure that there are no significant leaks in the sampling system.
8.4.2	Recovery study for bag sampling	Demonstrate that proper sampling/analysis procedures were selected.
8.4.3	Recovery study for adsorption tube sampling	Demonstrate that proper sampling/analysis procedures were selected.

10.0 Calibration and Standardization.

10.1 Calibration Standards. Obtain calibration gas standards for each target compound to be analyzed. Commercial cylinder gases certified by the manufacturer to be accurate to within 1 percent of the certified label value are preferable, although cylinder gases certified by the manufacturer to 2 percent accuracy are allowed. Another option allowed by this method is for the tester to obtain high concentration certified cylinder gases and then use a dilution system meeting the requirements of Test Method 205, 40 CFR Part 51, Appendix M to make multi-level calibration gas standards. Prepare or obtain enough calibration standards so that there are three different concentrations of each organic compound expected to be measured in the source sample. For each organic compound, select those concentrations that bracket the concentrations expected in the source samples. A calibration standard may contain more than one organic compound. If samples are collected in adsorbent tubes and extracted using solvent extraction, prepare or obtain standards in the same solvent used for the sample extraction procedure. Verify the stability of all standards for the time periods they are used.

10.2 Preparation of Calibration Curves.

10.2.1 Establish proper GC conditions, then flush the sampling loop for 30 seconds. Allow the sample loop pressure to equilibrate to atmospheric pressure, and activate the injection valve. Record the standard concentration, attenuator factor, injection time, chart speed, retention time, peak area, sample loop temperature, column temperature, and carrier gas flow rate. Analyze each standard in triplicate.

10.2.2 Repeat this procedure for each standard. Prepare a graphical plot of concentration (C_s) versus the calibration area values. Perform a regression analysis, and draw the least square line.

11.0 Analytical Procedures

11.1 Analysis Development

11.1.1 Selection of GC Parameters

11.1.1.1 Column Choice. Based on the initial contact with plant personnel concerning the plant process and the anticipated emissions, choose a column that provides good resolution and rapid analysis time. The choice of an appropriate column can be aided by a literature search, contact with manufacturers of GC columns, and discussion with personnel at the emission source.

NOTE: Most column manufacturers keep excellent records on their products. Their technical service departments may be able to recommend appropriate columns and detector type for separating the anticipated compounds, and they may be able to provide information on interferences, optimum operating conditions, and column limitations. Plants with analytical laboratories may be able to provide information on their analytical procedures.

11.1.1.2 Preliminary GC Adjustment. Using the standards and column obtained in section 11.1.1.1, perform initial tests to determine appropriate GC conditions that provide good resolution and minimum analysis time for the compounds of interest.

11.1.1.3 Preparation of Presurvey Samples. If the samples were collected on an adsorbent, extract the sample as recommended by the manufacturer for removal of the compounds with a solvent suitable to the type of GC analysis. Prepare other samples in an appropriate manner.

11.1.1.4 Presurvey Sample Analysis.

11.1.1.4.1 Before analysis, heat the presurvey sample to the duct temperature to vaporize any condensed material. Analyze the samples by the GC procedure, and compare the retention times against those of the calibration samples that contain the components expected to be in the stream. If any compounds cannot be identified with certainty by this procedure, identify them by other means such as GC/mass spectroscopy (GC/MS) or GC/infrared techniques. A GC/MS system is recommended.

11.1.1.4.2 Use the GC conditions determined by the procedure of section 11.1.1.2 for the first injection. Vary the GC parameters during subsequent injections to determine the optimum settings. Once the optimum settings have been determined, perform repeat injections of the sample to determine the retention time of each compound. To inject a sample, draw sample through the loop at a constant rate (100 ml/min for 30 seconds). Be careful not to pressurize the gas in the loop. Turn off the pump and allow the gas in the sample loop to come to ambient pressure. Activate the sample valve, and record injection time, loop temperature, column temperature, carrier flow rate, chart speed, and attenuator setting. Calculate the retention time of each peak using the distance from injection to the peak maximum divided by the chart speed. Retention times should be repeatable within 0.5 seconds.

11.1.1.4.3 If the concentrations are too high for appropriate detector response, a smaller sample loop or dilutions may be used for gas samples, and, for liquid samples, dilution with solvent is appropriate. Use the standard curves (Section 10.2) to obtain an estimate of the concentrations.

11.1.1.4.4 Identify all peaks by comparing the known retention times of compounds expected to be in the retention times of peaks in the sample. Identify any remaining unidentified peaks which have areas larger than 5 percent of the total using a GC/MS, or estimation of possible compounds by their retention times compared to known compounds, with confirmation by further GC analysis.

12.0 Data Analysis and Calculations

12.1 Nomenclature.

B_{ws} = Water vapor content of the bag sample or stack gas, proportion by volume.

C_s = Concentration of the organic from the calibration curve, ppm.

G_v = Gas volume or organic compound injected, ml.

L_v = Liquid volume of organic injected, µl.

M = Molecular weight of organic, g/g-mole.

m_s = Total mass of compound measured on adsorbent with spiked train (µg).

m_u = Total mass of compound measured on adsorbent with unspiked train (µg).

m_v = Mass per volume of spiked compound measured (µg/L).

P_i = Barometric or absolute sample loop pressure at time of sample analysis, mm Hg.

P_m = Absolute pressure of dry gas meter, mm Hg.

P_r = Reference pressure, the barometric pressure or absolute sample loop pressure recorded during calibration, mm Hg.

P_s = Absolute pressure of syringe before injection, mm Hg.

q_c = Flow rate of the calibration gas to be diluted.

q_{c1} = Flow rate of the calibration gas to be diluted in stage 1.

q_{c2} = Flow rate of the calibration gas to be diluted in stage 2.

q_d = Diluent gas flow rate.

q_{d1} = Flow rate of diluent gas in stage 1.

q_{d2} = Flow rate of diluent gas in stage 2.

s = Theoretical concentration (ppm) of spiked target compound in the bag.

S = Theoretical mass of compound spiked onto adsorbent in spiked train (µg).

t = Measured average concentration (ppm) of target compound and source sample (analysis results subsequent to bag spiking)

T_i = Sample loop temperature at the time of sample analysis, °K.

T_m = Absolute temperature of dry gas meter, °K.

T_s = Absolute temperature of syringe before injection, °K.

u = Source sample average concentration (ppm) of target compound in the bag (analysis results before bag spiking).

V_m=Gas volume indicated by dry gas meter, liters.

v_s = volume of stack gas sampled with spiked train (L).

v_u = volume of stack gas sampled with unspiked train (L).

X = Mole or volume fraction of the organic in the calibration gas to be diluted.

Y = Dry gas meter calibration factor, dimensionless.

µl = Liquid organic density as determined, g/ml.

24.055 = Ideal gas molar volume at 293 °K and 760 mm Hg, liters/g-mole.

1000 = Conversion factor, ml/liter.

10^6 = Conversion to ppm.

12.2 Calculate the concentration, C_s, in ppm using the following equation:

$$C_s = \frac{10^6 \left(\bar{X} q_c\right)}{q_c + q_d} \qquad \text{Eq. 18-1}$$

12.3 Calculate the concentration, C_s, in ppm of the organic in the final gas mixture using the following equation:

$$C_s = 10^6 \bar{X} \left(\frac{q_{c1}}{q_{c1} + q_{d1}} \right) \left(\frac{q_{c2}}{q_{c2} + q_{d2}} \right) \qquad \text{Eq. 18-2}$$

12.4 Calculate each organic standard concentration, C_s, in ppm using the following equation:

$$C_s = \frac{G_v \times 10^6 \dfrac{293}{T_s} \dfrac{P_s}{760}}{V_m Y \dfrac{293}{T_m} \dfrac{P_m}{760} 1000} \qquad \text{Eq. 18-3}$$

$$= \frac{G_v \times 10^3 \dfrac{P_s}{T_s} \dfrac{T_m}{P_m}}{V_m Y}$$

12.5 Calculate each organic standard concentration, C_s, in ppm using the following equation:

$$C_s = \frac{\dfrac{L_v}{M} \rho \left(24.055 \times 10^6 \right)}{V_m Y \dfrac{293}{T_m} \dfrac{P_m}{760} 1000} = 6.24 \times 10^4 \frac{L_v \rho T_m}{M V_m Y P_m} \qquad \text{Eq. 18-4}$$

12.6 Calculate the concentration, C_c, in ppm, dry basis, of each organic is the sample using the following equation:

$$C_C = \frac{C_S P_r T_i F_r}{P_i T_r (1 - B_{ws})} \qquad \text{Eq. 18-5}$$

12.7 Calculate the average fraction recovered (R) of each spiked target compound using the following equation:

$$R = \frac{t - u}{s} \qquad \text{Eq. 18-6}$$

12.8 Correct all field measurements with the calculated R value for that compound using the following equation:

$$\text{Reported Result} = \frac{\text{Measured Concentration (ppm)}}{\text{R}} \qquad \text{Eq. 18-7}$$

12.9 Determine the mass per volume of spiked compound measured using the following equation:

$$m_v = \frac{m_s}{V_s} - \frac{m_u}{V_u} \qquad \text{Eq. 18-8}$$

12.10 Calculate the fraction of spiked compound recovered, R, using the following equation:

$$R = \frac{m_v \times v_s}{S} \qquad \text{Eq. 18-9}$$

13.0 Method Performance

13.1 Since a potential sample may contain a variety of compounds from various sources, a specific precision limit for the analysis of field samples is impractical. Precision in the range of 5 to 10 percent relative standard deviation (RSD) is typical for gas chromatographic techniques, but an experienced GC operator with a reliable instrument can readily achieve 5 percent RSD. For this method, the following combined GC/operator values are required.

(a) Precision. Triplicate analyses of calibration standards fall within 5 percent of their mean value.

(c) Recovery. After developing an appropriate sampling and analytical system for the pollutants of interest, conduct the procedure in section 8.4. Conduct the appropriate recovery study in section 8.4 at each sampling point where the method is being applied. Submit the data and results of the recovery procedure with the reporting of results under section 8.3.

14.0 Pollution Prevention [Reserved]

15.0 Waste Management [Reserved]

16.0 Alternative Procedures

16.1 Optional Presurvey and Presurvey Sampling.

NOTE: Presurvey screening is optional. Presurvey sampling should be conducted for sources where the target pollutants are not known from previous tests and/or process knowledge.

Perform a presurvey for each source to be tested. Refer to Figure 18-1. Some of the information can be collected from literature surveys and source personnel. Collect gas samples that can be analyzed to confirm the identities and approximate concentrations of the organic emissions.

16.1.1 Apparatus. This apparatus list also applies to sections 8.2 and 11.

16.1.1.1 Teflon Tubing. (Mention of trade names or specific products does not constitute endorsement by the U.S. Environmental Protection Agency.) Diameter and length determined by connection requirements of cylinder regulators and the GC. Additional tubing is necessary to connect the GC sample loop to the sample.

16.1.1.2 Gas Chromatograph. GC with suitable detector, columns, temperature-controlled sample loop and valve assembly, and temperature programmable oven, if necessary. The GC shall achieve sensitivity requirements for the compounds under study.

16.1.1.3 Pump. Capable of pumping 100 ml/min. For flushing sample loop.

16.1.1.4 Flow Meter. To measure flow rates.

16.1.1.5 Regulators. Used on gas cylinders for GC and for cylinder standards.

16.1.1.6 Recorder. Recorder with linear strip chart is minimum acceptable. Integrator (optional) is recommended.

16.1.1.7 Syringes. 0.5-ml, 1.0- and 10-microliter size, calibrated, maximum accuracy (gas tight) for preparing calibration standards. Other appropriate sizes can be used.

16.1.1.8 Tubing Fittings. To plumb GC and gas cylinders.

16.1.1.9 Septa. For syringe injections.

16.1.1.10 Glass Jars. If necessary, clean, colored glass jars with Teflon-lined lids for condensate sample collection. Size depends on volume of condensate.

16.1.1.11 Soap Film Flowmeter. To determine flow rates.

16.1.1.12 Flexible Bags. Tedlar or equivalent, 10- and 50-liter capacity, for preparation of standards. (Verify through the manufacturer that the Tedlar alternative is suitable for the compound of interest and make this verifying information available for inspection.)

16.1.1.13 Dry Gas Meter with Temperature and Pressure Gauges. Accurate to ±2 percent, for preparation of gas standards.

16.1.1.14 Midget Impinger/Hot Plate Assembly. For preparation of gas standards.

16.1.1.15 Sample Flasks. For presurvey samples, must have gas-tight seals.

16.1.1.16 Adsorption Tubes. If necessary, blank tubes filled with necessary adsorbent (charcoal, Tenax, XAD-2, etc.) for presurvey samples.

16.1.1.17 Personnel Sampling Pump. Calibrated, for collecting adsorbent tube presurvey samples.

16.1.1.18 Dilution System. Calibrated, the dilution system is to be constructed following the specifications of an acceptable method.

16.1.1.19 Sample Probes. Pyrex or stainless steel, of sufficient length to reach centroid of stack, or a point no closer to the walls than 1 m.

16.1.1.20 Barometer. To measure barometric pressure.

16.1.2 Reagents.

16.1.2.1 Water. Deionized distilled.

16.1.2.2 Methylene chloride.

16.1.2.3 Calibration Gases. A series of standards prepared for every compound of interest.

16.1.2.4 Organic Compound Solutions. Pure (99.9 percent), or as pure as can reasonably be obtained, liquid samples of all the organic compounds needed to prepare calibration standards.

16.1.2.5 Extraction Solvents. For extraction of adsorbent tube samples in preparation for analysis.

16.1.2.6 Fuel. As recommended by the manufacturer for operation of the GC.

16.1.2.7 Carrier Gas. Hydrocarbon free, as recommended by the manufacturer for operation of the detector and compatibility with the column.

16.1.2.8 Zero Gas. Hydrocarbon free air or nitrogen, to be used for dilutions, blank preparation, and standard preparation.

16.1.3 Sampling.

16.1.3.1 Collection of Samples with Glass Sampling Flasks. Presurvey samples may be collected in precleaned 250-ml double-ended glass sampling flasks. Teflon stopcocks, without grease, are preferred. Flasks should be cleaned as follows: Remove the stopcocks from both ends of the flasks, and wipe the parts to remove any grease. Clean the stopcocks, barrels, and receivers with methylene chloride (or other non-target pollutant solvent, or heat and humidified air). Clean all glass ports with a soap solution, then rinse with tap and deionized distilled water. Place the flask in a cool glass annealing furnace, and apply heat up to 500 °C. Maintain at this temperature for 1 hour. After this time period, shut off and open the furnace to allow the flask to cool. Return the stopcocks to the flask receivers. Purge the assembly with high-purity nitrogen for 2 to 5 minutes. Close off the stopcocks after purging to maintain a slight positive nitrogen pressure. Secure the stopcocks with tape. Presurvey samples can be obtained either by drawing the gases into the previously evacuated flask or by drawing the gases into and purging the flask with a rubber suction bulb.

16.1.3.1.1 Evacuated Flask Procedure. Use a high-vacuum pump to evacuate the flask to the capacity of the pump; then close off the stopcock leading to the pump. Attach a 6-mm outside diameter (OD) glass tee to the flask inlet with a short piece of Teflon tubing. Select a 6-mm OD borosilicate sampling probe, enlarged at one end to a 12-mm OD and of sufficient length to reach the centroid of the duct to be sampled. Insert a glass wool plug in the enlarged end of the probe to remove particulate matter. Attach the other end of the probe to the tee with a short piece of Teflon tubing. Connect a rubber suction bulb to the third leg of the tee. Place the filter end of the probe at the centroid of the duct, and purge the probe with the rubber suction bulb. After the probe is completely purged and filled with duct gases, open the stopcock to the grab flask until the pressure in the flask reaches duct pressure. Close off the stopcock, and remove the probe from the duct. Remove the tee from the flask and tape the stopcocks to prevent leaks during shipment. Measure and record the duct temperature and pressure.

16.1.3.1.2 Purged Flask Procedure. Attach one end of the sampling flask to a rubber suction bulb. Attach the other end to a 6-mm OD glass probe as described in section 8.3.3.1.1. Place the filter end of the probe at the centroid of the duct, or at a point no closer to the walls than 1 m, and apply suction with the bulb to completely purge the probe and flask. After the flask has been purged, close off the stopcock near the suction bulb, and then close off the stopcock near the probe. Remove the probe from the duct, and disconnect both the probe and suction bulb. Tape the stopcocks to prevent leakage during shipment. Measure and record the duct temperature and pressure.

16.1.3.2 Flexible Bag Procedure. Any leak-free plastic (e.g., Tedlar, Mylar, Teflon) or plastic-coated aluminum (e.g., aluminized Mylar) bag, or equivalent, can be used to obtain the pre-survey sample. Use new bags, and leak-check them before field use. In addition, check the bag before use for contamination by filling it with nitrogen or air and analyzing the gas by GC at high sensitivity. Experience indicates that it is desirable to allow the inert gas to remain in the bag about 24 hours or longer to check for desorption of organics from the bag. Follow the leak-check and sample collection procedures given in Section 8.2.1.

16.1.3.3 Determination of Moisture Content. For combustion or water-controlled processes, obtain the moisture content from plant personnel or by measurement during the presurvey. If the source is below 59 °C, measure the wet bulb and dry bulb temperatures, and calculate the moisture content using a psychrometric chart. At higher temperatures, use Method 4 to determine the moisture content.

16.1.4 Determination of Static Pressure. Obtain the static pressure from the plant personnel or measurement. If a type S pitot tube and an inclined manometer are used, take care to align the pitot tube 90° from the direction of the flow. Disconnect one of the tubes to the manometer, and read the static pressure; note whether the reading is positive or negative.

16.1.5 Collection of Presurvey Samples with Adsorption Tube. Follow section 8.2.4 for presurvey sampling.

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18.0 Tables, Diagrams, Flowcharts, and Validation Data

I. Name of company ____
Date ____
Address ____
Contracts ____
Phone ____
Process to be sampled ____
____
____
Duct or vent to be ____
____

II. Process description ____
____
____
____
Raw material ____
____
____
Products ____
____
____
Operating cycle
Check: Batch _________ Continuous _________ Cyclic __________
Timing of batch or cycle ____
Best time to test ____

III. Sampling site
A. Description
Site decription ____
Duct shape and size ____
Material ____
Wall thickness ____ inches
Upstream distance ______________________ inches ____________________ diameter
Downstream distance ____________________ inches ____________________ diameter
Size of port ____
Size of access area ____
Hazards _______________________________ Ambient temp. __________________ °F

B. Properties of gas stream
Temperature ________ °C _________ °F, Data source _____________________________
Velocity ___________________________, Data source _____________________________
Static pressure ___________ inches H_2O, Data source _____________________________
Moisture content _________________%, Data source _____________________________
Particulate content __________________, Data source_____________________________

Gaseous components

N_2 ______________ %   Hydrocarbons ___________ ppm

O_2 ______________%   ______________ ___________

CO _____________ %   ______________ ___________

CO_2 ____________ %   ______________ ___________

SO_2 ____________ %   ______________ ___________

Hydrocarbon components

_____________ __________ ppm

_____________ __________ ppm

_____________ __________ ppm

_____________ __________ ppm

_____________ __________ ppm

_____________ __________ ppm

C. Sampling considerations

Location to set up GC ____

____

Special hazards to be considered ____

____

Power available at duct ____

Power available for GC ____

Plant safety requirements ____

____

Vehicle traffic rules ____

____

Plant entry requirements ____

____

Security agreements ____

____

Potential problems ____

____

D. Site diagrams. (Attach additional sheets if required).

Figure 18-1. Preliminary Survey Data Sheet

Components to be analyzed and Expected concentration

____
____
____
____
____
____

Suggested chromatographic column ____
____

Column flow rate ______________ ml/min
Head pressure _________________ mm Hg

Column temperature:
Isothermal ___________ °C,
Programmed from __________ °C to __________ °C at __________ °C/min
Injection port/sample loop temperature _____________ °C
Detector temperature _______________ °C

Detector flow rates:
Hydrogen __________ ml/min., head pressure ______________ mm Hg,
Air/Oxygen ________ ml/min., head pressure ______________ mm Hg.

Chart speed __________________ inches/minute

Compound data:
Compound and Retention time and Attenuation
____
____
____
____
____

Figure 18-2. Chromatographic Conditions Data Sheet

FIGURE 18-3. PREPARATION OF STANDARDS IN TEDLAR OR TEDLAR-EQULIVALENT BAGS AND CALIBRATION CURVE

	Standards		
	Mixture #1	**Mixture #2**	**Mixture #3**
Standards Preparation Data:			
Organic:			
Bag number or identification			
Dry gas meter calibration factor			
Final meter reading (liters)			
Initial meter reading (liters)			
Metered volume (liters)			
Average meter temperature (°K)			
Average meter pressure, gauge (mm Hg)			
Average atmospheric perssure (mm Hg)			
Average meter pressure, absolute (mm Hg)			
Syringe temperature (°K) (see section 10.1.2.1)			
Syringe pressure, absolute (mm Hg) (see section 10.1.2.1)			
Volume of gas in syringe (ml) (Section 10.1.2.1)			
Density of liquid organic (g/ml) (Section 10.1.2.1)			
Volume of liquid in syringe (ml) (Section 10.1.2.1)			
GC Operating Conditions:			
Sample loop volume (ml)			
Sample loop temperature ((°deg;C)			
Carrier gas flow rate (ml/min)			
Column temperature:			
Initial ((°deg;C)			
Rate change ((°deg;C/min)			
Final ((°deg;C)			

Organic Peak Identification and Calculated Concentrations:			
Injection time (24 hour clock)			
Distance to peak (cm)			
Chart speed (cm/min)			
Organic retention time (min)			
Attenuation factor			
Peak height (mm)			
Peak area (mm^2)			
Peak area * attenuation factor (mm^2)			
Calculated concentration (ppm) (Equation 18-3 or 18-4)			

Plot peak area * attenuation factor against calculated concentration to obtain calibration curve.

Flowmeter number or identification ____
Flowmeter Type ____
Method: Bubble meter___________ Spirometer_______________ Wet test meter ___________
Readings at laboratory conditions:
Laboratory temperature (T_{lab}) ________________ °K
Laboratory barometric pressure (P_{lab})___________ mm Hg

Flow data:

FLOWMETER

Reading (as marked)	Temp. (°K)	Pressure (absolute)

CALIBRATION DEVICE

Time (min)	Gas volume[a]	Flow rate[b]

[a]Vol. of gas may be measured in milliliters, liters or cubic feet.
[b]Convert to standard conditions (20 °C and 760 mm Hg). Plot flowmeter reading against flow rate (standard conditions), and draw a smooth curve. If the flowmeter being calibrated is a rotameter or other flow device that is viscosity dependent, it may be necessary to generate a "family" of calibration curves that cover the operating pressure and temperature ranges of the flowmeter. While the following technique should be verified before application, it may be possible to calculate flow rate reading for rotameters at standard conditions Q_{std} as follows:

$$Q_{std} = Q_{lab}\left(\frac{760 \times T_{lab}}{P_{lab} \times 293}\right)^{1/2}$$

Flow rate (laboratory conditions)	Flow rate (STD conditions)

Figure 18-4. Flowmeter Calibration

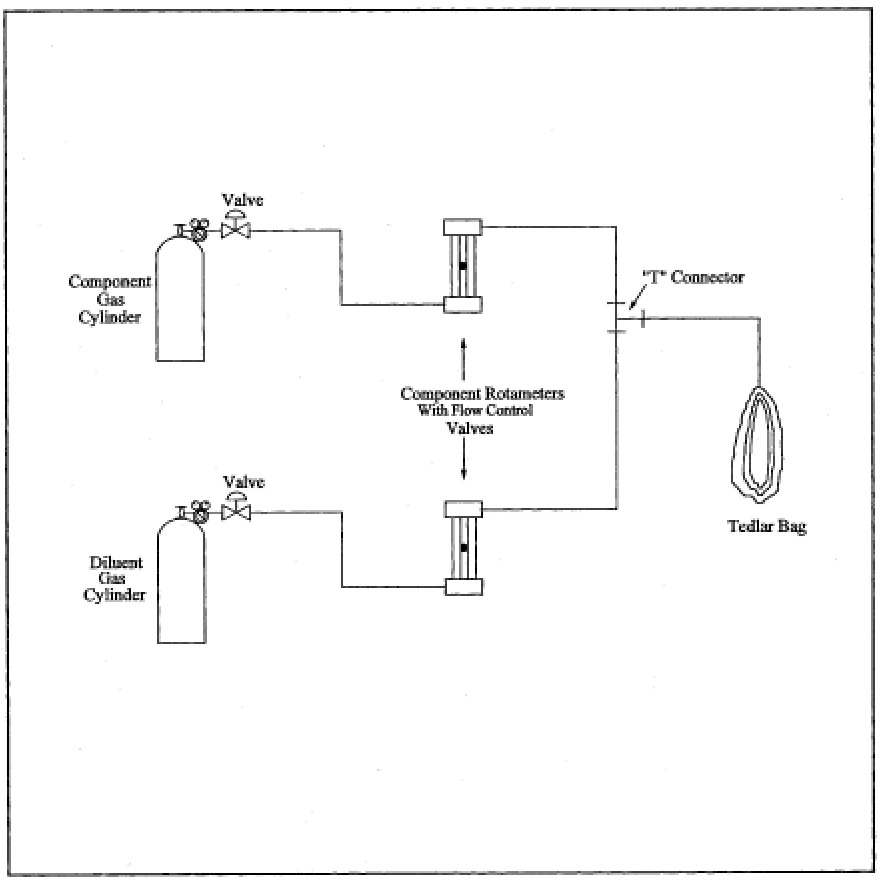

Figure 18-5. Single-Stage Calibration Gas Dilution System.

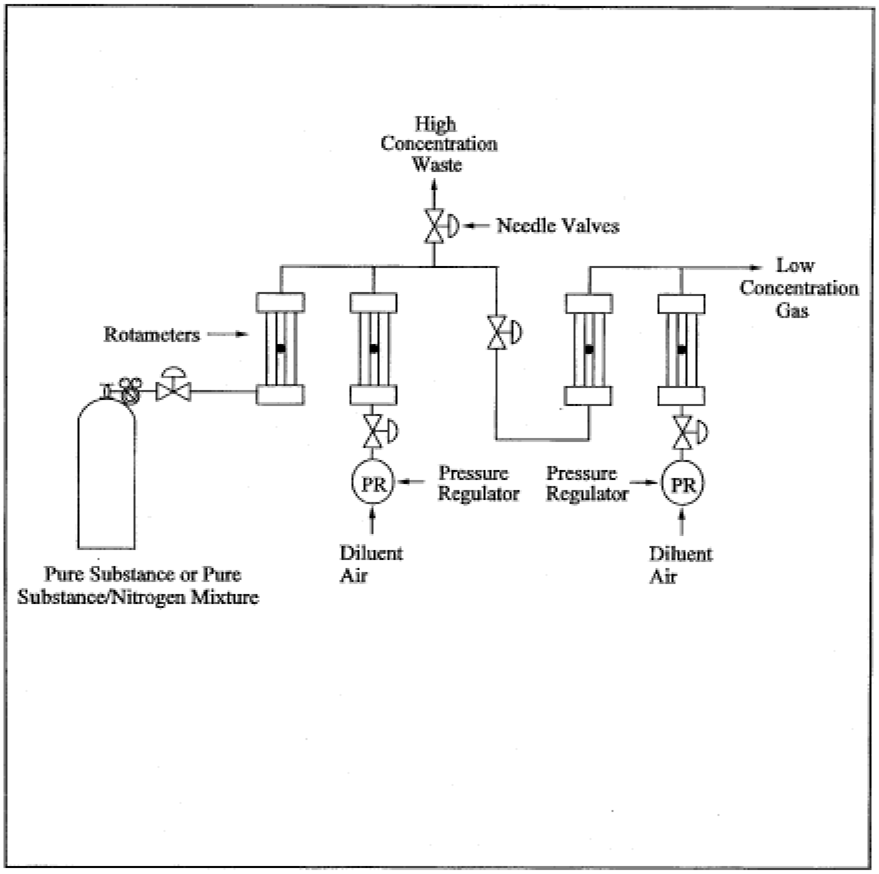

Figure 18-6. Two-Stage Dilution Apparatus.

PREPARATION OF STANDARDS BY DILUTION OF CYLINDER STANDARD

[Cylinder Standard: Organic ____ Certified Concentration ____ ppm]

Standards preparation data:	Date:		
	Mixture 1	Mixture 2	Mixture 3
Stage 1:			
Standard gas flowmeter reading			
Diluent gas flowmeter reading			
Laboratory temperature (°K)			
Barometric pressure (mm Hg)			
Flowmeter gage pressure (mm Hg)			
Flow rate cylinder gas at standard conditions (ml/min)			
Flow rate diluent gas at standard conditions (ml/min)			
Calculated concentration (ppm)			
Stage 2 (if used):			
Standard gas flowmeter reading			
Diluent gas flowmeter reading			
Flow rate Stage 1 gas at standard conditions (ml/min)			
Flow rate diluent gas at standard conditions			
Calculated concentration (ppm)			
GC Operating Conditions:			
Sample loop volume (ml)			
Sample loop temperature ((°deg;C)			
Carrier gas flow rate (ml/min)			
Column temperature:			
Initial ((°deg;C)			
Program rate ((°deg;C/min)			
Final ((°deg;C)			
Organic Peak Identification and Calculated Concentrations:			
Injection time (24-hour clock)			
Distance to peak (cm)			

Chart speed (cm/min)			
Retention time (min)			
Attenuation factor			
Peak area (mm^2)			
Peak area *attenuation factor			

Plot peak area *attenuation factor against calculated concentration to obtain calibration curve.

Figure 18-7. Standards Prepared by Dilution of Cylinder Standard

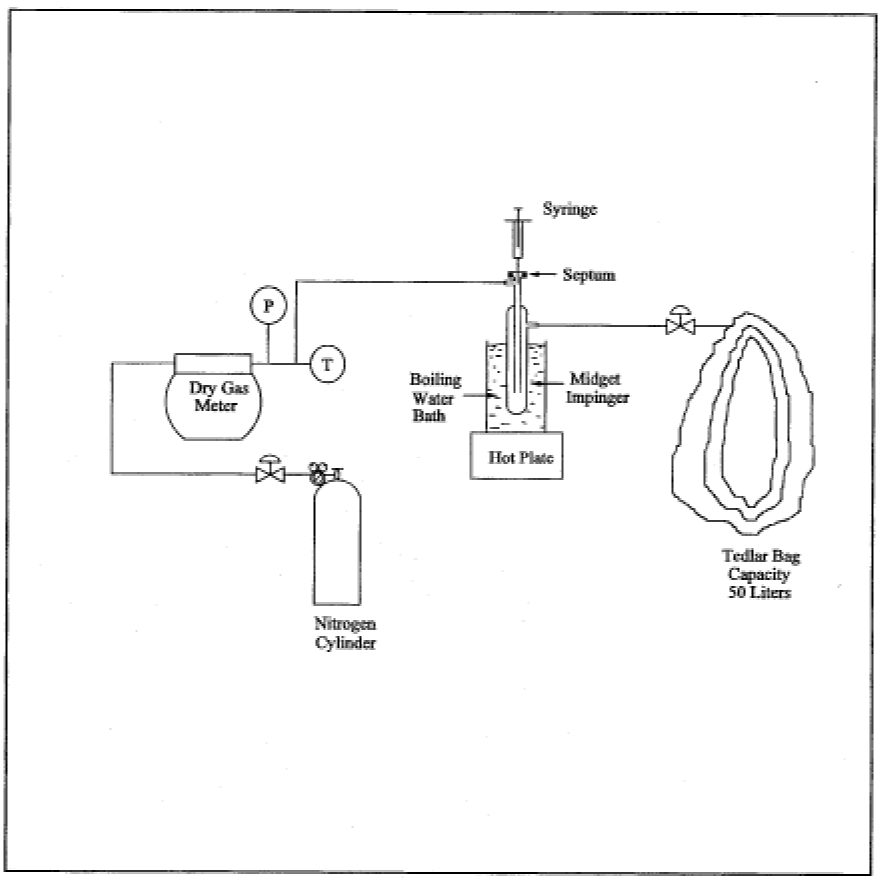

Figure 18-8. Apparatus for Preparation of Liquid Materials.

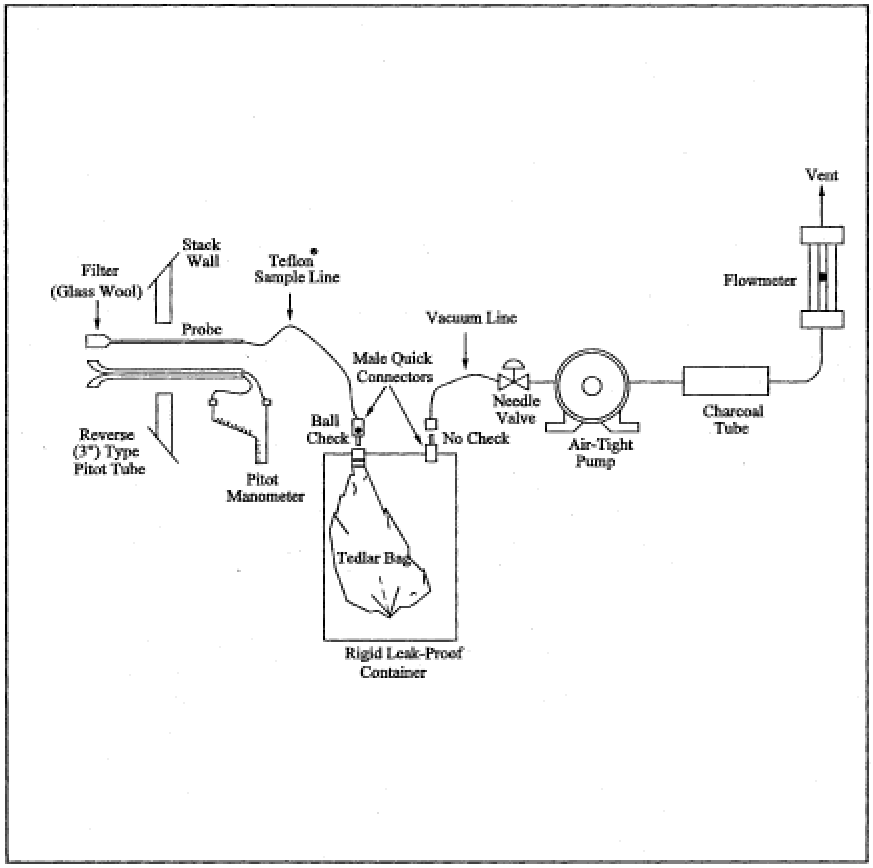

Figure 18-9. Integrated Bag Sampling Train.

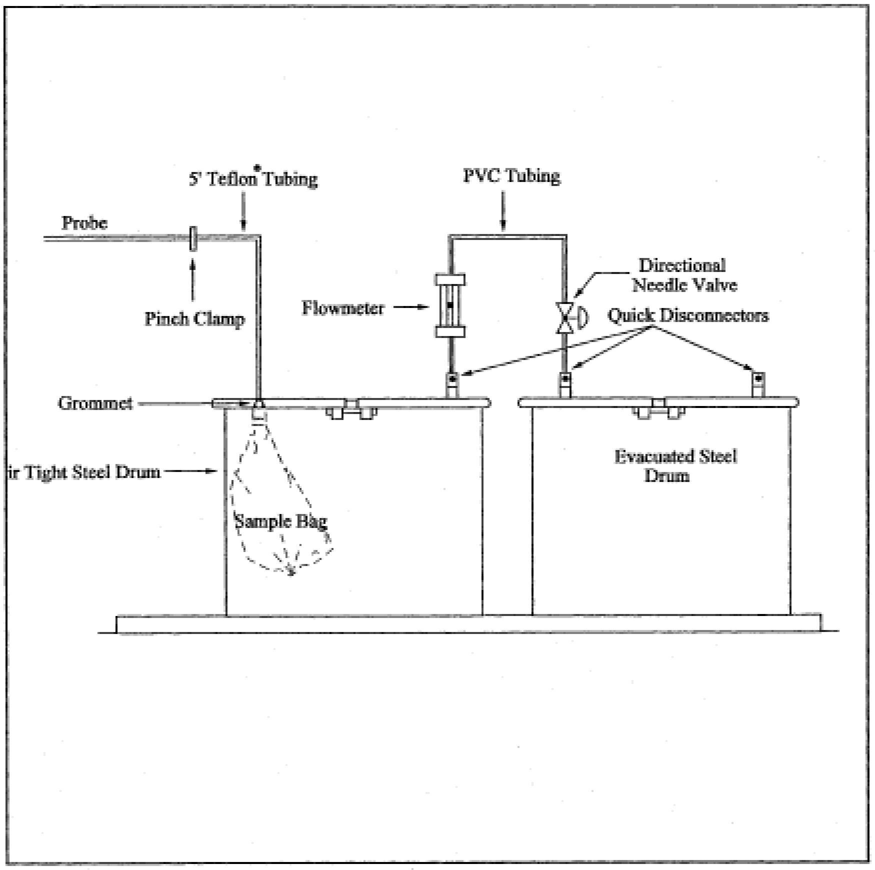

Figure 18-9a. Explosion Risk Gas Sampling Method.

PLANT____ DATE____ SITE____

	Sample 1	**Sample 2**	**Sample 3**
Source temperature ((°deg;C)			
Barometric pressure (mm Hg)			
Ambient temperature ((°deg;C)			
Sample flow rate (appr.)			
Bag number			
Start time			
Finish time			

Figure 18-10. Field Sample Data Sheet—Tedlar or Tedlar-Equivalent Bag Collection Method

PLANT _________ DATE ________ LOCATION ____________

1. General information:	
Source temperature ((°deg;C)	
Probe temperature ((°deg;C)	
Ambient temperature ((°deg;C)	
Atmospheric pressure (mm)	
Source pressure (′Hg)	
Absolute source pressure (mm)	
Sampling rate (liter/min)	
Sample loop volume (ml)	
Sample loop temperature ((°deg;C)	
Columnar temperature:	
Initial ((°deg;C) time (min)	
Program rate ((°deg;C/min)	
Final ((°deg;C)/time (min)	
Carrier gas flow rate (ml/min)	
Detector temperature ((°deg;C)	
Injection time (24-hour basis)	
Chart Speed (mm/min)	
Dilution gas flow rate (ml/min)	
Dilution gas used (symbol)	
Dilution ratio	

2. FIELD ANALYSIS DATA—CALIBRATION GAS

2. [Run No. ____ Time ______]

Components	**Area**	**Attenuation**	**A × A Factor**	**Conc._ (ppm)**

Figure 18-11. Field Analysis Data Sheets

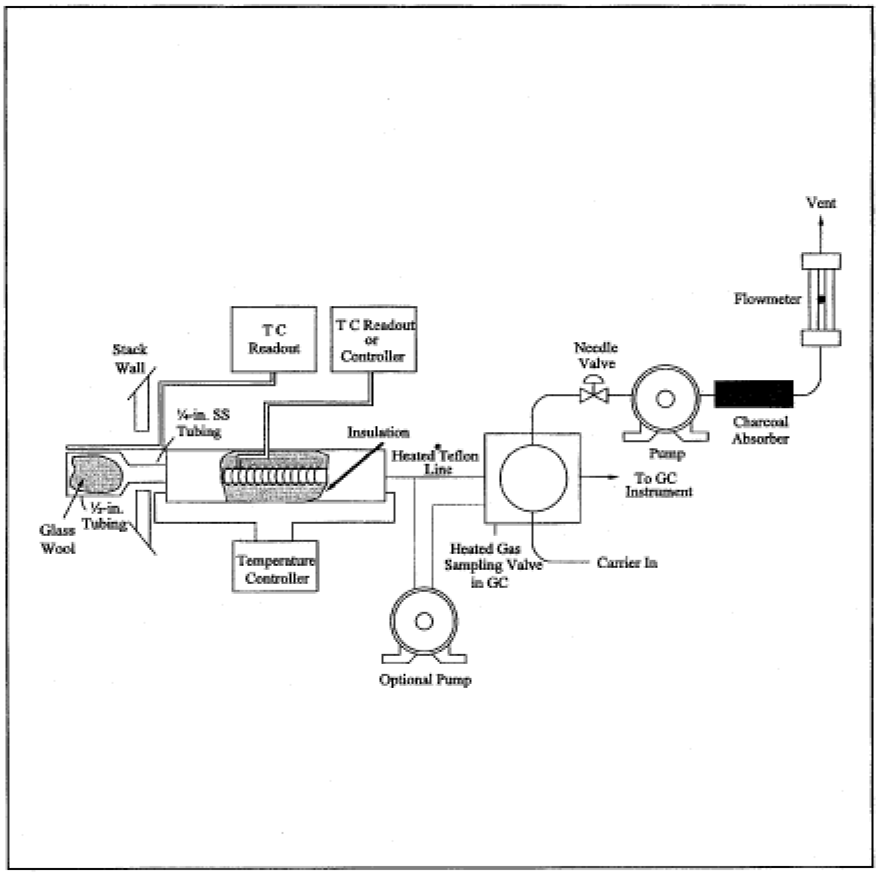

Figure 18-12. Direct Interface Sampling System.

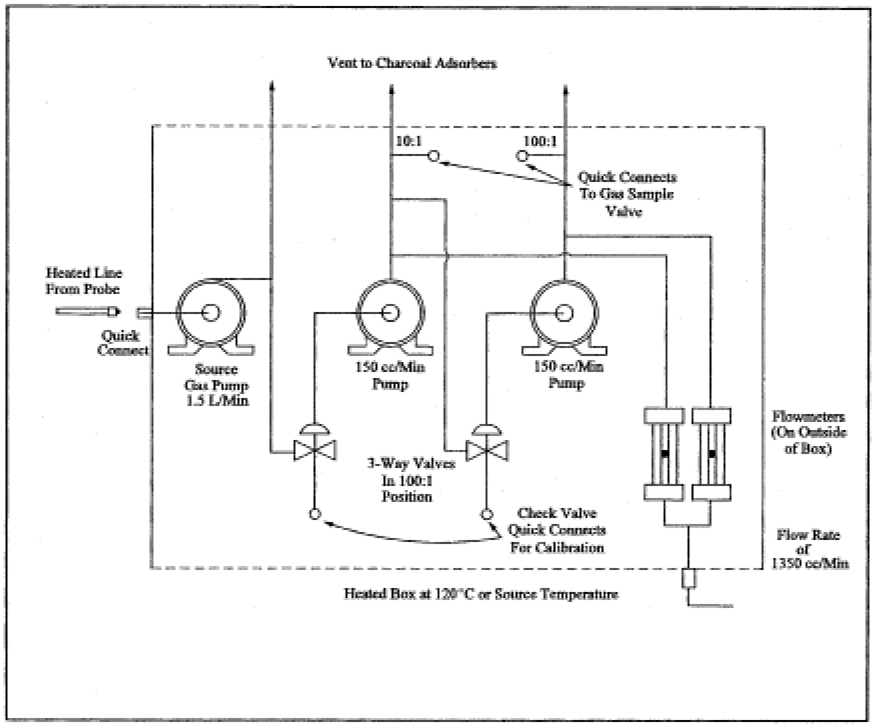

Figure 18-13. Schematic Diagram of the Heated Box Required for Dilution of Sample Gas.

GASEOUS ORGANIC SAMPLING AND ANALYSIS CHECK LIST

[Respond with initials or number as appropriate]

		Date
esurvey data:		
A. Grab sample collected	□	___
B. Grab sample analyzed for composition	□	___
Method GC	□	___
GC/MS	□	___
Other	□	___
C. GC-FID analysis performed	□	___
boratory calibration data:		
A. Calibration curves prepared	□	___
Number of components	□	___
Number of concentrations/component (3 required)	□	___
B. Audit samples (optional):		
Analysis completed	□	___
Verified for concentration	□	___
OK obtained for field work	□	___
mpling procedures:		
A. Method:		
Bag sample	□	___
Direct interface	□	___
Dilution interface	□	___
B. Number of samples collected	□	___
eld Analysis:		
A. Total hydrocarbon analysis performed	□	___
B. Calibration curve prepared	□	___
Number of components	□	___
Number of concentrations per component (3 required)	□	___

Gaseous Organic Sampling and Analysis Data

Plant ____

Date ____

Location ____

GASEOUS ORGANIC SAMPLING AND ANALYSIS CHECK LIST (RESPOND WITH INITIALS OR NUMBER AS APPROPRIATE)

e-survey data	Date
A. Grab sample collected	_____
B. Grab sample analyzed for composition	_____
Method GC	_____
GC/MS	_____
Other_____________	_____
C. GC-FID analysis performed	_____
boratory calibration curves prepared	_____
A. Number of components	_____
B. Number of concentrations per component (3 required)	_____
C. OK obtained for field work	_____
mpling procedures	
A. Method	
Bag sample	_____
Direct interface	_____
Dilution interface	_____
B. Number of samples collected	_____
eld Analysis	
A. Total hydrocarbon analysis performed	_____
B. Calibration curve prepared	_____
Number of components	_____
Number of concentrations per component (3 required)	_____

Figure 18-14. Sampling and Analysis Sheet

APPENDIX B
Detailed Results Summary

APPENDIX B-1
Screening Data

Table B-1-1

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1	FCC	Catalytic Cracking	Pumps	P	P-3802	2.00	frac reflux	Other	N	Blank	G	Blank	0	NA
A-3	FCC	Catalytic Cracking	Pumps	P	P-3803	2.00	frac reflux	Other	L	N	G	Blank	60	NA
A-5	FCC	Catalytic Cracking	Pumps	P	P-8889	3.00	LCO	Light Cycle Oil	L	N	G	>300	110	NA
A-7	FCC	Catalytic Cracking	Pumps	P	P-8888	3.00	LCO	Light Cycle Oil	L	N	G	>300	110	NA
A-9	FCC	Catalytic Cracking	Pumps	P	P-3807	3.00	fresh feed	Gas Oil	L	N	G	Blank	280	NA
A-11	FCC	Catalytic Cracking	Pumps	P	P-3806	3.00	fresh feed	Gas Oil	N	Blank	G	Blank	65	NA
A-13	FCC	Catalytic Cracking	Pumps	P	P-3515	3.00	Flushing oil	Other	L	N	G	Blank	240	NA
A-15	FCC	Catalytic Cracking	Pumps	P	P-3514	3.00	Flushing oil	Other	N	Blank	G	Blank	Blank	NA
A-17	FCC	Catalytic Cracking	Pumps	P	P-3804	3.00	decanted gas oil	Gas Oil	L	N	G	Blank	110	NA
A-19	FCC	Catalytic Cracking	Pumps	P	P-3805	3.00	decanted gas oil	Gas Oil	N	Blank	G	Blank	Blank	NA
A-21	FCC	Catalytic Cracking	Pumps	P	P-3800	3.00	light cycle oil	Cycle Oil	N	Blank	G	Blank	25	NA
A-23	FCC	Catalytic Cracking	Pumps	P	P-3801	3.00	HCO/LCO product	Light Cycle Oil	L	Blank	G	Blank	260	NA
A-25	FCC	Catalytic Cracking	Pumps	P	P-3512	3.00	heavy cycle oil	Cycle Oil	L	Blank	G	Blank	120	NA
A-27	FCC	Catalytic Cracking	Pumps	P	P-9199	3.00	recycle gas oil - north	Gas Oil	L	Blank	G	Blank	125	NA
A-29	FCC	Catalytic Cracking	Pumps	P	P-9200	3.00	recycle gas oil - south	Gas Oil	L	Blank	G	Blank	40	NA
A-31	FCC	Catalytic Cracking	Pumps	P	P-3558	Blank	north slurry pump	Slurry	N	Blank	G	Blank	0	NA
A-33	FCC	Catalytic Cracking	Pumps	P	P-3504	3.00	middle slurry	Slurry	L	Blank	G	Blank	160	NA
A-35	FCC	Catalytic Cracking	Pumps	P	P-9376	3.00	south slurry	Slurry	L	Blank	G	Blank	48	NA
A-37	FCC	Catalytic Cracking	Pumps	C	Flange	8.00	Slurry	Slurry	N	Blank	G	Blank	28	NA
A-39	FCC	Catalytic Cracking	Pumps	V	Gate	8.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	30	Y
A-41	FCC	Catalytic Cracking	Pumps	V	Gate	4.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	Y
A-43	FCC	Catalytic Cracking	Pumps	C	Flange	3.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	NA
A-45	FCC	Catalytic Cracking	Pumps	V	Gate	1.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	Y
A-47	FCC	Catalytic Cracking	Pumps	V	Gate	1.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	Y
A-49	FCC	Catalytic Cracking	Pumps	V	Gate	1.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	Y
A-51	FCC	Catalytic Cracking	Pumps	V	Gate	1.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	Y
A-53	FCC	Catalytic Cracking	Pumps	V	Gate	1.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	Y
A-55	FCC	Catalytic Cracking	Pumps	C	Union	1.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	NA
A-57	FCC	Catalytic Cracking	Pumps	V	Gate	1.00	LGO/HGO	Light Gas Oil/Heavy Gas Oil	L	Blank	G	Blank	265	Y
A-59	FCC	Catalytic Cracking	Pumps	V	Gate	4.00	Effluent	Effluent	N	Blank	P	Blank	Blank	Y
A-61	FCC	Catalytic Cracking	Pumps	V	Gate	4.00	Reactor Feed	Gas Oil	L	Blank	G	Blank	Blank	Y
A-63	FCC	Catalytic Cracking	Pumps	V	Gate	6.00	Reactor Feed	Gas Oil	L	Blank	P	Blank	58	Y
A-65	FCC	Catalytic Cracking	Pumps	V	Gate	2.00	Reactor Feed	Gas Oil	L	Blank	P	Blank	58	Y
A-67	FCC	Catalytic Cracking	Pumps	C	Plug	Blank	Reactor Feed	Gas Oil	L	Blank	P	Blank	58	NA
A-69	FCC	Catalytic Cracking	Pumps	V	Gate	Blank	Reactor Feed	Gas Oil	L	Blank	P	Blank	58	Y
A-71	FCC	Catalytic Cracking	Feed riser	C	Flange	8.00	Reactor Feed	Gas Oil	L	Blank	P	270	50	NA
A-73	FCC	Catalytic Cracking	Feed riser	V	Gate	4.00	Reactor Feed	Gas Oil	L	Blank	P	270	180	Y
A-75	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	Blank	P	270	180	NA
A-77	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	270	180	Y
A-79	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	270	180	Y
A-81	FCC	Catalytic Cracking	Feed riser	C	TC	1.00	Reactor Feed	Gas Oil	L	Blank	P	270	180	NA
A-83	FCC	Catalytic Cracking	Feed riser	C	Plug	0.50	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-85	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	180	50	Y
A-87	FCC	Catalytic Cracking	Feed riser	C	TC	1.00	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-89	FCC	Catalytic Cracking	Feed riser	C	TC	1.00	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-91	FCC	Catalytic Cracking	Feed riser	C	TC	0.75	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-93	FCC	Catalytic Cracking	Feed riser	C	TC	0.75	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-95	FCC	Catalytic Cracking	Feed riser	C	TC	0.75	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-97	FCC	Catalytic Cracking	Feed riser	C	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-99	FCC	Catalytic Cracking	Feed riser	C	Plug	0.50	Reactor Feed	Gas Oil	L	Blank	P	180	50	NA
A-101	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	180	50	Y
A-103	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	150	60	Y
A-105	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	Blank	P	150	60	NA
A-107	FCC	Catalytic Cracking	Feed riser	V	Gate	4.00	Reactor Feed	Gas Oil	L	Blank	P	250	60	Y
A-109	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	Blank	P	250	60	NA
A-111	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	250	60	N
A-113	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	Blank	P	250	60	NA
A-115	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	Blank	P	250	60	Y
A-117	FCC	Catalytic Cracking	Feed riser	C	TC	1.00	Reactor Feed	Gas Oil	L	Blank	P	250	60	NA
A-119	FCC	Catalytic Cracking	Feed riser	C	T fitting/pressure	0.75	Reactor Feed	Gas Oil	L	Blank	P	250	60	NA
A-121	FCC	Catalytic Cracking	Feed riser	C	Press gauge	0.50	Reactor Feed	Gas Oil	L	Blank	P	250	60	NA
A-123	FCC	Catalytic Cracking	Feed riser	C	Flange	8	Reactor Feed	Gas Oil	L	Blank	P	280	60	NA
A-125	FCC	Catalytic Cracking	Feed riser	V	Gate	4	Reactor Feed	Gas Oil	L	Blank	P	250	Blank	Y
A-127	FCC	Catalytic Cracking	Feed riser	C	Plug	1	Reactor Feed	Gas Oil	L	Blank	P	Blank	Blank	NA
A-129	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	N	P	250	60	Y
A-131	FCC	Catalytic Cracking	Feed riser	V	Gate	4.00	Reactor Feed	Gas Oil	L	N	P	250	57	Y
A-133	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	57	NA
A-135	FCC	Catalytic Cracking	Feed riser	V	Gate	1.00	Reactor Feed	Gas Oil	L	N	P	250	57	Y
A-137	FCC	Catalytic Cracking	Feed riser	C	Plug	0.75	Reactor Feed	Gas Oil	L	N	P	250	57	NA
A-139	FCC	Catalytic Cracking	Feed riser	V	Gate	1	Reactor Feed	Gas Oil	L	N	P	250	57	Y
A-141	FCC	Catalytic Cracking	Feed riser	C	TC	1	Reactor Feed	Gas Oil	L	N	P	250	57	NA
A-143	FCC	Catalytic Cracking	Feed riser	C	TC	1	Reactor Feed	Gas Oil	L	N	P	250	57	NA
A-145	FCC	Catalytic Cracking	Feed riser	C	To Gauge	0.75	Reactor Feed	Gas Oil	L	N	P	250	57	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-147	FCC	Catalytic Cracking	Feed riser	V	Gate	1	Reactor Feed	Gas Oil	L	N	P	250	57	Y
A-149	FCC	Catalytic Cracking	Feed riser	C	Flange	8	Reactor Feed	Gas Oil	L	N	P	250	57	NA
A-151	FCC	Catalytic Cracking	Feed riser	C	Plug	1	Reactor Feed	Gas Oil	L	N	P	250	57	NA
A-153	FCC	Catalytic Cracking	Feed riser	V	GT	1	Reactor Feed	Gas Oil	L	N	P	250	57	Y
A-155	FCC	Catalytic Cracking	Feed riser	V	Gt	1	Reactor Feed	Gas Oil	L	N	P	250	57	Y
A-157	FCC	Catalytic Cracking	Feed riser	C	Plug	0.75	Reactor Feed	Gas Oil	L	N	P	250	57	NA
A-159	FCC	Catalytic Cracking	Feed riser	C	TC	1	Reactor Feed	Gas Oil	L	N	P	250	52	NA
A-161	FCC	Catalytic Cracking	Feed riser	V	GT	1	Reactor Feed	Gas Oil	L	N	P	250	52	Y
A-163	FCC	Catalytic Cracking	Feed riser	C	TC	1	Reactor Feed	Gas Oil	L	N	P	250	52	NA
A-165	FCC	Catalytic Cracking	Feed riser	C	To Gauge	0.75	Reactor Feed	Gas Oil	L	N	P	250	52	NA
A-167	FCC	Catalytic Cracking	Feed riser	V	GT	1	Reactor Feed	Gas Oil	L	N	P	250	52	N
A-169	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	52	NA
A-171	FCC	Catalytic Cracking	Feed riser	V	GT	4.00	Reactor Feed	Gas Oil	L	N	P	250	52	Y
A-173	FCC	Catalytic Cracking	Feed riser	C	Flange	8.00	Reactor Feed	Gas Oil	L	N	P	250	52	NA
A-175	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-177	FCC	Catalytic Cracking	Feed riser	V	GT	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-179	FCC	Catalytic Cracking	Feed riser	V	Gt	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-181	FCC	Catalytic Cracking	Feed riser	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-183	FCC	Catalytic Cracking	Feed riser	C	TC	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-185	FCC	Catalytic Cracking	Feed riser	C	To Gauge	0.75	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-187	FCC	Catalytic Cracking	Feed riser	V	GT	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-189	FCC	Catalytic Cracking	Feed reactor	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-191	FCC	Catalytic Cracking	Feed reactor	V	Gate	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	N
A-193	FCC	Catalytic Cracking	Feed reactor	V	Gate	4.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-195	FCC	Catalytic Cracking	Feed reactor	C	Flange	8.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-197	FCC	Catalytic Cracking	Feed reactor	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-199	FCC	Catalytic Cracking	Feed reactor	V	Gate	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-201	FCC	Catalytic Cracking	Feed reactor	V	Gate	4.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-203	FCC	Catalytic Cracking	Feed reactor	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-205	FCC	Catalytic Cracking	Feed reactor	V	Gate	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-207	FCC	Catalytic Cracking	Feed reactor	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-209	FCC	Catalytic Cracking	Feed reactor	V	Gate	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	Y
A-211	FCC	Catalytic Cracking	Feed reactor	C	TC	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-213	FCC	Catalytic Cracking	Feed reactor	C	TC	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	NA
A-215	FCC	Catalytic Cracking	Feed reactor	V	Gate	1.00	Reactor Feed	Gas Oil	L	N	P	250	67	N
A-217	FCC	Catalytic Cracking	Feed reactor	C	TC	1.00	Reactor Feed	Gas Oil	L	N	P	250	50	NA
A-219	FCC	Catalytic Cracking	Feed reactor	C	TC	1.00	Reactor Feed	Gas Oil	L	N	P	250	50	NA
A-221	FCC	Catalytic Cracking	Feed reactor	C	Flange	8.00	Reactor Feed	Gas Oil	L	N	P	250	50	NA
A-223	FCC	Catalytic Cracking	Feed reactor	C	Plug	1.00	Reactor Feed	Gas Oil	L	N	P	250	60	NA
A-225	FCC	Catalytic Cracking	Feed riser #7	V	GT	1.00	Gas oil reacted	Gas Oil	L	N	P	150-260	60	Y
A-227	FCC	Catalytic Cracking	Feed riser #7	V	GT	1.00	Gas oil reacted	Gas Oil	L	N	P	150-260	60	Y
A-229	FCC	Catalytic Cracking	Feed riser #7	V	GT	4.00	Gas oil reacted	Gas Oil	L	N	P	150-260	60	Y
A-231	FCC	Catalytic Cracking	Feed riser #7	C	Plug	1.00	Gas oil reacted	Gas Oil	L	N	P	150-260	60	NA
A-233	FCC	Catalytic Cracking	Feed riser #7	V	GT	1.00	Gas oil reacted	Gas Oil	L	N	P	150-260	60	Y
A-235	FCC	Catalytic Cracking	Feed riser #7	C	Plug	0.75	Gas oil reacted	Gas Oil	L	N	P	150-260	60	NA
A-237	FCC	Catalytic Cracking	Feed riser #7	V	GT	1.00	Gas oil reacted	Gas Oil	L	N	P	150-260	60	Y
A-239	FCC	Catalytic Cracking	Feed riser #7	C	TC	0.75	Gas oil reacted	Gas Oil	L	N	P	150-260	60	NA
A-241	FCC	Catalytic Cracking	Feed riser #7	C	TC	0.75	Gas oil reacted	Gas Oil	L	N	P	150-260	60	NA
A-243	FCC	Catalytic Cracking	Feed riser #7	C	Flange	8.00	Gas oil reacted	Gas Oil	L	N	P	150-260	60	NA
A-245	FCC	Catalytic Cracking	Feed riser #8	C	Plug	1.00	Gas oil reacted	Gas Oil	L	N	P	150-250	57	NA
A-247	FCC	Catalytic Cracking	Feed riser #8	V	GT	1.00	Gas oil reacted	Gas Oil	L	N	P	150-250	57	Y
A-249	FCC	Catalytic Cracking	Feed riser #8	V	GT	1.00	Gas oil reacted	Gas Oil	L	N	P	150-250	57	Y
A-251	FCC	Catalytic Cracking	Feed riser #8	V	GT	1.00	Gas oil reacted	Gas Oil	L	N	P	150-250	57	Y
A-253	FCC	Catalytic Cracking	Feed riser #8	V	GT	4.00	Gas oil reacted	Gas Oil	L	N	P	150-250	57	Y
A-255	FCC	Catalytic Cracking	Feed riser #8	C	PL	1.00	Gas oil	Gas Oil	L	N	P	150-250	57	NA
A-257	FCC	Catalytic Cracking	Feed riser #8	C	PL	0.75	Gas oil	Gas Oil	L	N	P	150-250	57	NA
A-259	FCC	Catalytic Cracking	Feed riser #8	C	TC	0.75	Gas oil	Gas Oil	L	N	P	150-250	57	NA
A-261	FCC	Catalytic Cracking	Feed riser #8	V	GT	1	Gas oil	Gas Oil	L	N	P	150-250	57	Y
A-263	FCC	Catalytic Cracking	Feed riser #8	C	TC	0.75	Gas oil	Gas Oil	L	N	P	150-250	57	NA
A-265	FCC	Catalytic Cracking	Feed riser #8	C	TC @ gauge	0.75	Gas oil	Gas Oil	L	N	P	150-250	57	NA
A-267	FCC	Catalytic Cracking	Feed riser #8	C	Flange	8	Gas oil	Gas Oil	L	N	P	Blank	Blank	NA
A-269	FCC	Catalytic Cracking	Feed riser	V	GT	1	Gas oil	Gas Oil	L	N	P	270	50	Y
A-271	FCC	Catalytic Cracking	Feed riser	C	TC	1	Gas oil	Gas Oil	L	N	P	270	50	NA
A-273	FCC	Catalytic Cracking	Feed riser	C	TC	1	Gas oil	Gas Oil	L	N	P	270	50	NA
A-275	FCC	Catalytic Cracking	Feed riser	C	TC	1	Gas oil	Gas Oil	L	N	P	270	50	NA
A-277	FCC	Catalytic Cracking	Feed riser	C	TC	1	Gas oil	Gas Oil	L	N	P	270	50	NA
A-279	FCC	Catalytic Cracking	Feed riser	C	PL	1	Gas oil	Gas Oil	L	N	P	270	50	NA
A-281	FCC	Catalytic Cracking	Feed riser	V	GT	1	Gas oil	Gas Oil	L	N	P	270	50	Y
A-283	FCC	Catalytic Cracking	Feed riser	C	TC @ gauge	1	Gas oil	Gas Oil	L	N	P	270	50	NA
A-285	FCC	Catalytic Cracking	Feed riser	C	Flange	4	Gas oil	Gas Oil	L	N	P	517	Blank	NA
A-287	FCC	Catalytic Cracking	Feed riser	C	Flange	24	Gas oil	Gas Oil	L	N	P	517	Blank	NA
A-289	FCC	Catalytic Cracking	Feed riser	C	Flange	5.00	Gas oil reactor feed	Gas Oil	L	N	P	556	Blank	NA
A-291	FCC	Catalytic Cracking	Feed riser	C	Flange	24.00	Gas oil reactor feed	Gas Oil	L	N	P	556	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-293	FCC	Catalytic Cracking	Feed riser	C	Flange	24.00	Gas oil reactor feed	Gas Oil	L	N	P	407	Blank	NA
A-295	FCC	Catalytic Cracking	Feed riser	C	Flange	40.00	Gas oil reactor feed	Gas Oil	L	N	P	101	Blank	NA
A-297	FCC	Catalytic Cracking	Feed riser	PRD	Rupture DBC	2.00	Gas oil reactor feed	Gas Oil	L	N	P	110	Blank	NA
A-299	FCC	Catalytic Cracking	Feed riser	C	Flange	36.00	Gas oil reactor feed	Gas Oil	L	N	P	400	200	NA
A-301	FCC	Catalytic Cracking	Decant cooler/E-4014	C	PL	1.00	Decant oil	Gas Oil	N	N	G	461	70	NA
A-303	FCC	Catalytic Cracking	Decant cooler/E-4015	V	GT	1.00	Decant oil	Gas Oil	N	N	G	461	70	Y
A-305	FCC	Catalytic Cracking	Decant cooler/E-4016	C	TC	1.00	Decant oil	Gas Oil	N	N	G	461	70	NA
A-307	FCC	Catalytic Cracking	Decant cooler/E-4017	C	PL	1.00	Decant oil	Gas Oil	N	N	G	461	70	NA
A-309	FCC	Catalytic Cracking	Decant cooler/E-4018	V	GT	1.00	Decant oil	Decant Oil	N	N	G	461	70	N
A-311	FCC	Catalytic Cracking	Decant cooler/E-4019	C	TC	1.00	Decant oil	Decant Oil	N	N	G	461	70	NA
A-313	FCC	Catalytic Cracking	Decant cooler/E-4020	V	GT	4.00	Decant oil	Decant Oil	N	N	G	461	70	Y
A-315	FCC	Catalytic Cracking	Decant oil line	V	GT	4.00	Decant oil	Decant Oil	N	N	G	461	70	Y
A-317	FCC	Catalytic Cracking	Decant oil line	C	Flange	4.00	Decant oil	Decant Oil	N	N	G	461	70	NA
A-319	FCC	Catalytic Cracking	Decant oil line	V	GT	1.00	Decant oil	Decant Oil	N	N	G	461	70	Y
A-321	FCC	Catalytic Cracking	Decant oil line	C	TC to gauge	0.75	Decant oil	Decant Oil	N	N	G	461	70	NA
A-323	FCC	Catalytic Cracking	LGO line	V	GT	4.00	LGO	Light Gas Oil	L	N	G	250	70	Y
A-325	FCC	Catalytic Cracking	LGO line	V	CV-2398	3.00	LGO	Light Gas Oil	L	N	G	250	70	Y
A-327	FCC	Catalytic Cracking	LGO line	V	GT	1.00	LGO	Light Gas Oil	L	N	G	250	70	Y
A-329	FCC	Catalytic Cracking	LGO line	C	PL	1.00	LGO	Light Gas Oil	L	N	G	250	70	NA
A-331	FCC	Catalytic Cracking	LGO line	C	Flange	4.00	LGO	Light Gas Oil	L	N	G	250	70	NA
A-333	FCC	Catalytic Cracking	LGO line	V	GT	4.00	LGO	Light Gas Oil	L	N	G	250	70	Y
A-335	FCC	Catalytic Cracking	LGO line	V	GT	4.00	LGO	Light Gas Oil	L	N	G	170	70	Y
A-337	FCC	Catalytic Cracking	Pumps P8887	C	Flange	10.00	LCO	Heavy Cycle Oil/Light Cycle Oil	L	N	G	362	70	NA
A-339	FCC	Catalytic Cracking	Pumps P8888	V	GT	1.00	LCO	Light Cycle Oil	L	N	G	362	70	Y
A-341	FCC	Catalytic Cracking	Pumps P8889	V	GT	10.00	LCO	Light Cycle Oil	L	N	G	362	70	Y
A-343	FCC	Catalytic Cracking	Pumps P8890	V	GT	1.00	LCO	Light Cycle Oil	L	N	G	362	70	Y
A-345	FCC	Catalytic Cracking	LGO cooler E4251	V	GT	4.00	LGO	Light Gas Oil	L	N	G	330	70	Y
A-347	FCC	Catalytic Cracking	LGO cooler E4252	V	GT	4.00	LGO	Light Gas Oil	L	N	G	330	70	Y
A-349	FCC	Catalytic Cracking	LGO cooler E4253	C	Flange	4.00	LGO	Light Gas Oil	L	N	G	330	70	NA
A-351	FCC	Catalytic Cracking	LGO cooler E4254	V	GT	1.00	LGO	Light Gas Oil	L	N	G	330	70	Y
A-353	FCC	Catalytic Cracking	LGO cooler E4255	C	TC	1.00	LGO	Light Gas Oil	L	N	G	330	70	NA
A-355	FCC	Catalytic Cracking	LGO cooler E4251	V	GT	8.00	LGO	Light Gas Oil	L	N	G	330	Blank	Y
A-357	FCC	Catalytic Cracking	LGO cooler E4251	V	GT	3.00	LGO	Light Gas Oil	L	N	G	365	Blank	Y
A-359	FCC	Catalytic Cracking	LGO cooler E4251	V	GT	8.00	LGO	Light Gas Oil	L	N	G	365	Blank	Y
A-361	FCC	Catalytic Cracking	LGO cooler E4251	C	Flange	8.00	LGO	Light Gas Oil	L	N	G	365	Blank	NA
A-363	FCC	Catalytic Cracking	LGO cooler E4251	C	PL	1.00	LGO	Light Gas Oil	L	N	G	365	Blank	NA
A-365	FCC	Catalytic Cracking	Fresh feed line to slops	V	GT	3.00	Gas oil	Gas Oil	L	N	G	350	Blank	Y
A-367	FCC	Catalytic Cracking	Fresh feed line to slops	C	F	3.00	Gas oil	Gas Oil	L	N	G	350	Blank	NA
A-369	FCC	Catalytic Cracking	Fresh feed line to slops	C	PL	1.00	Gas oil	Gas Oil	L	N	G	350	Blank	NA
A-371	FCC	Catalytic Cracking	Fresh feed line to slops	V	GT	1.00	Gas oil	Gas Oil	L	N	G	350	Blank	Y
A-373	FCC	Catalytic Cracking	Decant out line	V	GT	3.00	Decant oil	Decant Oil	L	N	G	200	Blank	Y
A-375	FCC	Catalytic Cracking	RGO bypass	V	GT	12.00	RGO	Recycled Gas Oil	N	N	G	380	55	Y
A-377	FCC	Catalytic Cracking	RGO bypass	C	Flange	12.00	RGO	Recycled Gas Oil	N	N	G	380	55	NA
A-379	FCC	Catalytic Cracking	RGO bypass	V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	380	55	Y
A-381	FCC	Catalytic Cracking	RGO bypass	V	(CV) Control Valve	12.00	RGO	Recycled Gas Oil	N	N	G	380	55	N
A-383	FCC	Catalytic Cracking	RGO bypass	C	Flange	12.00	RGO	Recycled Gas Oil	N	N	G	380	55	NA
A-385	FCC	Catalytic Cracking	RGO bypass	V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	380	55	Y
A-387	FCC	Catalytic Cracking	RGO bypass	V	GT	12.00	RGO	Recycled Gas Oil	N	N	G	380	55	Y
A-389	#1 FEED PREP	Vacuum Distillation Unit	Pumps P-8657	P	C	4.00	C2 Overhead	Other	L	N	G	117	140	NA
A-391	#1 FEED PREP	Vacuum Distillation Unit	P8416	P	C	4.00	C2 Overhead	Other	L	N	G	117	10	NA
A-393	#1 FEED PREP	Vacuum Distillation Unit	Pumps P-9927	P	C	10.00	Furnace charge pump	Other	L	N	G	450	55	NA
A-395	#1 FEED PREP	Vacuum Distillation Unit	P-3495	P	C	10.00	Resid/Furnace charge	Resid	L	N	G	450	10	NA
A-397	#1 FEED PREP	Vacuum Distillation Unit	P-3494	P	C	6.00	Resid/Furnace pump	Resid	L	N	G	280	285	NA
A-399	#1 FEED PREP	Vacuum Distillation Unit	P-3678	P	C	6.00	Resid at G	Resid	L	N	G	250	155	NA
A-401	#1 FEED PREP	Vacuum Distillation Unit	P-3679	P	C	6.00	Resid/ 3 Crude charge	Resid	L	N	G	290	250	NA
A-403	#1 FEED PREP	Vacuum Distillation Unit	P-9921	P	C	6.00	Side cut	Other	L	N	G	250	340	NA
A-405	FCC	Catalytic Cracking	LGO flow bypass	V	GT	4.00	LGO	Light Gas Oil	L	N	G	300	Blank	Y
A-407	FCC	Catalytic Cracking	LGO flow bypass	C	Flange	4.00	LGO	Light Gas Oil	L	N	G	300	Blank	NA
A-409	FCC	Catalytic Cracking	LGO flow bypass	C	Flange	4.00	LGO	Light Gas Oil	L	N	G	300	Blank	NA
A-411	FCC	Catalytic Cracking	LGO flow bypass	V	GT	1.00	LGO	Light Gas Oil	L	N	G	300	Blank	Y
A-413	FCC	Catalytic Cracking	LGO flow bypass	V	GT	1.00	LGO	Light Gas Oil	L	N	O	300	Blank	Y
A-415	FCC	Catalytic Cracking	LGO	V	GT	1.00	LGO	Light Gas Oil	L	N	O	300	Blank	Y
A-417	FCC	Catalytic Cracking	RGO	V	GT	12.00	RGO	Recycled Gas Oil	N	N	G	320	55	Y
A-419	FCC	Catalytic Cracking	Pumps P-803	P	C	4.00	Diesel reflux	Diesel	L	N	G	482	155	NA
A-421	FCC	Catalytic Cracking	P-9908	P	C	4.00	Vacuum distillate	Diesel	L	N	G	81	0	NA
A-423	FCC	Catalytic Cracking	P-3098	P	C	4.00	Diesel product/reflux	Diesel	L	N	G	45	25	NA
A-425	FCC	Catalytic Cracking	Pumps P-804	P	C	4.00	Diesel	Diesel	L	N	G	450	180	NA
A-427	FCC	Catalytic Cracking	P-0072	P	C	4.00	Vacuum distillate	Diesel	L	N	G	118	195	NA
A-429	FCC	Catalytic Cracking	P-9040	P	C	5.00	Vacuum distillate	Diesel	L	N	G	619	215	NA
A-431	FCC	Catalytic Cracking	P-9248	P	C	5.00	Vacuum distillate	Diesel	L	N	G	619	0	NA
A-433	3 Crude	Atmospheric Distillation Unit	P-10018 Pumps	P	C	6.00	HVGO	Gas Oil	L	N	G	500	40	NA
A-435	3 Crude	Atmospheric Distillation Unit	P-10019	P	C	6.00	HVGO	Gas Oil	L	N	G	500	275	NA
A-437	3 Crude	Atmospheric Distillation Unit	P-9189	P	C	6.00	AGO	Gas Oil	Blank	Blank	Blank	575	250	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-439	3 Crude	Atmospheric Distillation Unit	P-9188	P	C	6.00	AGO	Gas Oil	Blank	Blank	Blank	575	250	NA
A-441	#2 Feed Prep	Vacuum Distillation Unit	P-3680	P	C	6.00	Vacuum tower resid	Resid	Blank	Blank	Blank	600	0	NA
A-443	#2 Feed Prep	Vacuum Distillation Unit	P-9038	P	C	6.00	Vacuum tower resid	Resid	Blank	Blank	Blank	600	175	NA
A-445	#2 Feed Prep	Vacuum Distillation Unit	P-9926	P	C	4.00	UDO Distilled	Vacuum Gas Oil	Blank	Blank	Blank	360	220	NA
A-447	#2 Feed Prep	Vacuum Distillation Unit	P-3683	P	C	4.00	Spare Distillate	Diesel	Blank	Blank	Blank	390	3	NA
A-449	#2 Feed Prep	Vacuum Distillation Unit	P-3682	P	C	4.00	Distillate	Diesel	Blank	Blank	Blank	500	280	NA
A-451	FCC	Catalytic Cracking	E5550	V	GT	6.00	RGO	Recycled Gas Oil	Blank	Blank	Blank	377	Blank	Y
A-453	1 HDS	Hydrotreater	P-9671	P	C	4.00	Diesel	Diesel	L	N	G	384	384	NA
A-455	1 HDS	Hydrotreater	P-9673	P	C	4.00	Diesel	Diesel	L	N	G	340	340	NA
A-457	50 Crude	Crude Unit	Pumps	P	P-8770	6.00	AAGO/LPA	Gas Oil	L	N	G	568	90	NA
A-459	50 Crude	Crude Unit	Pumps	C	P-8771	6.00	LPA	Gas Oil	L	N	G	500	90	NA
A-461	50 Crude	Crude Unit	Pumps	C	P-0259	6.00	AGO	Gas Oil	L	N	G	551	180	NA
A-463	50 Crude	Crude Unit	Pumps	C	P-9280	3.00	Kerosene	Kerosene	L	N	G	327	250	NA
A-465	50 Crude	Crude Unit	Pumps	C	P-9281	3.00	Kerosene	Kerosene	L	N	G	327	170	NA
A-467	50 Crude	Crude Unit	Pumps	C	P-0220	4.00	Diesel	Diesel	L	N	G	507	375	NA
A-469	50 Crude	Crude Unit	Pumps	C	P-8773	4.00	Diesel	Diesel	L	N	G	521	Blank	NA
A-471	50 Crude	Crude Unit	Pumps	C	P-3705	8.00	Fractionater bottoms	Other	L	N	G	644	340	NA
A-473	50 Crude	Crude Unit	Pumps	C	P-3634	10.00	Resid pumps	Resid	L	N	G	630	340	NA
A-475	50 Crude	Crude Unit	Pumps	C	P-9242	8.00	Resid booster	Resid	L	N	G	530	40	NA
A-477	50 Crude	Crude Unit	Pumps	P	P-3473	8.00	N. furnace charge pump	CRUDE	L	N	G	397	Blank	NA
A-479	50 Crude	Crude Unit	Pumps	C	P-924	Blank	S. furnace charge pump	Other	L	N	G	398	Blank	NA
A-481	50 Crude	Crude Unit	Pumps	C	P-9243	12.00	Resid	Resid	L	N	G	600	75	NA
A-483	50 Crude	Crude Unit	Pumps	V	GT P-9201	6.00	Kerosene	Kerosene	L	N	G	314	28	Y
A-485	50 Crude	Crude Unit	Pumps	V	GT P-9201	1.00	Kerosene	Kerosene	L	N	G	314	28	N
A-487	50 Crude	Crude Unit	Pumps	C	TC P-9281	0.75	Kerosene	Kerosene	L	N	G	314	28	NA
A-489	50 Crude	Crude Unit	Pumps	C	F P-9281	6.00	Kerosene	Kerosene	L	N	G	314	28	NA
A-491	50 Crude	Crude Unit	Pumps	C	F P-9280	6.00	Kerosene	Kerosene	L	N	G	323	24	NA
A-493	50 Crude	Crude Unit	Pumps	V	GT P-9280	1.00	Kerosene	Kerosene	L	N	G	323	24	N
A-495	50 Crude	Crude Unit	Pumps	C	TC P-9280	0.75	Kerosene	Kerosene	L	N	G	323	24	NA
A-497	3HDS	Hydrotreater	Pumps	C	P-8822	10.00	Fractionater bottoms	Other	L	N	G	600	40	NA
A-499	3HDS	Hydrotreater	Pumps	C	P-8821	10.00	Fractionater bottoms	Other	L	N	G	460	40	NA
A-501	3HDS	Hydrotreater	Pumps	P	P-8818	3.00	Diesel	Diesel	L	N	G	430	170	NA
A-503	3HDS	Hydrotreater	Pumps	P	P-8817	3.00	Diesel	Diesel	L	N	G	200	40	NA
A-505	3HDS	Hydrotreater	Pumps	P	P-8820	6.00	GO	Gas Oil	N	N	G	58	0	NA
A-507	3HDS	Hydrotreater	Pumps	P	P-8819	6.00	Cold feed	Other	N	N	G	58	0	NA
A-509	3HDS	Hydrotreater	P-8822	V	GT	10.00	Fractionater bottoms	Other	L	N	G	600	40	Y
A-511	3HDS	Hydrotreater	P-8822	V	GT	1.00	Fractionater bottoms	Other	L	N	G	600	40	Y
A-513	3HDS	Hydrotreater	P-8822	C	Threaded connector	0.75	Fractionater bottoms	Other	L	N	G	600	40	NA
A-515	3HDS	Hydrotreater	P-8822	V	GT	1.00	Fractionater bottoms	Other	L	N	G	80.5	40	Y
A-517	3HDS	Hydrotreater	P-8822	V	GT	1.00	Fractionater bottoms	Other	L	N	G	80.5	40	Y
A-519	3HDS	Hydrotreater	P-8822	C	Union	1.00	Fractionater bottoms	Other	L	N	G	80.5	40	NA
A-521	3HDS	Hydrotreater	P-8822	V	GT	2.00	Fractionater bottoms	Other	L	N	G	115	40	Y
A-523	3HDS	Hydrotreater	P-8821	V	GT	10.00	Fractionater bottoms	Other	L	N	G	600	40	Y
A-525	3HDS	Hydrotreater	P-8821	V	GT	1.00	Fractionater bottoms	Other	L	N	G	600	40	Y
A-527	3HDS	Hydrotreater	P-8821	C	Plug	1.00	Fractionater bottoms	Other	L	N	G	600	40	NA
A-529	3HDS	Hydrotreater	P-8821	V	GT	1.00	Fractionater bottoms	Other	L	N	G	530	40	N
A-531	3HDS	Hydrotreater	P-8821	V	GT	1.00	Fractionater bottoms	Other	L	N	G	530	40	N
A-533	3HDS	Hydrotreater	P-8821	C	Flange	1.00	Fractionater bottoms	Other	L	N	G	530	40	NA
A-535	3HDS	Hydrotreater	P-8818	V	GT	6.00	Diesel	Diesel	L	N	G	390	40	Y
A-537	50 Crude	Crude Unit	Pumps	P	P-8767	6.00	MPA/UPA	Kerosene / Naphtha	L	N	G	357	Blank	NA
A-539	50 Crude	Crude Unit	Pumps	C	P-9245	6.00	MPA/UPA	Kerosene / Naphtha	L	N	G	427	Blank	NA
A-541	50 Crude	Crude Unit	Pumps	V	GT P-9280	6.00	Kerosene	Kerosene	L	N	G	327	22	Y
A-543	50 Crude	Crude Unit	Pumps	C	F P-9280	3.00	Kerosene	Kerosene	L	N	G	327	22	NA
A-545	50 Crude	Crude Unit	Pumps	C	F P-9280	3.00	Kerosene	Kerosene	L	N	G	327	22	NA
A-547	50 Crude	Crude Unit	Pumps	V	GT P-9280	3.00	Kerosene	Kerosene	L	N	G	327	22	Y
A-549	50 Crude	Crude Unit	Pumps	V	GT P-9281	3.00	Kerosene	Kerosene	L	N	G	300	160	Y
A-551	50 Crude	Crude Unit	Pumps	V	GT P-9280	1.00	Kerosene	Kerosene	L	N	G	327	22	Y
A-553	50 Crude	Crude Unit	Pumps	V	GT P-9280	1.00	Kerosene	Kerosene	L	N	G	327	22	N
A-555	50 Crude	Crude Unit	Pumps	C	F P-9280	1.00	Kerosene	Kerosene	L	N	G	327	22	NA
A-557	50 Crude	Crude Unit	Pumps	V	F P-9280	1.00	Kerosene	Kerosene	L	N	G	327	22	Y
A-559	50 Crude	Crude Unit	Pumps	V	F P-9280	1.00	Kerosene	Kerosene	L	N	G	327	22	N
A-561	50 Crude	Crude Unit	Pumps	C	Plug P-9280	1.00	Kerosene	Kerosene	L	N	G	327	22	NA
A-563	50 Crude	Crude Unit	Pumps	V	GT P-9281	1.00	Kerosene	Kerosene	L	N	G	300	160	Y
A-565	50 Crude	Crude Unit	Pumps	V	GT P-9281	1.00	Kerosene	Kerosene	L	N	G	300	160	N
A-567	50 Crude	Crude Unit	Pumps	C	F P-9281	1.00	Kerosene	Kerosene	L	N	G	300	160	NA
A-569	50 Crude	Crude Unit	Pumps	V	GT P-9281	1.00	Kerosene	Kerosene	L	N	G	300	160	Y
A-571	50 Crude	Crude Unit	Pumps	V	GT P-9281	1.00	Kerosene	Kerosene	L	N	G	300	160	N
A-573	50 Crude	Crude Unit	Pumps	C	TC P-9281	0.75	Kerosene	Kerosene	L	N	G	300	160	NA
A-575	50 Crude	Crude Unit	Kerosene stripper	V	GT stripper V4	3.00	Kerosene	Kerosene	L	N	G	325	Blank	Y
A-577	50 Crude	Crude Unit	Kerosene stripper	C	F stripper V4	3.00	Kerosene	Kerosene	L	N	G	325	Blank	NA
A-579	50 Crude	Crude Unit	Kerosene stripper	C	F stripper V4	6.00	Kerosene	Kerosene	L	N	G	325	Blank	NA
A-581	50 Crude	Crude Unit	Kerosene stripper	C	F entry hatch	24.00	Kerosene	Kerosene	L	N	G	300	Blank	NA
A-583	50 Crude	Crude Unit	Kerosene stripper	V	GT stripper V4	2.00	Kerosene	Kerosene	L	N	G	80	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-585	50 Crude	Crude Unit	Kerosene stripper	C	TC elbow	1.00	Kerosene	Kerosene	L	N	G	80	Blank	NA
A-587	50 Crude	Crude Unit	Kerosene stripper	C	TC elbow	1.00	Kerosene	Kerosene	L	N	G	80	Blank	NA
A-589	50 Crude	Crude Unit	Kerosene stripper	C	Plug	1.00	Kerosene	Kerosene	L	N	G	80	Blank	NA
A-591	50 Crude	Crude Unit	V4 kerosene stripper	V	Gt	1.00	Kerosene	Kerosene	L	N	P	170	Blank	Y
A-593	50 Crude	Crude Unit	V4 kerosene stripper	C	TC	2.00	Kerosene	Kerosene	L	N	P	100	Blank	NA
A-595	50 Crude	Crude Unit	V4 kerosene stripper	V	GT	2.00	Kerosene	Kerosene	L	N	P	100	Blank	Y
A-597	50 Crude	Crude Unit	V4 kerosene stripper	C	TC	2.00	Kerosene	Kerosene	L	N	P	100	Blank	NA
A-599	50 Crude	Crude Unit	V4 kerosene stripper	C	Block off plate	2.00	Kerosene	Kerosene	L	N	P	100	Blank	NA
A-601	50 Crude	Crude Unit	V4 kerosene stripper	V	GT	2.00	Kerosene	Kerosene	L	N	P	100	Blank	Y
A-603	50 Crude	Crude Unit	Kerosene V4	V	GT	1.00	Kerosene	Kerosene	N	N	P	230	Blank	Y
A-605	50 Crude	Crude Unit	Kerosene V4	C	Flange	0.75	Kerosene	Kerosene	N	N	P	230	Blank	NA
A-607	50 Crude	Crude Unit	Kerosene V4	V	GT	0.75	Kerosene	Kerosene	N	N	P	230	Blank	Y
A-609	50 Crude	Crude Unit	Kerosene V4	C	Sight glass	0.75	Kerosene	Kerosene	N	N	P	230	Blank	NA
A-611	50 Crude	Crude Unit	Kerosene V4	V	GT	2.00	Kerosene	Kerosene	N	N	P	230	Blank	Y
A-613	50 Crude	Crude Unit	Kerosene V4	V	GT	2.00	Kerosene	Kerosene	N	N	P	230	Blank	Y
A-615	50 Crude	Crude Unit	Kerosene V4	V	GT	1.00	Kerosene	Kerosene	N	N	P	230	Blank	Y
A-617	50 Crude	Crude Unit	Kerosene V4	V	GT	4.00	Kerosene	Kerosene	N	N	T	350	Blank	Y
A-619	50 Crude	Crude Unit	Kerosene V4	C	Flange	4.00	Kerosene	Kerosene	L	N	P	350	Blank	NA
A-621	50 Crude	Crude Unit	Kerosene V4	V	GT	6.00	Kerosene	Kerosene	N	N	T	357	Blank	Y
A-623	50 Crude	Crude Unit	Kerosene V4	C	Flange	3.00	Kerosene	Kerosene	N	N	T	357	Blank	N
A-625	50 Crude	Crude Unit	Kerosene V4	V	BF	3.00	Kerosene	Kerosene	N	N	T	357	Blank	Y
A-627	50 Crude	Crude Unit	Kerosene V4	V	GT	3.00	Resid	Resid	N	N	T	357	Blank	Y
A-629	50 Crude	Crude Unit	Kerosene V4	V	GT	1.00	Resid	Resid	N	N	T	357	Blank	Y
A-631	50 Crude	Crude Unit	Kerosene V4	C	Plug	1.00	Resid	Resid	N	N	T	357	Blank	NA
A-633	50 Crude	Crude Unit	Diesel V6	V	GT	8.00	Resid	Resid	L	N	T	520	Blank	Y
A-635	50 Crude	Crude Unit	Diesel V6	C	Flange	8.00	Resid	Resid	L	N	T	520	Blank	NA
A-637	50 Crude	Crude Unit	Diesel V6	C	Flange	8.00	Resid	Resid	L	N	T	520	Blank	NA
A-639	50 Crude	Crude Unit	Diesel V6	V	GT	1.00	Resid	Resid	L	N	T	520	Blank	Y
A-641	50 Crude	Crude Unit	Diesel V6	V	GT	2.00	Resid	Resid	L	N	P	360	Blank	Y
A-643	50 Crude	Crude Unit	Diesel V6	V	GT	2.00	Resid	Resid	L	N	P	360	Blank	Y
A-645	50 Crude	Crude Unit	Diesel V6	C	Plug	2.00	Resid	Resid	L	N	P	360	Blank	NA
A-647	50 Crude	Crude Unit	Diesel V6	V	GT	1.00	Resid	Resid	L	N	P	360	Blank	Y
A-649	50 Crude	Crude Unit	Diesel V6	C	Plug	1.00	Resid	Resid	L	N	P	360	Blank	NA
A-651	50 Crude	Crude Unit	Diesel V6	V	GT	1.00	Resid	Resid	L	N	P	360	Blank	Y
A-653	50 Crude	Crude Unit	Diesel V6	C	Flange	3.00	Resid	Resid	L	N	P	360	Blank	NA
A-655	50 Crude	Crude Unit	Diesel V6	V	GT	1.00	Resid	Resid	L	N	P	360	Blank	Y
A-657	FCC	Catalytic Cracking	Hyd. Oil	V	GT	3.00	Resid	Resid	N	N	G	60	210	Y
A-659	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Resid	Resid	N	N	G	60	210	Y
A-661	FCC	Catalytic Cracking	Hyd. Oil	C	Flange	2.00	Resid	Resid	N	N	G	60	210	NA
A-663	FCC	Catalytic Cracking	Hyd. Oil	C	Flange	3.00	Resid	Resid	N	N	G	60	210	NA
A-665	FCC	Catalytic Cracking	Hyd. Oil	P	P-9778	2.00	Resid	Resid	L	N	G	80	220	NA
A-667	FCC	Catalytic Cracking	Hyd. Oil	V	GT	0.75	Resid	Resid	N	N	G	60	220	Y
A-669	FCC	Catalytic Cracking	Hyd. Oil	V	GT	0.75	Resid	Resid	N	N	G	60	220	Y
A-671	FCC	Catalytic Cracking	Hyd. Oil	V	GT	0.75	Resid	Resid	L	N	G	80	220	Y
A-673	FCC	Catalytic Cracking	Hyd. Oil	V	GT	0.75	Resid	Resid	N	N	G	60	220	Y
A-675	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Resid	Resid	N	N	G	80	220	Y
A-677	FCC	Catalytic Cracking	Hyd. Oil	C	Flange	4.00	Resid	Resid	N	N	G	60	220	NA
A-679	FCC	Catalytic Cracking	Hyd. Oil	V	GT	1.00	Resid	Resid	N	N	G	60	220	Y
A-681	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Resid	Resid	N	N	G	80	220	Y
A-683	FCC	Catalytic Cracking	Hyd. Oil	V	GT	1.00	Resid	Resid	N	N	G	60	220	Y
A-685	FCC	Catalytic Cracking	Hyd. Oil	C	Flange	4.00	Resid	Resid	N	N	G	80	220	NA
A-687	FCC	Catalytic Cracking	Hyd. Oil	V	GT	1.00	Resid	Resid	L	N	G	60	220	Y
A-689	FCC	Catalytic Cracking	Hyd. Oil	C	Flange	2.00	Resid	Resid	L	N	G	85	220	NA
A-691	FCC	Catalytic Cracking	Hyd. Oil	C	Flange	2.00	Resid	Resid	L	N	G	60	220	NA
A-693	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Resid	Resid	L	N	G	80	220	Y
A-695	FCC	Catalytic Cracking	Hyd. Oil	V	GT	1.00	Resid	Resid	L	N	G	60	220	Y
A-697	FCC	Catalytic Cracking	Hyd. Oil	C	Plug	1.00	Resid	Resid	L	N	G	60	220	NA
A-699	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Resid	Resid	L	N	G	80	220	Y
A-701	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	Y
A-703	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	Y
A-705	FCC	Catalytic Cracking	Hyd. Oil	V	GT	1.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	Y
A-707	FCC	Catalytic Cracking	Hyd. Oil	V	GT	3.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	Y
A-709	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	Y
A-711	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	Y
A-713	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	Y
A-715	FCC	Catalytic Cracking	Hyd. Oil	C	Flange	2.00	Hyd. Oil	Hydraulic Oil	L	N	G	80	220	NA
A-717	FCC	Catalytic Cracking	Hyd. Oil	C	TC	2.00	Hyd. Oil	Hydraulic Oil	N	N	G	55	220	NA
A-719	FCC	Catalytic Cracking	Hyd. Oil	V	GT	2.00	Hyd. Oil	Hydraulic Oil	N	N	G	55	220	Y
A-721	FCC	Catalytic Cracking	V7	V	GT	2.00	Hyd. Oil	Hydraulic Oil	N	N	G	55	220	Y
A-723	FCC	Catalytic Cracking	V7	PRD	PSV #1149	4.00	Hyd. Oil	Hydraulic Oil	N	N	G	60	220	NA
A-725	FCC	Catalytic Cracking	V7	V	GT	1.00	Hyd. Oil	Hydraulic Oil	N	N	G	60	220	Y
A-727	FCC	Catalytic Cracking	V7	V	GT	1.00	Hyd. Oil	Hydraulic Oil	N	N	G	60	220	Y
A-729	FCC	Catalytic Cracking	V6	V	GT	1.00	Hyd. Oil	Hydraulic Oil	N	N	G	100	220	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-731	FCC	Catalytic Cracking	V7	V	GT	1.00	Hyd. Oil	Hydraulic Oil	N	N	G	60	220	Y
A-733	FCC	Catalytic Cracking	V6	C	Plug	0.75	Hyd. Oil	Hydraulic Oil	N	N	G	100	220	NA
A-735	FCC	Catalytic Cracking	V6	V	GT	1.00	Hyd. Oil	Hydraulic Oil	N	N	G	100	220	Y
A-737	FCC	Catalytic Cracking	V7	C	Flange	4.00	Hyd. Oil	Hydraulic Oil	N	N	G	60	220	NA
A-739	FCC	Catalytic Cracking	V6	V	GT	1.00	Hyd. Oil	Hydraulic Oil	N	N	G	100	220	Y
A-741	FCC	Catalytic Cracking	V7	C	TC	0.75	Hyd. Oil	Hydraulic Oil	N	N	G	60	220	NA
A-743	FCC	Catalytic Cracking	V6	C	TC	1.00	Hyd. Oil	Hydraulic Oil	N	N	G	100	220	NA
A-745	FCC	Catalytic Cracking	Lean DEA E-4464	V	GT	4.00	Lean DEA	Amine	L	N	G	112	250	Y
A-747	FCC	Catalytic Cracking	Lean DEA E-4464	V	GT	1.00	Lean DEA	Amine	L	N	G	112	250	Y
A-749	FCC	Catalytic Cracking	Lean DEA E-4464	V	GT	1.00	Lean DEA	Amine	L	N	G	112	250	Y
A-751	FCC	Catalytic Cracking	Lean DEA E-4464	C	Flange	4.00	Lean DEA	Amine	L	N	G	112	250	NA
A-753	FCC	Catalytic Cracking	Lean DEA E-4464	C	Flange	6.00	Lean DEA	Amine	L	N	G	112	250	NA
A-755	FCC	Catalytic Cracking	Lean DEA E-4464	V	GT	4.00	Lean DEA	Amine	L	N	G	112	250	Y
A-757	FCC	Catalytic Cracking	Lean DEA E-4464	V	GT	4.00	Lean DEA	Amine	L	N	G	112	250	Y
A-759	FCC	Catalytic Cracking	Lean DEA E-4464	V	GT	4.00	Lean DEA	Amine	L	N	G	112	250	Y
A-761	FCC	Catalytic Cracking	Lean DEA E-4464	C	GT	4.00	Lean DEA	Amine	L	N	G	112	250	NA
A-763	FCC	Catalytic Cracking	Lean DEA E-4464	C	Flange	1.00	Lean DEA	Amine	L	N	G	112	250	NA
A-765	FCC	Catalytic Cracking	Lean DEA E-4464	V	GT	3.00	Lean DEA	Amine	L	N	G	112	250	Y
A-767	FCC	Catalytic Cracking	C11	V	GT	4.00	Lean DEA	Amine	L	N	G	106	Blank	Y
A-769	FCC	Catalytic Cracking	C11	V	GT	4.00	Lean DEA	Amine	L	N	G	106	Blank	Y
A-771	FCC	Catalytic Cracking	C11	V	GL	3.00	Lean DEA	Amine	L	N	G	106	Blank	Y
A-773	FCC	Catalytic Cracking	E4185	C	Flange	18.00	Rich DEA	Amine	L	N	G	81	Blank	NA
A-775	FCC	Catalytic Cracking	E4185	C	GT	3.00	Rich DEA	Amine	L	N	G	81	Blank	NA
A-777	FCC	Catalytic Cracking	Decant pumps	V	GT	4.00	Decant	Decant Oil	L	N	P	375	Blank	Y
A-779	FCC	Catalytic Cracking	Decant pumps	C	Flange	4.00	Decant	Decant Oil	L	N	P	375	Blank	NA
A-781	FCC	Catalytic Cracking	Decant pumps	V	GT	4.00	Decant	Decant Oil	L	N	P	360	Blank	Y
A-783	FCC	Catalytic Cracking	Decant pumps	V	GT	4.00	Decant	Decant Oil	L	N	P	163	Blank	Y
A-785	FCC	Catalytic Cracking	Decant pumps	V	GT	4.00	Decant	Decant Oil	L	N	P	222	Blank	Y
A-787	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	P	230	Blank	Y
A-789	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	P	230	Blank	Y
A-791	50 Crude	Crude Unit	V6 Diesel Strip	C	Flange	2.00	Diesel	Diesel	L	N	P	460	Blank	NA
A-793	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	2.00	Diesel	Diesel	L	N	P	460	Blank	N
A-795	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	P	460	Blank	Y
A-797	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	P	460	Blank	Y
A-799	50 Crude	Crude Unit	V6 Diesel Strip	C	Flange	2.00	Diesel	Diesel	L	N	P	460	Blank	NA
A-801	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	2.00	Diesel	Diesel	L	N	P	460	Blank	Y
A-803	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	P	230	Blank	Y
A-805	50 Crude	Crude Unit	AGO Wash Line	V	GT	4.00	AGO	Gas Oil	L	N	P	617	Blank	Y
A-807	50 Crude	Crude Unit	AGO Wash Line	V	GT	4.00	AGO	Gas Oil	L	N	P	617	Blank	Y
A-809	50 Crude	Crude Unit	AGO Wash Line	C	Flange	4.00	AGO	Gas Oil	L	N	P	617	Blank	NA
A-811	50 Crude	Crude Unit	AGO Wash Line	V	Control valve	4.00	AGO	Gas Oil	L	N	P	617	Blank	Y
A-813	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	4.00	Diesel	Diesel	L	N	G	320	Blank	Y
A-815	50 Crude	Crude Unit	V6 Diesel Strip	C	Flange	4.00	Diesel	Diesel	L	N	G	320	Blank	NA
A-817	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	G	320	Blank	Y
A-819	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	2.00	Diesel	Diesel	L	N	G	95.5	Blank	Y
A-821	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	2.00	Diesel	Diesel	L	N	G	95.5	Blank	N
A-823	50 Crude	Crude Unit	V6 Diesel Strip	V	BL	0.50	Diesel	Diesel	L	N	G	77.5	Blank	Y
A-825	50 Crude	Crude Unit	V6 Diesel Strip	V	BL	0.50	AGO atmosp. gas oil	Gas Oil	L	N	G	77.5	Blank	Y
A-827	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	AGO atmosp. gas oil	Gas Oil	L	N	G	77.5	Blank	Y
A-829	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	G	368	Blank	Y
A-831	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	G	220	Blank	Y
A-833	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	G	220	Blank	Y
A-835	50 Crude	Crude Unit	V6 Diesel Strip	V	GT	1.00	Diesel	Diesel	L	N	G	62.5	Blank	Y
A-837	50 Crude	Crude Unit	V6 Diesel Strip	V	N	0.50	Diesel	Diesel	L	N	G	62.5	Blank	Y
A-839	50 Crude	Crude Unit	Pumps P-0220	V	GT	8.00	Diesel	Diesel	L	N	G	527	400	Y
A-841	50 Crude	Crude Unit	Pumps P-0221	V	GT	4.00	Diesel	Diesel	L	N	G	500	400	Y
A-843	50 Crude	Crude Unit	Pumps P-0222	C	Flange	4.00	Diesel	Diesel	L	N	G	500	400	NA
A-845	50 Crude	Crude Unit	Pumps P-0223	C	Flange	8.00	Diesel	Diesel	L	N	G	527	400	NA
A-847	50 Crude	Crude Unit	P-8773	V	GT	8.00	Diesel	Diesel	L	N	G	534	Blank	Y
A-849	HDS	Hydrotreater	Frac tower	C	-	8.00	diesel	Diesel	N	N	P	410	Blank	NA
A-851	HDS	Hydrotreater	Frac tower	C	-	16.00	diesel	Diesel	N	N	P	420	Blank	NA
A-853	HDS	Hydrotreater	Frac tower	C	-	1.00	diesel	Diesel	N	N	P	165	Blank	NA
A-855	HDS	Hydrotreater	Frac tower	C	Flange	16.00	Frac bottoms	Other	N	N	P	610	Blank	NA
A-857	HDS	Hydrotreater	Frac tower	C	Flange	2.00	Frac bottoms	Other	N	N	P	490	Blank	NA
A-859	HDS	Hydrotreater	Diesel stripper	C	Flange	8.00	diesel	Diesel	N	N	P	350	Blank	NA
A-861	HDS	Hydrotreater	Diesel stripper	V	GT	2.00	diesel	Diesel	N	N	P	275	Blank	Y
A-863	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	95	Blank	N
A-865	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	235	Blank	Y
A-867	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	235	Blank	Y
A-869	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	190	Blank	Y
A-871	HDS	Hydrotreater	Diesel stripper	C	Bull Plug	1.00	diesel	Diesel	N	N	P	190	Blank	NA
A-873	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	Diesel	Diesel	N	N	P	230	Blank	Y
A-875	HDS	Hydrotreater	Diesel stripper	C	Union	1.00	diesel	Diesel	N	N	P	230	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-877	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	135	Blank	Y
A-879	HDS	Hydrotreater	Diesel stripper	V	GT	2.00	diesel	Diesel	N	N	P	200	Blank	Y
A-881	HDS	Hydrotreater	Diesel stripper	C	Flange	2.00	diesel	Diesel	N	N	P	300	Blank	NA
A-883	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	185	Blank	Y
A-885	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	200	Blank	Y
A-887	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	250	Blank	Y
A-889	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	250	Blank	Y
A-891	HDS	Hydrotreater	Diesel stripper	C	Union	1.00	diesel	Diesel	N	N	P	250	Blank	NA
A-893	HDS	Hydrotreater	Diesel stripper	C	Union	1.00	diesel	Diesel	N	N	P	240	Blank	NA
A-895	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	180	Blank	Y
A-897	HDS	Hydrotreater	Diesel stripper	C	Flange	1.00	diesel	Diesel	N	N	P	180	Blank	NA
A-899	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	190	Blank	Y
A-901	HDS	Hydrotreater	Diesel stripper	C	Hatch	24.00	diesel	Diesel	N	N	P	395	Blank	NA
A-903	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	200	Blank	Y
A-905	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	65	Blank	N
A-907	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	85	Blank	Y
A-909	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	180	Blank	Y
A-911	HDS	Hydrotreater	Diesel stripper	V	GT	1.00	diesel	Diesel	N	N	P	85	Blank	Y
A-913	3HDS	Hydrotreater	Exchangers	C	Flange	8.00	Gas oil	Gas Oil	N	N	G	167	Blank	NA
A-915	3HDS	Hydrotreater	Exchangers	V	GT	1.00	Gas oil	Gas Oil	N	N	G	95	Blank	Y
A-917	3HDS	Hydrotreater	Exchangers	V	GT	6.00	Gas oil	Gas Oil	L	N	G	413	Blank	Y
A-919	3HDS	Hydrotreater	Exchangers	V	GT	6.00	Gas oil	Gas Oil	L	N	O	286	Blank	Y
A-921	3HDS	Hydrotreater	Exchangers	V	BF	6.00	Gas oil	Gas Oil	L	N	G	360	Blank	Y
A-923	3HDS	Hydrotreater	Exchangers	V	GT	1.00	Gas oil	Gas Oil	L	N	G	108	Blank	Y
A-925	3HDS	Hydrotreater	Exchangers	C	Flange	6.00	Gas oil	Gas Oil	L	N	G	422	Blank	NA
A-927	3HDS	Hydrotreater	Exchangers	V	GT	8.00	Gas oil	Gas Oil	L	N	O	399	Blank	Y
A-929	3HDS	Hydrotreater	Exchangers	V	GT	6.00	Gas oil	Gas Oil	L	N	G	400	Blank	Y
A-931	3HDS	Hydrotreater	Exchangers	C	Flange	8.00	Gas oil	Gas Oil	L	N	G	200	Blank	NA
A-933	3HDS	Hydrotreater	Exchangers	C	Flange	8.00	Gas oil	Gas Oil	L	N	G	225	Blank	NA
A-935	3HDS	Hydrotreater	Exchangers	V	GT	10.00	Gas oil	Gas Oil	L	N	O	430	Blank	Y
A-937	3HDS	Hydrotreater	Exchangers	C	P	1.00	Gas oil	Gas Oil	L	N	G	115	Blank	NA
A-939	3HDS	Hydrotreater	Exchangers	V	GT	8.00	Gas oil	Gas Oil	L	N	O	430	Blank	Y
A-941	3HDS	Hydrotreater	Exchangers	V	GT	1.00	Gas oil	Gas Oil	L	N	G	115	Blank	Y
A-943	3HDS	Hydrotreater	Exchangers	V	GT	10.00	Gas oil	Gas Oil	L	N	G	440	Blank	Y
A-945	3HDS	Hydrotreater	Exchangers	V	GT	1.00	Gas oil	Gas Oil	L	N	G	190	Blank	Y
A-947	3HDS	Hydrotreater	Exchangers	C	PL	1.00	Gas oil	Gas Oil	L	N	G	190	Blank	NA
A-949	3HDS	Hydrotreater	Exchangers	C	Flange	8.00	Gas oil	Gas Oil	L	N	G	440	Blank	NA
A-951	3HDS	Hydrotreater	Exchangers	C	Flange	8.00	Gas oil	Gas Oil	L	N	G	440	Blank	NA
A-953	3HDS	Hydrotreater	Exchangers	V	GT	8.00	Gas oil	Gas Oil	L	N	O	325	Blank	Y
A-957	3HDS	Hydrotreater	Exchangers	V	GT	1.00	Gas oil	Gas Oil	L	N	G	190	Blank	Y
A-959	3HDS	Hydrotreater	Exchangers	V	GT	1.00	Gas oil	Gas Oil	L	N	G	155	Blank	Y
A-961	3HDS	Hydrotreater	Exchangers	C	PL	1.00	Gas oil	Gas Oil	L	N	G	155	Blank	NA
A-963	3HDS	Hydrotreater	Exchangers	V	GT	2.00	Gas oil	Gas Oil	L	N	G	180	Blank	Y
A-965	3HDS	Hydrotreater	Exchangers	V	GT	1.00	Gas oil	Gas Oil	L	N	G	68	Blank	Y
A-967	3HDS	Hydrotreater	Exchangers	C	Flange	16.00	Gas oil	Gas Oil	L	N	G	246	Blank	NA
A-969	3HDS	Hydrotreater	Exchangers	C	Flange	2.00	Gas oil	Gas Oil	L	N	G	180	Blank	NA
A-971	3HDS	Hydrotreater	Exchangers	C	PL	1.00	Gas oil	Gas Oil	L	N	G	68	Blank	NA
A-973	3HDS	Hydrotreater	Exchangers	C	Flange	2.00	Gas oil	Gas Oil	L	N	G	180	Blank	NA
A-975	3HDS	Hydrotreater	Exchangers	C	Flange	1.50	Gas oil	Gas Oil	L	N	O	250	Blank	NA
A-977	3HDS	Hydrotreater	E4653	C	Flange	12.00	Gas oil	Gas Oil	L	N	G	Blank	Blank	NA
A-979	3HDS	Hydrotreater	E4658	C	TC	1.00	Fresh feed frac btms	Gas Oil	L	N	O	60	Blank	NA
A-981	3HDS	Hydrotreater	Exchangers	V	GT	Blank	Gas oil	Gas Oil	N	N	G	88	Blank	Y
A-983	3HDS	Hydrotreater	Exchangers	V	GT	6.00	Gas oil	Gas Oil	L	N	G	99	Blank	Y
A-985	3HDS	Hydrotreater	E4658	C	TC	1.00	Gas oil	Gas Oil	L	N	G	60	Blank	NA
A-987	3HDS	Hydrotreater	E4658	V	GT	1.00	Gas oil	Gas Oil	L	N	G	60	Blank	Y
A-989	3HDS	Hydrotreater	E4658	V	BF	4.00	Gas oil	Gas Oil	L	N	G	70	Blank	Y
A-991	3HDS	Hydrotreater	E4658	C	PL	1.00	Gas oil	Gas Oil	L	N	G	130	Blank	NA
A-993	3HDS	Hydrotreater	E4658	V	GT	1.00	Gas oil	Gas Oil	L	N	G	130	Blank	N
A-995	3HDS	Hydrotreater	Exchangers	V	GT	4.00	Gas oil	Gas Oil	L	N	G	112	Blank	Y
A-997	3HDS	Hydrotreater	Exchangers	V	GT	4.00	Gas oil	Gas Oil	L	N	G	112	Blank	Y
A-999	3HDS	Hydrotreater	E4658	V	GT	10.00	Gas oil	Gas Oil	L	N	G	89	Blank	Y
A-1001	3HDS	Hydrotreater	E4658	C	Flange	4.00	Gas oil	Gas Oil	L	N	G	112	Blank	NA
A-1003	3HDS	Hydrotreater	E4658	C	Flange	10.00	Gas oil	Gas Oil	L	N	G	89	Blank	NA
A-1005	3HDS	Hydrotreater	E4658	C	Flange	10.00	Gas oil	Gas Oil	L	N	O	89	Blank	NA
A-1007	3HDS	Hydrotreater	E4658	V	GT	1.00	Gas oil	Gas Oil	L	N	G	75	Blank	Y
A-1009	3HDS	Hydrotreater	E4658	C	Flange	4.00	Gas oil	Gas Oil	L	N	G	112	Blank	NA
A-1011	3HDS	Hydrotreater	E4658	C	Flange	10.00	Gas oil	Gas Oil	L	N	G	88	Blank	NA
A-1013	3HDS	Hydrotreater	E4658	C	Flange	20.00	Gas oil	Gas Oil	L	N	G	435	Blank	NA
A-1015	3HDS	Hydrotreater	E4658	V	GT	1.00	Gas oil	Gas Oil	L	N	G	60	Blank	Y
A-1017	3HDS	Hydrotreater	E4658	V	GT	10.00	Gas oil	Gas Oil	L	N	G	260	Blank	Y
A-1019	3HDS	Hydrotreater	E4658	C	Plug (11)	1.00	Frac btms	Other	L	N	G	560	Blank	NA
A-1021	3HDS	Hydrotreater	E4658	C	Flange	10.00	Fresh feed	Gas Oil	L	N	O	82	Blank	NA
A-1023	3HDS	Hydrotreater	E4658	V	GT	8.00	Frac btm	Other	L	N	G	560	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1025	3HDS	Hydrotreater	E4658	C	PL	1.00	Fresh feed	Gas Oil	L	N	O	82	Blank	NA
A-1027	3HDS	Hydrotreater	E4658	V	GT	1.00	Fresh feed	Gas Oil	L	N	O	82	Blank	Y
A-1029	3HDS	Hydrotreater	E4658	C	Flange	10.00	Fresh feed	Gas Oil	L	N	G	260	Blank	NA
A-1031	3HDS	Hydrotreater	E4658	C	Flange	10.00	Fresh feed	Gas Oil	L	N	O	82	Blank	NA
A-1033	3HDS	Hydrotreater	Frac btms	V	Control valve	10.00	Frac btms	Other	L	N	G	560	Blank	Y
A-1035	3HDS	Hydrotreater	Frac btms	C	Flange	10.00	Fresh feed	Gas Oil	L	N	O	82	Blank	NA
A-1037	3HDS	Hydrotreater	Frac btms	V	GT	10.00	Frac btms	Other	L	N	G	560	Blank	Y
A-1039	3HDS	Hydrotreater	Frac btms	V	GT	1.00	Fresh feed	Gas Oil	L	N	O	82	Blank	Y
A-1041	3HDS	Hydrotreater	Frac btms	C	PL	1.00	Gas oil	Gas Oil	L	N	O	82	Blank	NA
A-1043	3HDS	Hydrotreater	Frac btms	V	GT	8.00	Gas oil	Gas Oil	L	N	G	260	Blank	Y
A-1045	3HDS	Hydrotreater	Frac btms	V	GT	10.00	Gas oil	Gas Oil	L	N	O	80	Blank	Y
A-1047	3HDS	Hydrotreater	Frac btms	C	Flange	10.00	Gas oil	Gas Oil	L	N	G	560	Blank	NA
A-1049	3HDS	Hydrotreater	Frac btms	V	GT	1.00	Gas oil	Gas Oil	L	N	G	260	Blank	Y
A-1051	3HDS	Hydrotreater	Frac btms	V	Control valve	10.00	Gas oil	Gas Oil	L	N	G	80	Blank	Y
A-1053	3HDS	Hydrotreater	Frac btms	V	GT	1.00	Gas oil	Gas Oil	L	N	G	560	Blank	Y
A-1055	3HDS	Hydrotreater	Frac btms	C	Flange	10.00	Gas oil	Gas Oil	L	N	G	80	Blank	NA
A-1057	3HDS	Hydrotreater	Frac btms	V	GT	8.00	Gas oil	Gas Oil	L	N	O	560	Blank	Y
A-1059	3HDS	Hydrotreater	Frac btms	V	GT	4.00	Gas oil	Gas Oil	L	N	G	45	Blank	Y
A-1061	3HDS	Hydrotreater	Frac btms	C	Flange	8.00	Gas oil	Gas Oil	L	N	O	560	Blank	NA
A-1063	3HDS	Hydrotreater	Diesel	C	Flange	3.00	Diesel	Diesel	L	N	G	45	Blank	NA
A-1065	3HDS	Hydrotreater	Diesel	V	Control valve	3.00	Diesel	Diesel	L	N	G	45	Blank	Y
A-1067	3HDS	Hydrotreater	Diesel	V	GT	4.00	Diesel	Diesel	L	N	O	45	Blank	Y
A-1069	3HDS	Hydrotreater	Diesel	V	GT	4.00	Diesel	Diesel	L	N	G	45	Blank	Y
A-1071	3HDS	Hydrotreater	Diesel	C	Flange	3.00	Diesel	Diesel	L	N	G	45	Blank	NA
A-1073	3HDS	Hydrotreater	Diesel	C	Flange	3.00	Diesel	Diesel	L	N	G	45	Blank	NA
A-1075	3HDS	Hydrotreater	Diesel	V	GT	4.00	Diesel	Diesel	L	N	O	45	Blank	Y
A-1077	3HDS	Hydrotreater	Diesel	V	GT	1.00	Diesel	Diesel	L	N	G	45	Blank	Y
A-1079	3HDS	Hydrotreater	Diesel	C	PL	1.00	Diesel	Diesel	L	N	G	45	Blank	NA
A-1081	3HDS	Hydrotreater	Diesel	C	Flange	3.00	Diesel	Diesel	L	N	G	45	Blank	NA
A-1083	3HDS	Hydrotreater	Diesel	C	F	8.00	Frac btms	Other	L	N	G	540	Blank	NA
A-1085	3HDS	Hydrotreater	Diesel	V	GT	8.00	Frac btms	Other	L	N	G	300	Blank	Y
A-1087	3HDS	Hydrotreater	Diesel	V	GT	8.00	Frac btms	Other	L	N	G	560	Blank	Y
A-1089	3HDS	Hydrotreater		C	-	2.00	Lube oil	Lube Oil	N	N	G	56	Blank	NA
A-1091	3HDS	Hydrotreater		V	GT	2.00	Lube oil	Lube Oil	N	N	G	56	Blank	Y
A-1093	3HDS	Hydrotreater		C	-	2.00	Lube oil	Lube Oil	N	N	G	73	Blank	NA
A-1095	3HDS	Hydrotreater		V	GT	2.00	Lube oil	Lube Oil	N	N	G	73	Blank	Y
A-1097	3HDS	Hydrotreater		C	-	2.00	Lube oil	Lube Oil	N	N	G	73	Blank	NA
A-1099	3HDS	Hydrotreater		V	GT	0.50	Lube oil	Lube Oil	N	N	G	65	Blank	Y
A-1101	3HDS	Hydrotreater		V	GT	0.50	Lube oil	Lube Oil	N	N	G	65	Blank	Y
A-1103	3HDS	Hydrotreater		C	-	2.00	Lube oil	Lube Oil	N	N	G	110	Blank	NA
A-1105	3HDS	Hydrotreater		V	GT	2.00	Lube oil	Lube Oil	N	N	G	130	Blank	Y
A-1107	3HDS	Hydrotreater		C	Bolted	2.00	Lube oil	Lube Oil	N	N	G	110	Blank	NA
A-1109	3HDS	Hydrotreater		V	Needle	0.25	Lube oil	Lube Oil	N	N	G	80	Blank	Y
A-1111	3HDS	Hydrotreater		V	Needle	0.50	Lube oil	Lube Oil	N	N	G	80	Blank	Y
A-1113	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	130	Blank	NA
A-1115	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	130	Blank	Y
A-1117	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	135	Blank	NA
A-1119	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1121	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	70	Blank	N
A-1123	3HDS	Hydrotreater		V	GT	1.50	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1125	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1127	3HDS	Hydrotreater		V	Control	1.00	Lube oil	Lube Oil	N	N	G	105	Blank	Y
A-1129	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	100	Blank	NA
A-1131	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1133	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	75	Blank	NA
A-1135	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	50	Blank	Y
A-1137	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	53	Blank	Y
A-1139	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1141	3HDS	Hydrotreater		C	Bolted	2.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	NA
A-1143	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	NA
A-1145	3HDS	Hydrotreater		V	GT	0.25	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1147	3HDS	Hydrotreater		V	Needle	0.25	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1149	3HDS	Hydrotreater		C	Elbow	0.50	Lube oil	Lube Oil	N	N	G	Blank	Blank	NA
A-1151	3HDS	Hydrotreater		V	Needle	0.50	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1153	3HDS	Hydrotreater		V	Needle	0.25	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1155	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	95	Blank	Y
A-1157	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	95	Blank	Y
A-1159	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	95	Blank	NA
A-1161	3HDS	Hydrotreater		V	Control	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1163	3HDS	Hydrotreater		V	GT	6.00	Gas oil	Gas Oil	N	N	G	70	Blank	Y
A-1165	3HDS	Hydrotreater		V	GT	6.00	Gas oil	Gas Oil	N	N	G	40	Blank	Y
A-1167	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	G	40	Blank	Y
A-1169	3HDS	Hydrotreater		C	-	6.00	Gas oil	Gas Oil	N	N	G	40	Blank	NA

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A-1171	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	G	45	Blank	Y
A-1173	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	G	45	Blank	Y
A-1175	3HDS	Hydrotreater		V	GT	0.75	Gas oil	Gas Oil	N	N	G	42	Blank	Y
A-1177	3HDS	Hydrotreater		V	GT	0.50	Gas oil	Gas Oil	N	N	G	42	Blank	Y
A-1179	3HDS	Hydrotreater		C	Union	0.50	Gas oil	Gas Oil	N	N	G	42	Blank	NA
A-1181	3HDS	Hydrotreater		C	Union	0.50	Gas oil	Gas Oil	N	N	G	42	Blank	NA
A-1183	3HDS	Hydrotreater		V	GT	0.50	Gas oil	Gas Oil	N	N	G	45	Blank	N
A-1185	3HDS	Hydrotreater		C	Tee	0.50	Gas oil	Gas Oil	N	N	G	45	Blank	NA
A-1187	3HDS	Hydrotreater		V	GT	0.50	Gas oil	Gas Oil	N	N	G	45	Blank	Y
A-1189	3HDS	Hydrotreater		V	Quarter Turn	0.50	Gas oil	Gas Oil	N	N	G	46	Blank	Y
A-1191	3HDS	Hydrotreater		C	Bull plug	0.50	Gas oil	Gas Oil	N	N	G	46	Blank	NA
A-1193	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	55	Blank	Y
A-1195	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	55	Blank	Y
A-1197	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	55	Blank	Y
A-1199	3HDS	Hydrotreater		V	Control	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1201	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	115	Blank	Y
A-1203	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	80	Blank	NA
A-1205	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1207	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	50	Blank	Y
A-1209	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	50	Blank	NA
A-1211	3HDS	Hydrotreater		V	Needle	0.50	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1213	3HDS	Hydrotreater		V	Needle	0.25	Lube oil	Lube Oil	N	N	G	Blank	Blank	Y
A-1215	3HDS	Hydrotreater		C	-	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	NA
A-1217	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	80	Blank	Y
A-1219	3HDS	Hydrotreater		V	GT	1.00	Lube oil	Lube Oil	N	N	G	65	Blank	Y
A-1221	3HDS	Hydrotreater		C	Bull plug	0.75	Lube oil	Lube Oil	N	N	G	65	Blank	NA
A-1223	3HDS	Hydrotreater		C	Housing connector	1.00	Lube oil	Lube Oil	N	N	G	Blank	Blank	NA
A-1225	3HDS	Hydrotreater	Diesel stripper	C	-	8.00	Diesel	Diesel	N	N	P	420	Blank	NA
A-1227	3HDS	Hydrotreater	Diesel stripper	C	-	0.50	diesel	Diesel	N	N	G	300	Blank	NA
A-1229	3HDS	Hydrotreater	Diesel stripper	V	GT	2.00	diesel	Diesel	N	N	O	50	Blank	Y
A-1231	3HDS	Hydrotreater		V	GT	1.00	diesel	Diesel	N	N	P	162	Blank	Y
A-1233	3HDS	Hydrotreater		C	-	6.00	diesel	Diesel	L	N	P	450	Blank	NA
A-1235	3HDS	Hydrotreater		V	GT	1.00	diesel	Diesel	L	N	P	180	Blank	Y
A-1237	3HDS	Hydrotreater		C	Elbow	1.00	diesel	Diesel	L	N	P	70	Blank	NA
A-1239	3HDS	Hydrotreater		C	-	4.00	diesel	Diesel	N	N	P	375	Blank	NA
A-1241	3HDS	Hydrotreater		V	GT	4.00	diesel	Diesel	N	N	P	415	Blank	Y
A-1243	3HDS	Hydrotreater		V	GT	1.00	diesel	Diesel	N	N	P	255	Blank	Y
A-1245	3HDS	Hydrotreater		V	GT	6.00	diesel	Diesel	L	N	P	455	Blank	Y
A-1247	3HDS	Hydrotreater		C	-	6.00	diesel	Diesel	L	N	P	440	Blank	NA
A-1249	3HDS	Hydrotreater		V	GT	1.00	diesel	Diesel	N	N	P	75	Blank	Y
A-1251	3HDS	Hydrotreater		V	GT	1.00	diesel	Diesel	N	N	P	85	Blank	Y
A-1253	3HDS	Hydrotreater		C	Elbow	1.00	diesel	Diesel	N	N	P	85	Blank	NA
A-1255	3HDS	Hydrotreater		V	Control	4.00	diesel	Diesel	N	N	P	465	Blank	Y
A-1257	3HDS	Hydrotreater		C	-	6.00	diesel	Diesel	N	N	P	430	Blank	NA
A-1259	3HDS	Hydrotreater		V	GT	6.00	diesel	Diesel	N	N	P	460	Blank	Y
A-1261	3HDS	Hydrotreater		C	-	8.00	Gas oil	Gas Oil	N	N	P	106	Blank	NA
A-1263	3HDS	Hydrotreater		V	GT	8.00	Gas oil	Gas Oil	N	N	P	106	Blank	Y
A-1265	3HDS	Hydrotreater		C	-	8.00	Gas oil	Gas Oil	N	N	P	106	Blank	NA
A-1267	3HDS	Hydrotreater		V	GT	10.00	Gas oil	Gas Oil	N	N	P	110	Blank	Y
A-1269	3HDS	Hydrotreater		C	-	10.00	Gas oil	Gas Oil	N	N	P	110	Blank	NA
A-1271	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	P	55	Blank	Y
A-1273	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	P	55	Blank	Y
A-1275	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	P	55	Blank	Y
A-1277	3HDS	Hydrotreater		C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	55	Blank	NA
A-1279	3HDS	Hydrotreater		C	-	8.00	Gas oil	Gas Oil	N	N	P	130	Blank	NA
A-1281	3HDS	Hydrotreater		V	GT	8.00	Gas oil	Gas Oil	N	N	P	140	Blank	Y
A-1283	3HDS	Hydrotreater		C	-	8.00	Gas oil	Gas Oil	N	N	P	140	Blank	NA
A-1285	3HDS	Hydrotreater		V	Control	8.00	Gas oil	Gas Oil	N	N	P	150	Blank	Y
A-1287	3HDS	Hydrotreater		C	-	8.00	Gas oil	Gas Oil	N	N	P	Blank	Blank	NA
A-1289	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	P	Blank	Blank	Y
A-1291	3HDS	Hydrotreater		V	GT	8.00	Gas oil	Gas Oil	N	N	P	Blank	Blank	Y
A-1293	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	P	Blank	Blank	Y
A-1295	3HDS	Hydrotreater		C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	Blank	Blank	NA
A-1297	3HDS	Hydrotreater		V	GT	8.00	Gas oil	Gas Oil	N	N	P	70	Blank	Y
A-1299	3HDS	Hydrotreater		C	--	8.00	Gas oil	Gas Oil	N	N	P	60	Blank	NA
A-1301	3HDS	Hydrotreater		V	GT	1.00	Gas oil	Gas Oil	N	N	P	Blank	Blank	Y
A-1303	3HDS	Hydrotreater		C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	Blank	Blank	NA
A-1305	3HDS	Hydrotreater		V	GT	4.00	Diesel	Diesel	N	N	P	425	Blank	Y
A-1307	3HDS	Hydrotreater		V	GT	4.00	Diesel	Diesel	N	N	P	400	Blank	Y
A-1309	3HDS	Hydrotreater		C	-	4.00	Diesel	Diesel	N	N	P	415	Blank	NA
A-1311	3HDS	Hydrotreater		V	GT	4.00	Diesel	Diesel	N	N	P	100	Blank	Y
A-1313	3HDS	Hydrotreater		C	-	4.00	diesel	Diesel	N	N	P	100	Blank	NA
A-1315	3HDS	Hydrotreater		V	GT	4.00	diesel	Diesel	N	N	P	100	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1317	3HDS	Hydrotreater		V	GT	1.00	GO	Gas Oil	N	N	P	140	Blank	Y
A-1319	3HDS	Hydrotreater		C	Union	1.00	GO	Gas Oil	N	N	P	140	Blank	NA
A-1321	3HDS	Hydrotreater		V	GT	1.00	GO	Gas Oil	N	N	P	80	Blank	Y
A-1323	3HDS	Hydrotreater		C	-	4.00	Frac btms	Other	N	N	P	165	Blank	NA
A-1325	3HDS	Hydrotreater		C	-	3.00	Frac btms	Other	N	N	P	320	Blank	NA
A-1327	3HDS	Hydrotreater		C	-	4.00	Frac btms	Other	N	N	P	190	Blank	NA
A-1329	3HDS	Hydrotreater		C	-	4.00	Frac btms	Other	N	N	P	180	Blank	NA
A-1331	3HDS	Hydrotreater		C	-	3.00	Frac btms	Other	N	N	P	328	Blank	NA
A-1333	3HDS	Hydrotreater		C	-	4.00	Frac btms	Other	N	N	P	190	Blank	NA
A-1335	3HDS	Hydrotreater		C	-	4.00	Frac btms	Other	N	N	P	165	Blank	NA
A-1337	3HDS	Hydrotreater		C	-	4.00	Frac btms	Other	N	N	P	155	Blank	NA
A-1339	3HDS	Hydrotreater	Fin fan deck	V	GT	1.00	Frac btms	Other	N	N	P	330	Blank	Y
A-1341	3HDS	Hydrotreater	Fin fan deck	V	G	8.00	Gas oil	Gas Oil	N	Blank	P	348	Blank	Y
A-1343	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	290	Blank	NA
A-1345	3HDS	Hydrotreater	Fin fan deck	V	G	8.00	Frac btms	Other	N	Blank	P	420	Blank	Y
A-1347	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	428	Blank	NA
A-1349	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	183	Blank	NA
A-1351	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	216	Blank	NA
A-1353	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	153	Blank	NA
A-1355	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	213	Blank	NA
A-1357	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	233	Blank	NA
A-1359	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	222	Blank	NA
A-1361	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	257	Blank	NA
A-1363	3HDS	Hydrotreater	Fin fan deck	V	G	8.00	Frac btms	Other	N	Blank	P	438	Blank	Y
A-1365	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	440	Blank	NA
A-1367	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	184	Blank	NA
A-1369	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	Blank	P	207	Blank	NA
A-1371	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	260	<90 PST*	NA
A-1373	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	325	<90 PST*	NA
A-1375	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	265	<90 PST*	NA
A-1377	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	310	<90 PST*	NA
A-1379	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	165	<90 PST*	NA
A-1381	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	240	<90 PST*	NA
A-1383	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	290	<90 PST*	NA
A-1385	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	330	<90 PST*	NA
A-1387	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	200	<90 PST*	NA
A-1389	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	180	<90 PST*	NA
A-1391	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	285	<90 PST*	NA
A-1393	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	195	<90 PST*	NA
A-1395	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	465	<90 PST*	NA
A-1397	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	205	<90 PST*	NA
A-1399	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	295	<90 PST*	NA
A-1401	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	2.00	Frac btms	Other	N	N	P	335	<90 PST*	NA
A-1403	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	70	<90 PST*	NA
A-1405	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	70	<90 PST*	NA
A-1407	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	70	<90 PST*	NA
A-1409	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	63	<90 PST*	NA
A-1411	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	65	<90 PST*	NA
A-1413	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	85	<90 PST*	NA
A-1415	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	67	<90 PST*	NA
A-1417	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	58	<90 PST*	NA
A-1419	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	59	<90 PST*	NA
A-1421	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	66	<90 PST*	NA
A-1423	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	96	<90 PST*	NA
A-1425	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	71	<90 PST*	NA
A-1427	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	66	<90 PST*	NA
A-1429	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	63	<90	NA
A-1431	3HDS	Hydrotreater	Fin fan deck	C	Bull plug	1.00	Gas oil	Gas Oil	N	N	P	63	<90	NA
A-1433	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	180	Blank	NA
A-1435	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	190	Blank	NA
A-1437	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	170	Blank	NA
A-1439	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	330	Blank	NA
A-1441	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	140	Blank	NA
A-1443	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	160	Blank	NA
A-1445	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	180	Blank	NA
A-1447	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	260	Blank	NA
A-1449	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	175	Blank	NA
A-1451	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	355	Blank	NA
A-1453	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	190	Blank	NA
A-1455	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	195	Blank	NA
A-1457	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	Gas oil	Gas Oil	N	N	P	140	Blank	NA
A-1459	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	130	Blank	NA
A-1461	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	390	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1463	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	415	Blank	NA
A-1465	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	110	Blank	NA
A-1467	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	100	Blank	NA
A-1469	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	110	Blank	NA
A-1471	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	125	Blank	NA
A-1473	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	110	Blank	NA
A-1475	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	125	Blank	NA
A-1477	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	409	Blank	NA
A-1479	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	420	Blank	NA
A-1481	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	405	Blank	NA
A-1483	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	395	Blank	NA
A-1485	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	100	Blank	NA
A-1487	3HDS	Hydrotreater	Fin fan deck	C	BP	2.00	Frac btms	Other	N	N	P	245	Blank	NA
A-1489	3HDS	Hydrotreater	Fin fan deck	C	BP	1.00	diesel	Diesel	N	N	P	175	Blank	NA
A-1491	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	175	Blank	NA
A-1493	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	100	Blank	Y
A-1495	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	285	Blank	Y
A-1497	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	235	Blank	NA
A-1499	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	260	Blank	NA
A-1501	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	335	Blank	NA
A-1503	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	155	Blank	NA
A-1505	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	200	Blank	NA
A-1507	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	225	Blank	NA
A-1509	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	365	Blank	NA
A-1511	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	165	Blank	NA
A-1513	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	190	Blank	NA
A-1515	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	100	Blank	Y
A-1517	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	300	Blank	Y
A-1519	3HDS	Hydrotreater	Fin fan	C	-	3.00	Frac bottoms	Other	N	N	P	250	Blank	NA
A-1521	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	155	Blank	NA
A-1523	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	210	Blank	NA
A-1525	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	250	Blank	NA
A-1527	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	380	Blank	NA
A-1529	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	115	Blank	Y
A-1531	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	275	Blank	Y
A-1533	3HDS	Hydrotreater	Fin fan	C	-	3.00	Frac bottoms	Other	N	N	P	220	Blank	NA
A-1535	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	180	Blank	NA
A-1537	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	210	Blank	NA
A-1539	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	235	Blank	NA
A-1541	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	205	Blank	NA
A-1543	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	210	Blank	NA
A-1545	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	365	Blank	NA
A-1547	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	200	Blank	NA
A-1549	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	130	Blank	Y
A-1551	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Frac bottoms	Other	N	N	P	315	Blank	Y
A-1553	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	175	Blank	NA
A-1555	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	195	Blank	NA
A-1557	3HDS	Hydrotreater	Fin fan	C	BP	2.00	Frac bottoms	Other	N	N	P	230	Blank	NA
A-1559	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1561	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1563	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	45	Blank	NA
A-1565	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	55	Blank	NA
A-1567	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1569	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1571	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1573	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	45	Blank	NA
A-1575	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Gas oil	Gas Oil	N	N	P	45	Blank	Y
A-1577	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1579	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	45	Blank	NA
A-1581	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1583	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	45	Blank	NA
A-1585	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	50	Blank	NA
A-1587	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	45	Blank	NA
A-1589	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	45	Blank	NA
A-1591	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	175	Blank	NA
A-1593	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	265	Blank	NA
A-1595	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	215	Blank	NA
A-1597	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	145	Blank	NA
A-1599	3HDS	Hydrotreater	Fin fan	C	-	4.00	Gas oil	Gas Oil	N	N	P	120	Blank	NA
A-1601	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	235	Blank	NA
A-1603	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	145	Blank	NA
A-1605	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	230	Blank	NA
A-1607	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	155	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1609	3HDS	Hydrotreater	Fin fan	V	GT	1.00	Gas oil	Gas Oil	N	N	P	160	Blank	Y
A-1611	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	220	Blank	NA
A-1613	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	225	Blank	NA
A-1615	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	180	Blank	NA
A-1617	3HDS	Hydrotreater	Fin fan	C		1.00	Gas oil	Gas Oil	N	N	P	235	Blank	NA
A-1619	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	220	Blank	NA
A-1621	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	150	Blank	NA
A-1623	3HDS	Hydrotreater	Fin fan	C	BP	1.00	Gas oil	Gas Oil	N	N	P	210	Blank	NA
A-1625	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	150	Blank	NA
A-1627	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	140	Blank	NA
A-1629	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	135	Blank	NA
A-1631	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	140	Blank	NA
A-1633	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	160	Blank	NA
A-1635	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	90	Blank	NA
A-1637	3HDS	Hydrotreater	Fin fan	V	BP	1.00	diesel	Diesel	N	N	P	90	Blank	Y
A-1639	3HDS	Hydrotreater	Fin fan	V	GT	1.00	diesel	Diesel	N	N	P	165	Blank	Y
A-1641	3HDS	Hydrotreater	Fin fan	C	GT	1.00	diesel	Diesel	N	N	P	80	Blank	NA
A-1643	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	110	Blank	NA
A-1645	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	135	Blank	NA
A-1647	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	150	Blank	NA
A-1649	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	165	Blank	NA
A-1651	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	110	Blank	NA
A-1653	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	120	Blank	NA
A-1655	3HDS	Hydrotreater	Fin fan	C	BP	1.00	diesel	Diesel	N	N	P	150	Blank	NA
A-1657	3HDS	Hydrotreater	-	V	GT	6.00	Frac bottoms	Other	N	N	G	175	Blank	Y
A-1659	3HDS	Hydrotreater	-	C	-	6.00	Frac bottoms	Other	N	N	G	165	Blank	NA
A-1661	3HDS	Hydrotreater	-	V	Control valve	6.00	Frac bottoms	Other	N	N	G	Insulated	Blank	Y
A-1663	3HDS	Hydrotreater	-	V	GT	6.00	Frac bottoms	Other	N	N	G	170	Blank	Y
A-1665	3HDS	Hydrotreater		V	GT	1.00	Frac bottoms	Other	N	N	G	105	Blank	N
A-1667	3HDS	Hydrotreater		C	-	6.00	Frac bottoms	Other	N	N	G	150	Blank	NA
A-1669	3HDS	Hydrotreater		V	GT	6.00	Frac bottoms	Other	N	N	G	120	Blank	Y
A-1671	3HDS	Hydrotreater		V	GT	8.00	Frac bottoms	Other	N	N	G	80	Blank	Y
A-1673	3HDS	Hydrotreater		V	GT	1.00	Frac bottoms	Other	N	N	G	100	122	Y
A-1675	3HDS	Hydrotreater		V	GT	1.00	Frac bottoms	Other	N	N	G	60	122	Y
A-1677	3HDS	Hydrotreater		C	-	1.50	Frac bottoms	Other	N	N	G	100	Blank	NA
A-1679	3HDS	Hydrotreater		V	GT	6.00	Frac bottoms	Other	N	N	G	135	Blank	Y
A-1681	3HDS	Hydrotreater		V	Control	6.00	Frac bottoms	Other	N	N	G	125	Blank	Y
A-1683	3HDS	Hydrotreater		V	GT	6.00	Frac bottoms	Other	N	N	G	175	Blank	Y
A-1685	3HDS	Hydrotreater		V	GT	2.00	Frac bottoms	Other	N	N	G	100	Blank	Y
A-1687	3HDS	Hydrotreater		C	-	2.00	Frac bottoms	Other	N	N	G	100	Blank	NA
A-1689	3HDS	Hydrotreater		V	GT	1.00	Frac bottoms	Other	N	N	G	60	Blank	N
A-1691	3HDS	Hydrotreater		V	Control	2.00	Frac bottoms	Other	N	N	G	60	Blank	Y
A-1693	3HDS	Hydrotreater		C	GT	2.00	Frac bottoms	Other	N	N	G	60	Blank	NA
A-1695	3HDS	Hydrotreater		V	GT	2.00	Frac bottoms	Other	N	N	P	85	Blank	Y
A-1697	3HDS	Hydrotreater		V	GT	4.00	Frac bottoms	Other	N	N	G	55	Blank	Y
A-1699	3HDS	Hydrotreater		V	GT	4.00	Filtered Feed	Gas Oil	N	N	G	55	Blank	Y
A-1701	3HDS	Hydrotreater		V	GT	1.00	Filtered Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-1703	3HDS	Hydrotreater		V	GT	4.00	Frac bottoms	Other	N	N	G	52	Blank	Y
A-1705	3HDS	Hydrotreater		C	-	4.00	Backwash	Other	N	N	P	55	Blank	NA
A-1707	3HDS	Hydrotreater		V	GT	2.00	Seal Oil	Seal Oil	N	N	G	Blank	Blank	Y
A-1709	3HDS	Hydrotreater		C	-	2.00	Seal Oil	Seal Oil	N	N	G	130	Blank	NA
A-1711	3HDS	Hydrotreater		V	GT	2.00	Seal Oil	Seal Oil	N	N	G	130	Blank	Y
A-1713	3HDS	Hydrotreater		C	-	2.00	Seal Oil	Seal Oil	N	N	G	120	Blank	NA
A-1715	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	65	Blank	Y
A-1717	3HDS	Hydrotreater		C	-	2.00	Seal Oil	Seal Oil	N	N	G	125	Blank	NA
A-1719	3HDS	Hydrotreater		V	GT	2.00	Seal Oil	Seal Oil	N	N	G	125	Blank	Y
A-1721	3HDS	Hydrotreater		V	GT	2.00	Seal Oil	Seal Oil	N	N	G	105	Blank	Y
A-1723	3HDS	Hydrotreater		C	-	2.00	Seal Oil	Seal Oil	N	N	G	80	Blank	NA
A-1725	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	70	Blank	Y
A-1727	3HDS	Hydrotreater		C	-	2.00	Seal Oil	Seal Oil	N	N	G	90	Blank	NA
A-1729	3HDS	Hydrotreater		C	-	2.00	Seal Oil	Seal Oil	N	N	G	122	Blank	NA
A-1731	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	80	Blank	Y
A-1733	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	Blank	Blank	Y
A-1735	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	82	Blank	Y
A-1737	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	Blank	Blank	Y
A-1739	3HDS	Hydrotreater		V	GT	2.00	Seal Oil	Seal Oil	N	N	G	100	Blank	Y
A-1741	3HDS	Hydrotreater		V	GT	1.50	Seal Oil	Seal Oil	N	N	G	85	Blank	Y
A-1743	3HDS	Hydrotreater		V	GT	2.00	Seal Oil	Seal Oil	N	N	G	130	Blank	Y
A-1745	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	80	Blank	Y
A-1747	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	70	Blank	Y
A-1749	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	75	Blank	Y
A-1751	3HDS	Hydrotreater		C	BP	1.00	Seal Oil	Seal Oil	N	N	G	Blank	Blank	NA
A-1753	3HDS	Hydrotreater		V	GT	1.50	Seal Oil	Seal Oil	N	N	G	115	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1755	3HDS	Hydrotreater		C	-	1.50	Seal Oil	Seal Oil	N	N	G	115	Blank	NA
A-1757	3HDS	Hydrotreater		V	GT	1.50	Seal Oil	Seal Oil	N	N	G	95	Blank	Y
A-1759	3HDS	Hydrotreater		C	-	1.50	Seal Oil	Seal Oil	N	N	G	95	Blank	NA
A-1761	3HDS	Hydrotreater		V	Control	2.00	Seal Oil	Seal Oil	N	N	G	115	Blank	Y
A-1763	3HDS	Hydrotreater		V	GT	2.00	Seal Oil	Seal Oil	N	N	G	105	Blank	Y
A-1765	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	Blank	Blank	Y
A-1767	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	72	Blank	Y
A-1769	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	Blank	Blank	N
A-1771	3HDS	Hydrotreater		C	-	0.50	Seal Oil	Seal Oil	N	N	G	Blank	Blank	NA
A-1773	3HDS	Hydrotreater		V	GT	1.00	Seal Oil	Seal Oil	N	N	G	Blank	Blank	Y
A-1775	3HDS	Hydrotreater		V	GT	4.00	Seal Oil	Seal Oil	N	N	G	110	Blank	Y
A-1777	3HDS	Hydrotreater		C	-	2.50	Seal Oil	Seal Oil	N	N	G	100	Blank	NA
A-1779	HCU	Hydrocracker		V	GT	Blank	Seal Oil	Seal Oil	N	N	G	90	Blank	Y
A-1781	HCU	Hydrocracker		P	P8017	4.00	Gas oil	Gas Oil	L	N	G	130	225	NA
A-1783	HCU	Hydrocracker		P	P8016	4.00	Gas oil	Gas Oil	N	N	G	40	100	NA
A-1785	HCU	Hydrocracker		P	P8015	4.00	Gas oil	Gas Oil	N	N	G	80	0	NA
A-1787	HCU	Hydrocracker		P	P3828	4.00	Diesel	Diesel	L	N	G	130	175	NA
A-1789	HCU	Hydrocracker		P	P3825	4.00	Diesel	Diesel	N	N	G	46	0	NA
A-1791	Tract 6	Tank Farm		P	P9984	4.00	Diesel	Diesel	N	N	G	57	25	NA
A-1793	Tract 6	Tank Farm		P	P9983	4.00	Diesel	Diesel	L	N	G	87	160	NA
A-1795	Tract 6	Tank Farm		P	P8426	10.00	Diesel	Diesel	N	N	G	40	0	NA
A-1797	Tract 6	Tank Farm		P	P8925	10.00	Diesel	Diesel	N	N	G	50	0	NA
A-1799	Tract 6	Tank Farm		P	P9749	2.00	Cetane impower	Cetane Improver	N	N	G	58	30	NA
A-1801	Tract 6	Tank Farm		P	P9748	2.00	Cetane impower	Cetane Improver	N	N	G	60	0	NA
A-1803	Tract 6	Tank Farm		P	P9804	1.00	Lubricity	Other	N	N	G	67	Blank	NA
A-1805	Tract 6	Tank Farm		P	P9805	1.00	Lubricity	Other	N	N	G	68	Blank	NA
A-1807	Tract 6	Tank Farm		P	P9748 F	2.00	Cetane impower	Cetane Improver	N	N	G	60	0	NA
A-1809	Tract 6	Tank Farm		P	P10144	10.00	VGO	Gas Oil	L	N	G	147	130	NA
A-1811	Tract 6	Tank Farm		P	P10148	8.00	VGO spare	Gas Oil	L	N	G	148	35	NA
A-1813	Tract 6	Tank Farm		P	P1014	2.00	VGO	Gas Oil	N	N	G	65	Blank	NA
A-1815	Tract 6	Tank Farm		P	P8974	6.00	VGO	Gas Oil	N	N	G	47	40	NA
A-1817	Tract 6	Tank Farm		P	P3401	4.00	VGO	Gas Oil	N	N	G	62	40	NA
A-1819	3 HDS	Hydrotreater	Lube oil GT	V	GT	1.00	Lube oil	Lube Oil	N	N	G	50	Blank	Y
A-1821	3 HDS	Hydrotreater	Lube oil GT	V	GT	1.00	Lube oil	Lube Oil	N	N	G	50	Blank	Y
A-1823	3 HDS	Hydrotreater	Lube oil GT	C	-	8.00	Lube oil	Lube Oil	N	N	G	53	Blank	NA
A-1825	3 HDS	Hydrotreater	Lube oil GT	V	GT	3.00	Lube oil	Lube Oil	N	N	G	96	Blank	Y
A-1827	3 HDS	Hydrotreater	Lube oil GT	C	-	2.00	Lube oil	Lube Oil	N	N	G	90	Blank	NA
A-1829	3 HDS	Hydrotreater	Lube oil GT	V	GT	1.00	Lube oil	Lube Oil	N	N	G	60	Blank	Y
A-1831	3 HDS	Hydrotreater	Lube oil GT	V	GT	1.00	Lube oil	Lube Oil	N	N	G	70	Blank	Y
A-1833	3 HDS	Hydrotreater	Lube oil GT	V	Needle	1.00	Lube oil	Lube Oil	N	N	G	70	Blank	Y
A-1835	3 HDS	Hydrotreater	Lube oil GT	V	GT	1.00	Lube oil	Lube Oil	N	N	G	70	Blank	Y
A-1837	3 HDS	Hydrotreater	Lube oil GT	V	GT	1.00	Lube oil	Lube Oil	N	N	G	60	Blank	Y
A-1839	3 HDS	Hydrotreater	Lube oil GT	C	-	Blank	Lube oil	Lube Oil	N	N	G	60	Blank	NA
A-1841	3 HDS	Hydrotreater	Lube oil GT	C	BP	1.00	Lube oil	Lube Oil	N	N	G	55	Blank	NA
A-1843	3 HDS	Hydrotreater	Lube oil GT	V	GT	1.00	Lube oil	Lube Oil	N	N	G	60	Blank	Y
A-1845	3 HDS	Hydrotreater	Lube oil GT	V	GT	2.00	Lube oil	Lube Oil	N	N	G	60	Blank	Y
A-1847	3 HDS	Hydrotreater	Lube oil GT	C	-	2.00	Lube oil	Lube Oil	N	N	G	85	Blank	NA
A-1849	3HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	90	Blank	Y
A-1851	3HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	95	Blank	Y
A-1853	3HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	75	Blank	Y
A-1855	3HDS	Hydrotreater	Lube oil Ex	C	-	2.00	Lube oil	Lube Oil	N	N	G	95	Blank	NA
A-1857	3 HDS	Hydrotreater	Lube oil Ex	V	Control Valve	2.00	Lube oil	Lube Oil	N	N	G	90	Blank	Y
A-1859	3 HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	90	Blank	N
A-1861	3 HDS	Hydrotreater	Lube oil Ex	C	-	8.00	Lube oil	Lube Oil	N	N	G	80	Blank	NA
A-1863	3 HDS	Hydrotreater	Lube oil Ex	C	-	2.00	Lube oil	Lube Oil	N	N	G	75	Blank	NA
A-1865	3 HDS	Hydrotreater	Lube oil Ex	C	Union	0.75	Lube oil	Lube Oil	N	N	G	60	Blank	NA
A-1867	3 HDS	Hydrotreater	Lube oil Ex	V	GT	1.00	Lube oil	Lube Oil	N	N	G	65	Blank	Y
A-1869	3HDS	Hydrotreater	Lube oil Ex	C	-	2.00	Lube oil	Lube Oil	N	N	G	95	Blank	NA
A-1871	3HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	120	Blank	Y
A-1873	3 HDS	Hydrotreater	Lube oil Ex	V	Needle	1.00	Lube oil	Lube Oil	N	N	G	130	Blank	Y
A-1875	3 HDS	Hydrotreater	Lube oil Ex	C	-	2.00	Lube oil	Lube Oil	N	N	G	120	Blank	NA
A-1877	3 HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	65	Blank	Y
A-1879	3 HDS	Hydrotreater	Lube oil Ex	V	GT	1.00	Lube oil	Lube Oil	N	N	G	65	Blank	Y
A-1881	3 HDS	Hydrotreater	Lube oil Ex	C	-	Blank	Lube oil	Lube Oil	N	N	G	120	Blank	NA
A-1883	3 HDS	Hydrotreater	Lube oil Ex	V	GT	3.00	Lube oil	Lube Oil	N	N	G	120	Blank	Y
A-1885	3 HDS	Hydrotreater	Lube oil Ex	C	-	3.00	Lube oil	Lube Oil	N	N	G	120	Blank	NA
A-1887	3 HDS	Hydrotreater	Lube oil Ex	V	GT	0.75	Lube oil	Lube Oil	N	N	G	120	Blank	Y
A-1889	3 HDS	Hydrotreater	Lube oil Ex	C	=	2.00	Lube oil	Lube Oil	N	N	G	95	Blank	NA
A-1891	3 HDS	Hydrotreater	Lube oil Ex	V	Needle	2.00	Lube oil	Lube Oil	N	N	G	80	Blank	Y
A-1893	3 HDS	Hydrotreater	Lube oil Ex	V	GT	0.75	Lube oil	Lube Oil	N	N	G	95	Blank	Y
A-1895	3 HDS	Hydrotreater	Lube oil Ex	C	-	2.00	Lube oil	Lube Oil	N	N	G	95	Blank	NA
A-1897	3 HDS	Hydrotreater	Lube oil Ex	V	Control	2.00	Lube oil	Lube Oil	N	N	G	100	Blank	Y
A-1899	3 HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	100	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1901	3 HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	95	Blank	Y
A-1903	3 HDS	Hydrotreater	Lube oil Ex	V	GT	2.00	Lube oil	Lube Oil	N	N	G	90	Blank	Y
A-1905	3 HDS	Hydrotreater	Lube oil Ex	V	Needle	2.00	Lube oil	Lube Oil	N	N	G	90	Blank	Y
A-1907	3 HDS	Hydrotreater	Lube oil Ex	C	GT	1.00	Lube oil	Lube Oil	N	N	G	95	Blank	NA
A-1909	3 HDS	Hydrotreater	Lube oil Ex	V	GT	1.00	Lube oil	Lube Oil	N	N	G	95	Blank	Y
A-1911	3 HDS	Hydrotreater	Lube oil Ex	V	GT	1.00	Lube oil	Lube Oil	N	N	G	60	Blank	Y
A-1913	3 HDS	Hydrotreater	Lube oil Ex	V	GT	1.00	Lube oil	Lube Oil	N	N	G	70	Blank	Y
A-1915	3 HDS	Hydrotreater	Lube oil Ex	C	-	1.00	Lube oil	Lube Oil	N	N	G	70	Blank	NA
A-1917	3 HDS	Hydrotreater	Lube oil Ex	V	GT	3.00	Lube oil	Lube Oil	N	N	G	75	Blank	Y
A-1919	3 HDS	Hydrotreater	Lube oil Ex	C	-	3.00	Lube oil	Lube Oil	N	N	G	65	Blank	NA
A-1921	3 HDS	Hydrotreater	Lube oil Ex	V	GT	1.00	Lube oil	Lube Oil	N	N	G	60	Blank	Y
A-1923	3 HDS	Hydrotreater	Lube oil Ex	C	-	1.00	Lube oil	Lube Oil	N	N	G	85	Blank	NA
A-1925	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	G	230	Blank	NA
A-1927	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	G	205	Blank	NA
A-1929	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	G	155	Blank	NA
A-1931	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	G	130	Blank	NA
A-1933	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	G	115	Blank	NA
A-1935	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	120	Blank	NA
A-1937	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	165	Blank	NA
A-1939	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	170	Blank	NA
A-1941	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	145	Blank	NA
A-1943	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	135	Blank	NA
A-1945	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	135	Blank	NA
A-1947	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	140	Blank	NA
A-1949	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	205	Blank	NA
A-1951	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	195	Blank	NA
A-1953	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	380	Blank	NA
A-1955	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	395	Blank	NA
A-1957	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	170	Blank	NA
A-1959	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	155	Blank	NA
A-1961	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	145	Blank	NA
A-1963	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	120	Blank	NA
A-1965	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	135	Blank	NA
A-1967	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	385	Blank	NA
A-1969	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	155	Blank	NA
A-1971	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	145	Blank	NA
A-1973	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	140	Blank	NA
A-1975	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	110	Blank	NA
A-1977	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	diesel	Diesel	N	N	P	385	Blank	NA
A-1979	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	125	Blank	NA
A-1981	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	160	Blank	NA
A-1983	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	200	Blank	NA
A-1985	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	120	Blank	NA
A-1987	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	220	Blank	NA
A-1989	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	125	Blank	NA
A-1991	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	140	Blank	NA
A-1993	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	145	Blank	NA
A-1995	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	142	Blank	NA
A-1997	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	250	Blank	NA
A-1999	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	135	Blank	NA
A-2001	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	220	Blank	NA
A-2003	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	130	Blank	NA
A-2005	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	213	Blank	NA
A-2007	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	122	Blank	NA
A-2009	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	140	Blank	NA
A-2011	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	110	Blank	NA
A-2013	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	120	Blank	NA
A-2015	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	125	Blank	NA
A-2017	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	145	Blank	NA
A-2019	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	133	Blank	NA
A-2021	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	155	Blank	NA
A-2023	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	310	Blank	NA
A-2025	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	163	Blank	NA
A-2027	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	290	Blank	NA
A-2029	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	155	Blank	NA
A-2031	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	170	Blank	NA
A-2033	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	135	Blank	NA
A-2035	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	160	Blank	NA
A-2037	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	320	Blank	NA
A-2039	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	165	Blank	NA
A-2041	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	300	Blank	NA
A-2043	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	220	Blank	NA
A-2045	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	105	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-2047	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	170	Blank	NA
A-2049	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	110	Blank	NA
A-2051	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	145	Blank	NA
A-2053	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	180	Blank	NA
A-2055	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	130	Blank	NA
A-2057	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	170	Blank	NA
A-2059	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	115	Blank	NA
A-2061	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	165	Blank	NA
A-2063	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	110	Blank	NA
A-2065	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	140	Blank	NA
A-2067	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	175	Blank	NA
A-2069	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	115	Blank	NA
A-2071	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	85	Blank	NA
A-2073	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	165	Blank	NA
A-2075	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	100	Blank	NA
A-2077	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	155	Blank	NA
A-2079	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	180	Blank	NA
A-2081	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	125	Blank	NA
A-2083	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	135	Blank	NA
A-2085	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	190	Blank	NA
A-2087	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	130	Blank	NA
A-2089	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	175	Blank	NA
A-2091	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	190	Blank	NA
A-2093	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	145	Blank	NA
A-2095	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	220	Blank	NA
A-2097	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	140	Blank	NA
A-2099	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	120	Blank	NA
A-2101	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	185	Blank	NA
A-2103	3 HDS	Hydrotreater	Fin fan	C	Bull plug	1.00	Hot gas oil	Gas Oil	N	N	P	Blank	Blank	NA
A-2105	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	160	Blank	NA
A-2107	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	330	Blank	NA
A-2109	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	180	Blank	NA
A-2111	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	170	Blank	NA
A-2113	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	142	Blank	NA
A-2115	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	170	Blank	NA
A-2117	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	155	Blank	NA
A-2119	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	305	Blank	NA
A-2121	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	200	Blank	NA
A-2123	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	175	Blank	NA
A-2125	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	155	Blank	NA
A-2127	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	270	Blank	NA
A-2129	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	150	Blank	NA
A-2131	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	300	Blank	NA
A-2133	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	185	Blank	NA
A-2135	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	165	Blank	NA
A-2137	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	140	Blank	NA
A-2139	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	290	Blank	NA
A-2141	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	175	Blank	NA
A-2143	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	270	Blank	NA
A-2145	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	185	Blank	NA
A-2147	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	165	Blank	NA
A-2149	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	130	Blank	NA
A-2151	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	305	Blank	NA
A-2153	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	190	Blank	NA
A-2155	3HDS	Hydrotreater	Fin fan	C	Bull plug	2.00	Frac btms	Other	N	N	P	165	Blank	NA
A-2	FCC	Catalytic Cracking	fractionator	C	n/a	10.00	LGO	Light Gas Oil	N	N	T	Blank	Blank	NA
A-4	FCC	Catalytic Cracking	fractionator	V	GT	1.00	LGO	Light Gas Oil	N	N	T	Blank	Blank	Y
A-6	FCC	Catalytic Cracking	fractionator	V	GT	2.00	DT	Decant Oil	N	N	T	Blank	Blank	Y
A-8	FCC	Catalytic Cracking	fractionator	V	GT	2.00	DT	Decant Oil	N	N	T	Blank	Blank	Y
A-10	FCC	Catalytic Cracking	fractionator	C	n/a	32.00	DT	Decant Oil	N	N	T	Blank	Blank	NA
A-12	FCC	Catalytic Cracking	fractionator	V	GL	10.00	HGO	Gas Oil	N	N	T	Blank	Blank	Y
A-14	FCC	Catalytic Cracking	fractionator	C	n/a	12.00	LGO	Light Gas Oil	N	N	T	Blank	Blank	NA
A-16	FCC	Catalytic Cracking	fractionator	V	GL	12.00	LGO	Light Gas Oil	N	N	T	Blank	Blank	Y
A-18	FCC	Catalytic Cracking		C		10.00	RGO	Recycled Gas Oil	N	N	P	390	Blank	NA
A-20	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	P	390	Blank	Y
A-22	FCC	Catalytic Cracking		V	GT	10.00	RGO	Recycled Gas Oil	N	N	P	390	Blank	Y
A-24	FCC	Catalytic Cracking		C		10.00	RGO	Recycled Gas Oil	N	N	P	390	Blank	NA
A-26	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	P	390	Blank	Y
A-28	FCC	Catalytic Cracking		V	GT	10.00	RGO	Recycled Gas Oil	N	N	P	390	Blank	Y
A-30	FCC	Catalytic Cracking		V	GT	10.00	RGO	Recycled Gas Oil	N	N	G	300	Blank	Y
A-32	FCC	Catalytic Cracking		V	GT	10.00	RGO	Recycled Gas Oil	N	N	G	375	Blank	Y
A-34	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	375	Blank	Y
A-36	FCC	Catalytic Cracking		C		1.00	RGO	Recycled Gas Oil	N	N	G	375	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-38	FCC	Catalytic Cracking		C		1.00	RGO	Recycled Gas Oil	N	N	G	375	Blank	NA
A-40	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	375	Blank	Y
A-42	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	375	Blank	Y
A-44	FCC	Catalytic Cracking		V	GT	10.00	RGO	Recycled Gas Oil	N	N	G	300	Blank	Y
A-46	FCC	Catalytic Cracking	Pumps	V	GT	12.00	RGO	Recycled Gas Oil	N	N	G	300	Blank	Y
A-48	FCC	Catalytic Cracking	Pumps	V	GT	12.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-50	FCC	Catalytic Cracking	Pumps	V	Control	15.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-52	FCC	Catalytic Cracking	Pumps	V	GT	15.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-54	FCC	Catalytic Cracking	Pumps	V	GT	15.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-56	FCC	Catalytic Cracking	Pumps	V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-58	FCC	Catalytic Cracking	Pumps	C	Union	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	NA
A-60	FCC	Catalytic Cracking	Pumps	C	Elbow	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	NA
A-62	FCC	Catalytic Cracking	Pumps	C	Plug	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	NA
A-64	FCC	Catalytic Cracking	Pumps	V	GT	6.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-66	FCC	Catalytic Cracking	Pumps	C	-	6.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	NA
A-68	FCC	Catalytic Cracking	Pumps	C	-	6.00	RGO	Recycled Gas Oil	N	N	G	400	Blank	NA
A-70	FCC	Catalytic Cracking	Pumps	V	GT	6.00	RGO	Recycled Gas Oil	N	N	G	Blank	70	Y
A-72	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	70	Y
A-74	FCC	Catalytic Cracking		C	Union	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	70	NA
A-76	FCC	Catalytic Cracking		C	Elbow	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	70	NA
A-78	FCC	Catalytic Cracking		C	Plug	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	70	NA
A-80	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	70	Y
A-82	FCC	Catalytic Cracking		C	Elbow	1.00	RGO	Recycled Gas Oil	N	N	G	150	70	NA
A-84	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	138	70	Y
A-86	FCC	Catalytic Cracking		C	Elbow	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	70	NA
A-88	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-90	FCC	Catalytic Cracking		V	GT	10.00	RGO	Recycled Gas Oil	N	N	G	245	Blank	Y
A-92	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	N
A-94	FCC	Catalytic Cracking		C	-	0.75	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	NA
A-96	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	Y
A-98	FCC	Catalytic Cracking		C	Union	1.00	RGO	Recycled Gas Oil	N	N	G	Blank	Blank	NA
A-100	FCC	Catalytic Cracking		V	GT	10.00	RGO	Recycled Gas Oil	N	N	G	490	Blank	Y
A-102	FCC	Catalytic Cracking		C	GT	8.00	Blank	Unknown	N	N	P	390	Blank	NA
A-104	FCC	Catalytic Cracking		V	GT	1.00	Blank	Unknown	N	N	P	390	Blank	Y
A-106	FCC	Catalytic Cracking		V	GT	8.00	Blank	Unknown	N	N	P	390	Blank	Y
A-108	FCC	Catalytic Cracking		C	-	8.00	Blank	Unknown	N	N	P	Blank	Blank	NA
A-110	FCC	Catalytic Cracking	Reactor feed riser	V	GT	4.00	GO	Gas Oil	L	N	P	400	58	N
A-112	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.00	GO	Gas Oil	L	N	P	400	58	N
A-114	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.00	GO	Gas Oil	L	N	P	400	58	Y
A-116	FCC	Catalytic Cracking	Reactor feed riser	C	Tee	1.00	GO	Gas Oil	L	N	P	400	58	NA
A-118	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.00	GO	Gas Oil	L	N	P	400	58	Y
A-120	FCC	Catalytic Cracking	Reactor feed riser	C	Plug	1.00	GO	Gas Oil	L	N	P	400	58	NA
A-122	FCC	Catalytic Cracking	Reactor feed riser	V	GT	4.00	GO	Gas Oil	L	N	P	460	50	Y
A-124	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.75	GO	Gas Oil	L	N	P	460	50	Y
A-126	FCC	Catalytic Cracking	Reactor feed riser	C	-	5.00	GO	Gas Oil	L	N	P	460	50	NA
A-128	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.50	GO	Gas Oil	L	N	P	460	50	Y
A-130	FCC	Catalytic Cracking	Reactor feed riser	C	Tee	1.00	GO	Gas Oil	L	N	P	460	50	NA
A-132	FCC	Catalytic Cracking	Reactor feed riser	C	Union	1.00	GO	Gas Oil	L	N	P	460	50	NA
A-134	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.00	GO	Gas Oil	L	N	P	460	50	Y
A-136	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.50	GO	Gas Oil	L	N	P	400	42	Y
A-138	FCC	Catalytic Cracking	Reactor feed riser	V	GT	4.00	GO	Gas Oil	L	N	P	400	42	Y
A-140	FCC	Catalytic Cracking	Reactor feed riser	C	Tee	1.50	GO	Gas Oil	L	N	P	400	42	NA
A-142	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.00	GO	Gas Oil	L	N	P	400	42	Y
A-144	FCC	Catalytic Cracking	Reactor feed riser	V	GT	1.00	GO	Gas Oil	L	N	P	400	70	Y
A-146	FCC	Catalytic Cracking	-	V	GT	8.00	Slurry	Slurry	N	N	G	325	Blank	Y
A-148	FCC	Catalytic Cracking	-	C	-	8.00	Slurry	Slurry	N	N	G	Blank	Blank	NA
A-150	FCC	Catalytic Cracking	-	V	GT	1.00	Slurry	Slurry	N	N	G	Blank	Blank	Y
A-152	FCC	Catalytic Cracking	-	C	-	8.00	Slurry	Slurry	N	N	G	Blank	Blank	NA
A-154	FCC	Catalytic Cracking	-	V	GT	8.00	Slurry	Slurry	N	N	G	Blank	Blank	Y
A-156	FCC	Catalytic Cracking	-	V	Control	6.00	Slurry	Slurry	N	N	G	Blank	Blank	Y
A-158	FCC	Catalytic Cracking	-	V	GT	1.00	Slurry	Slurry	N	N	G	Blank	Blank	Y
A-160	FCC	Catalytic Cracking	-	V	GT	2.00	Fresh feed	Gas Oil	N	N	G	Blank	Blank	Y
A-162	FCC	Catalytic Cracking	-	V	GT	8.00	Fresh feed	Gas Oil	N	N	G	Blank	Blank	Y
A-164	FCC	Catalytic Cracking	-	V	GT	8.00	Fresh feed	Gas Oil	N	N	G	Blank	Blank	Y
A-166	FCC	Catalytic Cracking	-	C	-	2.00	Fresh feed	Gas Oil	N	N	G	200	Blank	NA
A-168	FCC	Catalytic Cracking	-	V	GT	8.00	Fresh feed	Gas Oil	N	N	G	Blank	Blank	Y
A-170	FCC	Catalytic Cracking	-	V	GT	1.00	Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-172	FCC	Catalytic Cracking	-	V	GT	1.00	Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-174	FCC	Catalytic Cracking	-	V	-	1.00	Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-176	FCC	Catalytic Cracking	-	V	Gate	1.00	Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-178	FCC	Catalytic Cracking	-	V	Gate	1.00	Feed	Gas Oil	N	N	G	500-600	Blank	Y
A-180	FCC	Catalytic Cracking	-	C	Gate	1.00	Feed	Gas Oil	N	N	G	Blank	Blank	NA
A-182	FCC	Catalytic Cracking	-	V	Gate	1.00	#2 Slurry	Slurry	N	N	G	Blank	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-184	FCC	Catalytic Cracking	-	V	Gate	12.00	Slurry	Slurry	N	N	G	Blank	Blank	Y
A-186	FCC	Catalytic Cracking	-	V	Gate	1.50	Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-190	FCC	Catalytic Cracking	-	V	Gate	1.00	Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-192	FCC	Catalytic Cracking	-	V	Gate	10.00	Feed	Gas Oil	N	N	G	Blank	Blank	Y
A-194	FCC	Catalytic Cracking	-	V	Gate	1.00	Fresh feed	Gas Oil	N	N	G	Blank	Blank	Y
A-196	FCC	Catalytic Cracking	-	V	Gate	8.00	Fresh feed	Gas Oil	N	N	G	Blank	Blank	Y
A-198	FCC	Catalytic Cracking	-	V	Gate	10.00	#2 FF	Other	N	N	G	Blank	Blank	Y
A-200	FCC	Catalytic Cracking	-	V	Control	10.00	FF	Gas Oil	N	N	G	Blank	Blank	Y
A-202	FCC	Catalytic Cracking	-	V	Gate	1.50	#2 FF	Other	N	N	G	Blank	Blank	Y
A-204	FCC	Catalytic Cracking	-	V	Gate	10.00	FF	Gas Oil	H	Blank	Blank	Blank	Blank	Y
A-206	FCC	Catalytic Cracking		C	Bolted Flange	1.50	FT	Other	N	N	G	Blank	Blank	NA
A-208	FCC	Catalytic Cracking		V	Gate	1.50	FF	Gas Oil	N	N	O	Blank	Blank	Y
A-210	FCC	Catalytic Cracking		V	Gate	1.50	FF	Gas Oil	N	N	P	Blank	Blank	Y
A-212	FCC	Catalytic Cracking		C	Bolted Flange	1.50	FF	Gas Oil	N	N	P	Blank	Blank	NA
A-214	FCC	Catalytic Cracking		V	Gate	1.50	FF	Gas Oil	N	N	P	Blank	Blank	Y
A-216	FCC	Catalytic Cracking		V	Gate	10.00	FF	Gas Oil	N	N	P	Blank	Blank	Y
A-218	FCC	Catalytic Cracking		C		36.00	Slurry	Slurry	N	N	P	Blank	Blank	NA
A-220	FCC	Catalytic Cracking		V	Gate	10.00	FF	Gas Oil	N	N	P	Blank	Blank	Y
A-222	FCC	Catalytic Cracking		V	Control	Blank	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-224	FCC	Catalytic Cracking		C	-	1.50	Slurry	Slurry	N	N	P	Blank	Blank	NA
A-226	FCC	Catalytic Cracking		C	Bolted Flange	6.00	Slurry	Slurry	N	N	P	Blank	Blank	NA
A-228	FCC	Catalytic Cracking		V	Gate	10.00	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-230	FCC	Catalytic Cracking		V	GT	10.00	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-230	FCC	Catalytic Cracking		V	GT	10.00	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-232	FCC	Catalytic Cracking		C	Threaded	0.75	Slurry	Slurry	N	N	P	580	Blank	NA
A-234	FCC	Catalytic Cracking		V	GT	1.50	Slurry	Slurry	N	N	P	580	Blank	Y
A-236	FCC	Catalytic Cracking		C	-	1	Slurry	Slurry	N	N	P	Blank	Blank	NA
A-238	FCC	Catalytic Cracking		V	GT	1.50	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-240	FCC	Catalytic Cracking		C	Threaded	1.50	Slurry	Slurry	N	N	P	Blank	150	NA
A-242	FCC	Catalytic Cracking		C	Threaded	1.50	Slurry	Slurry	N	N	P	Blank	50	NA
A-244	FCC	Catalytic Cracking		C	Threaded	1	Slurry	Slurry	N	N	P	Blank	50	NA
A-246	FCC	Catalytic Cracking		V	GT	1.50	Slurry	Slurry	N	N	P	Blank	50	Y
A-250	FCC	Catalytic Cracking		V	GT	1.50	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-252	FCC	Catalytic Cracking		V	GT	10	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-254	FCC	Catalytic Cracking		V	GT	10	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-256	FCC	Catalytic Cracking		V	GT	1.50	Slurry	Slurry	N	N	P	Blank	Blank	Y
A-258	FCC	Catalytic Cracking		V	Check	1.50	#1 Slurry	Slurry	N	N	P	Blank	150	Y
A-260	FCC	Catalytic Cracking		V	GT	1.50	#1 Slurry	Slurry	N	N	P	Blank	150	Y
A-262	FCC	Catalytic Cracking		C	Pipe Union	1.00	#1 Slurry	Slurry	N	N	P	Blank	Blank	NA
A-264	FCC	Catalytic Cracking		V	GT	10.00	#1 Slurry	Slurry	N	N	P	Blank	Blank	Y
A-266	FCC	Catalytic Cracking		C	Threaded	1.50	#1 Slurry	Slurry	N	N	P	Blank	Blank	NA
A-268	FCC	Catalytic Cracking		V	GT	1.50	#1 Slurry	Slurry	N	N	P	250	Blank	Y
A-270	FCC	Catalytic Cracking		C	Flange	10.00	#1 Slurry	Slurry	N	N	P	370	Blank	NA
A-272	FCC	Catalytic Cracking		V	GT	12.00	#1 Slurry	Slurry	N	N	P	Blank	Blank	Y
A-274	FCC	Catalytic Cracking		V	Gate	10.00	#1 Slurry	Slurry	N	N	P	Blank	Blank	Y
A-276	FCC	Catalytic Cracking		C	Union	1.00	#1 Slurry	Slurry	N	N	P	Blank	Blank	NA
A-278	FCC	Catalytic Cracking		V	Gate	10.00	#1 Slurry	Slurry	N	N	P	Blank	Blank	Y
A-280	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	Blank	Blank	P	Blank	Blank	Y
A-282	FCC	Catalytic Cracking		C	Coupler	1.25	Blank	Unknown	Blank	Blank	P	Blank	Blank	NA
A-284	FCC	Catalytic Cracking		C	Bolted Flange	1.25	Blank	Unknown	Blank	Blank	P	Blank	Blank	NA
A-286	FCC	Catalytic Cracking		V	Gate	8	Blank	Unknown	Blank	Blank	P	Blank	Blank	Y
A-288	FCC	Catalytic Cracking		V	Gate Stem	6	Blank	Unknown	Blank	Blank	P	530	Blank	Y
A-290	FCC	Catalytic Cracking		C	Bolted	6	Blank	Unknown	Blank	Blank	P	530	Blank	NA
A-292	FCC	Catalytic Cracking		V	Gate	1.50	Blank	Unknown	Blank	Blank	P	160	Blank	Y
A-294	FCC	Catalytic Cracking		C	Bolted	1.25	Blank	Unknown	Blank	Blank	P	Blank	Blank	NA
A-296	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	Blank	Blank	P	Blank	Blank	Y
A-298	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	Blank	Blank	P	Blank	Blank	Y
A-300	FCC	Catalytic Cracking		C	Bolted Connector	36	Blank	Unknown	Blank	Blank	P	378	Blank	NA
A-302	FCC	Catalytic Cracking		V	Gate	2	Blank	Unknown	Blank	Blank	P	61	Blank	Y
A-304	FCC	Catalytic Cracking		C	Bolted Flange	2	Blank	Unknown	Blank	Blank	P	61	Blank	NA
A-306	FCC	Catalytic Cracking		V	Gate	1.50	Blank	Unknown	Blank	Blank	P	62	Blank	Y
A-308	FCC	Catalytic Cracking		V	Gate	1	Blank	Unknown	Blank	Blank	P	62	Blank	Y
A-310	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	N	N	P	62	Blank	Y
A-312	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	N	N	P	69	Blank	Y
A-314	FCC	Catalytic Cracking		C	Bolted	1.25	Blank	Unknown	N	N	P	69	Blank	NA
A-316	FCC	Catalytic Cracking		C	Bolted	1.25	Blank	Unknown	N	N	P	71	Blank	NA
A-318	FCC	Catalytic Cracking		V	Control	1.25	Blank	Unknown	N	N	P	125	Blank	Y
A-320	FCC	Catalytic Cracking		V	Gate	1.50	Blank	Unknown	N	N	P	180	Blank	Y
A-322	FCC	Catalytic Cracking		C	Bolted	1.50	Blank	Unknown	N	N	P	180	Blank	NA
A-324	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	N	N	P	67	Blank	Y
A-326	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	N	N	P	77	Blank	Y
A-328	FCC	Catalytic Cracking		C	Bolted	1.25	Blank	Unknown	N	N	P	68	Blank	NA
A-330	FCC	Catalytic Cracking		V	Gate	1.25	Blank	Unknown	N	N	P	146	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-332	FCC	Catalytic Cracking		C	Bolted Flange	4	Blank	Unknown	N	N	P	274	Blank	NA
A-334	FCC	Catalytic Cracking		V	Gate	8	3HDS	Other	N	Blank	G	371	Blank	Y
A-336	FCC	Catalytic Cracking		C	Bolted	8	3HDS	Other	N	Blank	G	332	Blank	NA
A-338	FCC	Catalytic Cracking		V	Butterfly control	8	3HDS	Other	N	Blank	G	386	Blank	Y
A-340	FCC	Catalytic Cracking		C	Bolted	8	3HDS	Other	N	Blank	G	386	Blank	NA
A-342	FCC	Catalytic Cracking		V	Gate	1.25	3HDS	Other	N	Blank	G	386	Blank	Y
A-344	FCC	Catalytic Cracking		V	Bolted	2.50	3HDS	Other	N	Blank	G	145	Blank	Y
A-346	FCC	Catalytic Cracking		C	Gate	8	3HDS	Other	N	Blank	G	369	Blank	NA
A-348	FCC	Catalytic Cracking		V	Bolted	8	3HDS	Other	N	Blank	G	306	Blank	Y
A-350	FCC	Catalytic Cracking		C	Bolted	8	?	Unknown	N	Blank	G	65	Blank	NA
A-352	FCC	Catalytic Cracking		C	Bolted	8	?	Unknown	N	Blank	G	65	Blank	NA
A-354	FCC	Catalytic Cracking		V	Gate	8	3HDS	Other	N	Blank	G	220	Blank	Y
A-356	FCC	Catalytic Cracking		V	Control	8.00	Blank	Unknown	N	Blank	G	60	Blank	Y
A-358	FCC	Catalytic Cracking		V	GT	2.50	Blank	Unknown	N	Blank	G	60	Blank	Y
A-360	FCC	Catalytic Cracking		V	GT	8.00	Blank	Unknown	N	Blank	G	60	Blank	Y
A-362	FCC	Catalytic Cracking		C	-	8.00	Blank	Unknown	N	Blank	G	60	Blank	NA
A-364	FCC	Catalytic Cracking		V	GT	8.00	Blank	Unknown	N	Blank	G	60	Blank	Y
A-366	FCC	Catalytic Cracking		V	GT	1.25	Blank	Unknown	N	Blank	G	60	Blank	Y
A-368	FCC	Catalytic Cracking		V	GT	8.00	Blank	Unknown	N	Blank	G	60	Blank	Y
A-370	FCC	Catalytic Cracking		V	GT	4.00	Blank	Unknown	N	Blank	G	110	Blank	Y
A-372	FCC	Catalytic Cracking		V	GT	10.00	Blank	Unknown	N	Blank	G	300	Blank	Y
A-374	FCC	Catalytic Cracking		C	-	8.00	Blank	Unknown	N	Blank	G	160	Blank	NA
A-376	FCC	Catalytic Cracking		V	GT	8.00	Blank	Unknown	N	Blank	G	185	Blank	Y
A-378	FCC	Catalytic Cracking		C	-	8.00	Blank	Unknown	N	Blank	G	280	Blank	NA
A-380	FCC	Catalytic Cracking		V	GT	8.00	Blank	Unknown	N	Blank	G	280	Blank	Y
A-382	FCC	Catalytic Cracking		V	Gt	1.00	Blank	Unknown	N	Blank	G	130	Blank	Y
A-384	FCC	Catalytic Cracking		C	Coupling	0.75	Blank	Unknown	N	Blank	G	90	Blank	NA
A-386	FCC	Catalytic Cracking		C	Bolted	8	Blank	Unknown	N	Blank	P	330	Blank	NA
A-388	FCC	Catalytic Cracking		C	Bolted	2.50	Blank	Unknown	N	Blank	P	190	Blank	NA
A-390	FCC	Catalytic Cracking		V	GT	8	Blank	Unknown	N	Blank	P	100	Blank	Y
A-392	FCC	Catalytic Cracking		V	GT	1	Blank	Unknown	N	Blank	P	85	Blank	Y
A-394	FCC	Catalytic Cracking		V	GT	2	Gas oil	Gas Oil	N	Blank	P	Blank	Blank	Y
A-396	FCC	Catalytic Cracking		V	GT	2	Gas oil	Gas Oil	N	Blank	P	78	Blank	Y
A-398	FCC	Catalytic Cracking		C	Bolted Coupling	4	Gas oil	Gas Oil	N	Blank	P	200	Blank	NA
A-400	FCC	Catalytic Cracking		C	-	4	Gas oil	Gas Oil	N	Blank	T	185	Blank	NA
A-402	FCC	Catalytic Cracking		V	GT	4	Gas oil	Gas Oil	N	Blank	T	Blank	Blank	Y
A-404	FCC	Catalytic Cracking		C	-	8	Gas oil	Gas Oil	N	Blank	G	115	Blank	NA
A-406	FCC	Catalytic Cracking		V	Control	6	Gas oil	Gas Oil	N	Blank	G	115	Blank	Y
A-408	FCC	Catalytic Cracking		V	Gt	1.50	Gas oil	Gas Oil	N	Blank	G	115	Blank	Y
A-410	FCC	Catalytic Cracking		C	Swage Fitting	0.50	Gas oil	Gas Oil	N	Blank	G	85	Blank	NA
A-412	FCC	Catalytic Cracking		V	GT	6	Gas oil	Gas Oil	N	Blank	G	Blank	Blank	Y
A-414	FCC	Catalytic Cracking		V	GT	8	Gas oil	Gas Oil	N	Blank	G	Blank	Blank	Y
A-416	FCC	Catalytic Cracking		V	GT	1.25	Decant oil/Slurry	Decant Oil	N	Blank	G	105	Blank	Y
A-418	FCC	Catalytic Cracking		V	GT	6.00	Decant oil/Slurry	Decant Oil	N	Blank	G	300	Blank	Y
A-420	FCC	Catalytic Cracking		V	GT	6.00	Decant oil/Slurry	Decant Oil	N	Blank	G	400	Blank	Y
A-422	FCC	Catalytic Cracking		V	GT	4.00	Decant oil/Slurry	Decant Oil	N	Blank	G	330	Blank	Y
A-424	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	Blank	G	Blank	140	Y
A-426	FCC	Catalytic Cracking		V	GT	6.00	Decant oil/Slurry	Decant Oil	N	Blank	G	300	Blank	Y
A-428	FCC	Catalytic Cracking	-	V	GT	10.00	LGO	Light Gas Oil	N	N	G	365	Blank	Y
A-430	FCC	Catalytic Cracking	-	C	-	10.00	LGO	Light Gas Oil	N	N	G	365	Blank	NA
A-432	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	365	Blank	Y
A-434	FCC	Catalytic Cracking	-	C	Union	1.00	LGO	Light Gas Oil	N	N	G	365	Blank	NA
A-436	FCC	Catalytic Cracking	-	C	-	8.00	LGO	Light Gas Oil	N	N	G	365	Blank	NA
A-438	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	200	120	Y
A-440	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	200	120	Y
A-442	FCC	Catalytic Cracking	-	C	-	8.00	LGO	Light Gas Oil	N	N	G	350	120	NA
A-444	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	200	120	Y
A-446	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	225	120	Y
A-448	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	295	120	Y
A-450	FCC	Catalytic Cracking	-	C	-	1.00	LGO	Light Gas Oil	N	N	G	295	120	NA
A-452	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	95	Blank	Y
A-454	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	260	120	Y
A-456	FCC	Catalytic Cracking	-	V	GT	10.00	LGO	Light Gas Oil	N	N	G	280	Blank	Y
A-458	FCC	Catalytic Cracking	-	C	-	8.00	LGO	Light Gas Oil	N	N	G	300	Blank	NA
A-460	FCC	Catalytic Cracking	-	V	GT	8.00	LGO	Light Gas Oil	N	N	G	250	Blank	Y
A-462	FCC	Catalytic Cracking	-	C	-	8.00	LGO	Light Gas Oil	N	N	G	250	Blank	NA
A-464	FCC	Catalytic Cracking	-	V	GT	4.00	LGO	Light Gas Oil	N	N	G	310	Blank	Y
A-466	FCC	Catalytic Cracking	-	C	-	4.00	LGO	Light Gas Oil	N	N	G	310	Blank	NA
A-468	FCC	Catalytic Cracking	-	V	Control	4.00	LGO	Light Gas Oil	N	N	G	315	Blank	Y
A-470	FCC	Catalytic Cracking	-	V	GT	4.00	LGO	Light Gas Oil	N	N	G	310	Blank	Y
A-472	FCC	Catalytic Cracking	-	C	-	8.00	LGO	Light Gas Oil	N	N	G	330	48	NA
A-474	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	360	48	Y
A-476	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	L	N	G	345	48	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-478	FCC	Catalytic Cracking	-	C	PH	18.00	LGO	Light Gas Oil	N	N	G	335	Blank	NA
A-480	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	L	N	G	230	Blank	N
A-482	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	L	N	G	300	48	Y
A-484	FCC	Catalytic Cracking	-	C	-	1.00	LGO	Light Gas Oil	L	N	G	300	Blank	NA
A-486	FCC	Catalytic Cracking	-	C	BP	1.00	LGO	Light Gas Oil	L	N	G	305	50	NA
A-488	FCC	Catalytic Cracking	-	V	GT	10.00	LGO	Light Gas Oil	L	N	G	335	Blank	Y
A-490	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	L	N	G	330	Blank	Y
A-492	FCC	Catalytic Cracking	-	C	-	10.00	LGO	Light Gas Oil	L	N	G	335	Blank	NA
A-494	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	320	Blank	Y
A-496	FCC	Catalytic Cracking	-	C	BP	1.00	LGO	Light Gas Oil	L	N	G	330	Blank	N
A-498	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	330	Blank	Y
A-500	FCC	Catalytic Cracking	-	C	-	8.00	LGO	Light Gas Oil	N	N	G	290	Blank	NA
A-502	FCC	Catalytic Cracking	-	C	Fitting	0.75	LGO	Light Gas Oil	N	N	G	103	Blank	NA
A-504	FCC	Catalytic Cracking	-	C	Fitting	0.75	LGO	Light Gas Oil	N	N	G	67	Blank	NA
A-506	FCC	Catalytic Cracking	-	V	Needle	0.50	LGO	Light Gas Oil	N	N	G	Blank	Blank	Y
A-508	FCC	Catalytic Cracking	-	V	Needle	0.50	LGO	Light Gas Oil	N	N	G	Blank	Blank	Y
A-510	FCC	Catalytic Cracking	-	V	GT	1.50	Spillback to frac.	Diesel	N	N	G	220	45	Y
A-512	FCC	Catalytic Cracking	-	C	Elbow	1	Spillback to frac.	Diesel	N	N	G	180	45	NA
A-514	FCC	Catalytic Cracking	-	C	Threaded	1	Spillback to frac.	Diesel	N	N	G	130	45	NA
A-516	FCC	Catalytic Cracking	-	V	GT	6	Spillback to frac.	Diesel	N	N	G	360	45	Y
A-518	FCC	Catalytic Cracking	-	C	-	6	Spillback to frac.	Diesel	N	N	G	420	45	NA
A-520	FCC	Catalytic Cracking	-	V	GT	6	Fresh feed	Gas Oil	N	N	G	390	118	Y
A-522	FCC	Catalytic Cracking	-	C	-	6.00	Fresh feed	Gas Oil	N	N	P	Blank	118	NA
A-524	FCC	Catalytic Cracking	-	V	GT	1.00	Fresh feed	Gas Oil	N	N	P	Blank	118	Y
A-526	FCC	Catalytic Cracking	-	V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	375	43	Y
A-528	FCC	Catalytic Cracking	-	C	BP*	1.00	RGO	Recycled Gas Oil	N	N	G	375	43	NA
A-530	FCC	Catalytic Cracking	-	C	-	6.00	RGO	Recycled Gas Oil	N	N	G	475	43	NA
A-532	FCC	Catalytic Cracking	-	V	GT	6.00	RGO	Recycled Gas Oil	N	N	G	470	43	Y
A-534	FCC	Catalytic Cracking	-	V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	430	43	Y
A-536	FCC	Catalytic Cracking	-	C	U*	1.00	RGO	Recycled Gas Oil	N	N	G	430	43	NA
A-538	FCC	Catalytic Cracking	-	V	GT	6.00	RGO	Recycled Gas Oil	N	N	G	130	40	Y
A-540	FCC	Catalytic Cracking	-	C	-	6.00	RGO	Recycled Gas Oil	N	N	G	78	Blank	NA
A-542	FCC	Catalytic Cracking	-	C	U	1.00	RGO	Recycled Gas Oil	N	N	G	71	Blank	NA
A-544	FCC	Catalytic Cracking	-	V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	71	Blank	Y
A-546	FCC	Catalytic Cracking	-	V	GT	6.00	RGO	Recycled Gas Oil	N	N	G	73	40	Y
A-548	FCC	Catalytic Cracking	-	C	-	6.00	RGO	Recycled Gas Oil	N	N	G	75	40	NA
A-550	FCC	Catalytic Cracking	-	V	GT	1.00	RGO	Recycled Gas Oil	N	N	O	81	Blank	Y
A-552	FCC	Catalytic Cracking	-	C	BP	1.00	RGO	Recycled Gas Oil	N	N	O	81	Blank	NA
A-554	FCC	Catalytic Cracking		V	GT	4.00	RGO	Recycled Gas Oil	N	Blank	O	72	Blank	Y
A-556	FCC	Catalytic Cracking		C	GT	4.00	RGO	Recycled Gas Oil	N	Blank	O	72	Blank	NA
A-558	FCC	Catalytic Cracking		C	-	4.00	RGO	Recycled Gas Oil	N	Blank	O	100	Blank	NA
A-560	FCC	Catalytic Cracking		V	-	4.00	RGO	Recycled Gas Oil	N	Blank	O	100	Blank	Y
A-562	FCC	Catalytic Cracking		V	GT	4.00	RGO	Recycled Gas Oil	N	Blank	O	100	Blank	Y
A-564	FCC	Catalytic Cracking		C	-	4.00	RGO	Recycled Gas Oil	N	Blank	O	110	Blank	NA
A-568	FCC	Catalytic Cracking		V	GT	4.00	RGO	Recycled Gas Oil	N	Blank	O	110	Blank	Y
A-570	FCC	Catalytic Cracking		C	-	6.00	RGO	Recycled Gas Oil	N	Blank	G	125	Blank	NA
A-572	FCC	Catalytic Cracking		V	GT	6.00	RGO	Recycled Gas Oil	N	Blank	G	85	Blank	Y
A-574	FCC	Catalytic Cracking		V	GT	1.00	RGO	Recycled Gas Oil	N	Blank	G	85	Blank	N
A-576	FCC	Catalytic Cracking		C	BP*	1.00	RGO	Recycled Gas Oil	N	Blank	G	85	Blank	NA
A-578	FCC	Catalytic Cracking		V	GT	6.00	RGO	Recycled Gas Oil	N	Blank	G	455	Blank	Y
A-580	FCC	Catalytic Cracking		C	-	6.00	RGO	Recycled Gas Oil	N	Blank	G	455	Blank	NA
A-582	FCC	Catalytic Cracking		V	GT	6.00	RGO	Recycled Gas Oil	N	Blank	G	455	Blank	Y
A-584	FCC	Catalytic Cracking	-	V	GT	1.00	RGO	Recycled Gas Oil	N	N	G	100	Blank	Y
A-586	FCC	Catalytic Cracking	-	V	GT	4.00	RGO	Recycled Gas Oil	N	N	O	370	Blank	Y
A-588	FCC	Catalytic Cracking	-	C	-	2.50	RGO	Recycled Gas Oil	N	N	G	370	Blank	NA
A-590	FCC	Catalytic Cracking	-	C	-	4.00	LGO	Light Gas Oil	N	N	G	245	Blank	NA
A-592	FCC	Catalytic Cracking	-	V	GT	4.00	LGO	Light Gas Oil	N	N	G	245	Blank	Y
A-594	FCC	Catalytic Cracking	-	V	GT	4.00	LGO	Light Gas Oil	N	N	G	250	Blank	Y
A-596	FCC	Catalytic Cracking	-	C	-	4.00	LGO	Light Gas Oil	N	N	G	250	Blank	N
A-598	FCC	Catalytic Cracking	-	V	GT	1.00	LGO	Light Gas Oil	N	N	G	180	Blank	Y
A-600	FCC	Catalytic Cracking	-	V	GT	4.00	LGO	Light Gas Oil	N	N	G	246	Blank	Y
A-602	FCC	Catalytic Cracking	-	C	-	4.00	LGO	Light Gas Oil	N	N	O	235	Blank	NA
A-604	FCC	Catalytic Cracking	-	V	GT	4.00	LGO	Light Gas Oil	N	N	O	235	Blank	Y
A-606	FCC	Catalytic Cracking	-	V	GT	6.00	FF*	Gas Oil	N	N	P	404	120	N
A-608	FCC	Catalytic Cracking	-	V	GT	6.00	FF	Gas Oil	N	N	P	395	280	Y
A-610	FCC	Catalytic Cracking	-	C	-	6.00	FF	Gas Oil	N	N	P	395	280	NA
A-612	FCC	Catalytic Cracking	-	V	GT	1.00	FF	Gas Oil	L	N	P	395	280	Y
A-614	FCC	Catalytic Cracking	-	C	Union	0.75	FF	Gas Oil	L	N	P	395	280	NA
A-616	FCC	Catalytic Cracking	-	V	GT	4.00	FF	Gas Oil	L	N	P	335	Blank	Y
A-618	FCC	Catalytic Cracking	-	C	-	3.00	Decant oil	Decant Oil	L	N	P	85	Blank	NA
A-620	FCC	Catalytic Cracking	-	V	GT	4.00	Decant oil	Decant Oil	H	N	P	450	Blank	Y
A-622	FCC	Catalytic Cracking	-	V	GT	6.00	Decant oil	Decant Oil	H	N	P	450	Blank	Y
A-624	50 Crude	Crude Unit		C	-	10.00	Resid	Resid	L	N	G	640	Blank	NA

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A-626	50 Crude	Crude Unit		V	GT	10.00	Resid	Resid	L	N	G	640	Blank	Y
A-628	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	640	Blank	Y
A-630	50 Crude	Crude Unit		C	Threaded	1.00	Resid	Resid	L	N	G	640	Blank	NA
A-632	50 Crude	Crude Unit		V	GT	4.00	Resid	Resid	L	N	G	640	Blank	Y
A-634	50 Crude	Crude Unit		C	-	10.00	Resid	Resid	L	N	G	640	Blank	NA
A-636	50 Crude	Crude Unit		V	Needle	0.50	Resid	Resid	L	N	G	640	4	Y
A-638	50 Crude	Crude Unit		V	Needle	0.50	Resid	Resid	L	N	G	640	4	Y
A-640	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	640	Blank	Y
A-642	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	618	Blank	Y
A-644	50 Crude	Crude Unit		C	-	8.00	Resid	Resid	L	N	G	304	Blank	NA
A-646	50 Crude	Crude Unit		V	Needle	0.50	Resid	Resid	L	N	G	304	Blank	Y
A-648	50 Crude	Crude Unit		C	-	10.00	Resid	Resid	L	N	G	560	Blank	NA
A-650	50 Crude	Crude Unit		V	Needle	0.50	Resid	Resid	L	N	G	Blank	0	Y
A-652	50 Crude	Crude Unit		V	Needle	0.50	Resid	Resid	L	N	G	Blank	0	Y
A-654	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	525	Blank	Y
A-656	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	130	350	Y
A-658	50 Crude	Crude Unit		C	Bull Plug	1.00	Resid	Resid	L	N	G	130	350	NA
A-660	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	130	350	Y
A-662	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	525	350	Y
A-664	50 Crude	Crude Unit		C	-	1.00	Resid	Resid	L	N	G	525	Blank	NA
A-666	50 Crude	Crude Unit		V	GT	10.00	Resid	Resid	L	N	G	410	Blank	Y
A-668	50 Crude	Crude Unit		V	GT	1.50	Resid	Resid	L	N	G	470	Blank	Y
A-670	50 Crude	Crude Unit	-	C	-	10.00	Resid	Resid	N	N	G	415	Blank	NA
A-670	50 Crude	Crude Unit		C	-	6.00	Resid	Resid	L	N	G	Blank	Blank	NA
A-672	50 Crude	Crude Unit	-	V	GT	8.00	Resid	Resid	L	N	P	60	Blank	Y
A-672	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	380	Blank	Y
A-674	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	380	Blank	Y
A-674	50 Crude	Crude Unit	-	C	-	6.00	Resid	Resid	L	N	P	160	Blank	NA
A-676	50 Crude	Crude Unit	-	V	Control	6.00	Resid	Resid	L	N	P	580	Blank	Y
A-676	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	L	N	G	380	Blank	Y
A-678	50 Crude	Crude Unit		V	GT	12.00	Resid	Resid	L	N	G	330	Blank	Y
A-678	50 Crude	Crude Unit	-	V	GT	6.00	Resid	Resid	L	N	P	580	Blank	Y
A-680	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	P	510	Blank	N
A-680	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	G	330	Blank	Y
A-682	50 Crude	Crude Unit	-	C	-	4	Resid	Resid	L	N	P	620	Blank	NA
A-682	50 Crude	Crude Unit	-	C	-	10.00	Resid	Resid	N	N	G	515	Blank	NA
A-684	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	G	520	24	Y
A-684	50 Crude	Crude Unit	-	V	GT	6.00	Resid	Resid	L	N	P	450	Blank	Y
A-686	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	G	520	24	N
A-686	50 Crude	Crude Unit	-	V	GT	6.00	Resid	Resid	L	N	P	500	Blank	Y
A-688	50 Crude	Crude Unit	-	C	Union	1.00	Resid	Resid	L	N	G	520	24	NA
A-688	50 Crude	Crude Unit	-	C	-	6.00	Resid	Resid	L	N	P	530	Blank	NA
A-690	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	P	500	Blank	Y
A-690	50 Crude	Crude Unit	-	V	GT	8.00	Resid	Resid	N	N	G	525	24	Y
A-692	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	P	525	Blank	Y
A-692	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	N	N	G	510	Blank	Y
A-694	50 Crude	Crude Unit	-	C	Elbow	1.00	Resid	Resid	N	N	G	510	Blank	NA
A-694	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	P	650	Blank	N
A-696	50 Crude	Crude Unit	-	V	GT	10.00	Resid	Resid	N	N	G	445	Blank	Y
A-696	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	P	190	Blank	N
A-698	50 Crude	Crude Unit	-	C	-	10.00	Resid	Resid	N	N	G	445	Blank	NA
A-698	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	P	640	Blank	N
A-700	50 Crude	Crude Unit	-	V	GT	1.00	Resid	Resid	L	N	P	160	Blank	N
A-702	50 Crude	Crude Unit	-	V	GT	4.00	AGO*	Gas Oil	L	N	P	130	Blank	Y
A-704	50 Crude	Crude Unit	-	C	-	4.00	AGO	Gas Oil	L	N	P	130	Blank	NA
A-706	50 Crude	Crude Unit	-	V	Control	4.00	AGO	Gas Oil	L	N	P	130	Blank	Y
A-708	50 Crude	Crude Unit	-	V	GT	1.00	AGO	Gas Oil	L	N	P	130	Blank	N
A-710	50 Crude	Crude Unit	-	V	GT	4.00	AGO	Gas Oil	L	N	P	120	Blank	Y
A-712	50 Crude	Crude Unit	-	V	GT	4.00	AGO	Gas Oil	L	N	P	120	Blank	Y
A-714	50 Crude	Crude Unit	-	C	-	4.00	AGO	Gas Oil	L	N	P	125	Blank	NA
A-716	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	Y
A-718	FCC	Catalytic Cracking		C	Union	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	NA
A-720	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	380	Blank	Y
A-722	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	Y
A-724	FCC	Catalytic Cracking		C	-	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	NA
A-726	FCC	Catalytic Cracking		C	-	4.00	Decant oil/Slurry	Decant Oil	N	N	G	480	Blank	NA
A-728	FCC	Catalytic Cracking		C	-	4.00	Decant oil/Slurry	Decant Oil	N	N	G	455	Blank	NA
A-730	FCC	Catalytic Cracking		V	GT	4.00	Decant oil/Slurry	Decant Oil	N	N	G	455	Blank	Y
A-732	FCC	Catalytic Cracking		C	Threaded	1.00	Decant oil/Slurry	Decant Oil	N	N	G	300	130	NA
A-734	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	300	130	Y
A-736	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	300	130	Y
A-738	FCC	Catalytic Cracking		C	Union	1.00	Decant oil/Slurry	Decant Oil	N	N	G	300	130	NA
A-740	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	Y

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A-742	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	N
A-744	FCC	Catalytic Cracking		C	Bull Plug	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	NA
A-746	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	Y
A-748	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	Y
A-750	FCC	Catalytic Cracking		C	-	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	NA
A-752	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	Y
A-754	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	370	Blank	Y
A-756	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	Blank	Blank	Y
A-758	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	90	Blank	Y
A-760	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	90	Blank	Y
A-762	FCC	Catalytic Cracking		C	-	4.00	Decant oil/Slurry	Decant Oil	N	N	G	390	Blank	NA
A-764	FCC	Catalytic Cracking		V	GT	4.00	Decant oil/Slurry	Decant Oil	N	N	G	390	Blank	Y
A-766	FCC	Catalytic Cracking		V	GT	2.50	Decant oil/Slurry	Decant Oil	N	N	G	385	Blank	Y
A-768	FCC	Catalytic Cracking		C	-	4.00	Decant oil/Slurry	Decant Oil	N	N	G	320	Blank	NA
A-770	FCC	Catalytic Cracking		V	GT	4.00	Decant oil/Slurry	Decant Oil	N	N	G	320	Blank	Y
A-772	FCC	Catalytic Cracking		V	Control/diaphragm	2.50	Decant oil/Slurry	Decant Oil	N	N	G	400	Blank	Y
A-774	FCC	Catalytic Cracking		C	-	2.00	Decant oil/Slurry	Decant Oil	N	N	G	400	Blank	NA
A-776	FCC	Catalytic Cracking		V	GT	3.00	Decant oil/Slurry	Decant Oil	N	N	G	315	Blank	Y
A-778	FCC	Catalytic Cracking		C	-	2.00	Decant oil/Slurry	Decant Oil	N	N	G	315	Blank	NA
A-780	FCC	Catalytic Cracking		V	GT	2.50	Decant oil/Slurry	Decant Oil	N	N	G	315	Blank	Y
A-782	FCC	Catalytic Cracking		V	GT	4.00	Decant oil/Slurry	Decant Oil	N	N	G	260	Blank	Y
A-784	FCC	Catalytic Cracking		C	-	4.00	Decant oil/Slurry	Decant Oil	N	N	G	260	Blank	NA
A-786	FCC	Catalytic Cracking		V	GT	1.00	Decant oil/Slurry	Decant Oil	N	N	G	260	Blank	Y
A-788	FCC	Catalytic Cracking		C	Bolted	4.00	Decant oil/Slurry	Decant Oil	N	N	G	310	Blank	NA
A-790	FCC	Catalytic Cracking		V	Specialty	4.00	Decant oil/Slurry	Decant Oil	N	N	G	310	Blank	Y
A-792	FCC	Catalytic Cracking		V	Needle	0.50	Flushing oil	Other	N	N	G	70	Blank	Y
A-794	FCC	Catalytic Cracking		C	Tube fitting	0.50	Flushing oil	Other	N	N	G	70	Blank	NA
A-796	FCC	Catalytic Cracking		C	Union	1.00	Flushing oil	Other	N	N	G	70	Blank	NA
A-798	FCC	Catalytic Cracking		V	Needle	1.00	Flushing oil	Other	N	N	G	70	Blank	Y
A-800	FCC	Catalytic Cracking		V	Needle	0.50	Flushing oil	Other	N	N	G	70	Blank	Y
A-802	FCC	Catalytic Cracking	-	C	-	4.00	Reslurry to FF	Slurry	N	N	G	435	Blank	NA
A-804	FCC	Catalytic Cracking	-	V	GT	4.00	Reslurry to FF	Slurry	N	N	G	435	Blank	Y
A-806	FCC	Catalytic Cracking	-	V	GT	4.00	Reslurry to FF	Slurry	N	N	G	465	Blank	Y
A-808	FCC	Catalytic Cracking	-	C	-	4.00	Reslurry to FF	Slurry	N	N	G	220	Blank	NA
A-810	FCC	Catalytic Cracking	-	V	Control valve	2.00	Reslurry to FF	Slurry	N	N	G	455	Blank	Y
A-812	FCC	Catalytic Cracking	-	C	-	4.00	Reslurry to FF	Slurry	N	N	G	430	Blank	NA
A-814	FCC	Catalytic Cracking	-	V	GT	4.00	Reslurry to FF	Slurry	N	N	G	440	Blank	Y
A-816	FCC	Catalytic Cracking	-	V	GT	1.00	Reslurry to FF	Slurry	N	N	G	445	Blank	N
A-818	FCC	Catalytic Cracking	-	V	GT	1.00	Reslurry to FF	Slurry	N	N	G	440	Blank	N
A-820	FCC	Catalytic Cracking	-	C	BP	1.00	Reslurry to FF	Slurry	N	N	G	440	Blank	NA
A-822	FCC	Catalytic Cracking	-	V	GT	4.00	Decant	Decant Oil	N	N	G	380	Blank	Y
A-824	FCC	Catalytic Cracking	-	V	GT	4.00	Decant	Decant Oil	N	N	G	380	233	Y
A-826	FCC	Catalytic Cracking	-	C	Union	1.00	Decant	Decant Oil	N	N	G	380	233	NA
A-828	FCC	Catalytic Cracking	-	V	GT	1.00	Decant	Decant Oil	N	N	G	380	233	N
A-830	FCC	Catalytic Cracking	-	V	GT	1.00	Decant	Decant Oil	N	N	G	580	Blank	Y
A-832	FCC	Catalytic Cracking	-	V	GT	1.00	Decant	Decant Oil	N	N	G	390	Blank	N
A-834	FCC	Catalytic Cracking	-	V	Control	4.00	Decant	Decant Oil	N	N	G	385	Blank	Y
A-836	FCC	Catalytic Cracking	-	V	-	4.00	Decant	Decant Oil	N	N	G	436	Blank	Y
A-838	FCC	Catalytic Cracking	-	V	GT	1.00	Decant	Decant Oil	N	N	G	390	Blank	Y
A-840	FCC	Catalytic Cracking	-	V	GT	10.00	Decant	Decant Oil	N	N	G	445	Blank	Y
A-842	FCC	Catalytic Cracking	-	C	BP	1.00	Decant	Decant Oil	N	N	G	445	Blank	NA
A-844	FCC	Catalytic Cracking	-	V	GT	1.00	Decant	Decant Oil	N	N	G	445	Blank	Y
A-846	FCC	Catalytic Cracking	-	V	GT	1.00	Decant	Decant Oil	N	N	G	445	Blank	N
A-848	FCC	Catalytic Cracking	-	V	GT	1.00	Decant	Decant Oil	N	N	G	445	Blank	Y
A-850	FCC	Catalytic Cracking	-	C	Union	0.38	Decant	Decant Oil	N	N	G	445	Blank	NA
A-852	FCC	Catalytic Cracking	-	C	End cap	16.00	Decant	Decant Oil	N	N	G	450	Blank	NA
A-854	FCC	Catalytic Cracking	-	V	Needle	0.38	Decant	Decant Oil	N	N	G	125	Blank	Y
A-856	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	125	Blank	Y
A-858	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	125	Blank	Y
A-860	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	125	Blank	Y
A-862	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	115	Blank	Y
A-864	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	115	Blank	Y
A-866	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	155	Blank	Y
A-868	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	115	Blank	Y
A-870	FCC	Catalytic Cracking	-	V	Needle	0.38	FF to reactor	Gas Oil	N	N	G	150	Blank	Y
A-872	FCC	Catalytic Cracking	-	V	GT	1.00	Flush oil	Other	L	N	G	110	Blank	N
A-874	FCC	Catalytic Cracking	-	V	GT	1.00	Flush oil	Other	L	N	G	115	Blank	Y
A-876	FCC	Catalytic Cracking	-	C	Elbow	1.00	Flush oil	Other	L	N	G	115	Blank	NA
A-878	FCC	Catalytic Cracking	-	V	GT	1.00	Flush oil	Other	H	N	G	115	Blank	Y
A-880	FCC	Catalytic Cracking	-	V	GT	1.00	Flush oil	Other	H	N	G	95	Blank	Y
A-882	FCC	Catalytic Cracking	-	V	GT	1.00	Flush oil	Other	H	N	G	165	Blank	N
A-884	50 Crude	Crude Unit		C	-	18.00	Crude	Crude	N	Blank	T	342	Blank	NA
A-886	50 Crude	Crude Unit		V	GT	8.00	Kerosene	Kerosene	N	Blank	T	330	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-888	50 Crude	Crude Unit		V	GT	8.00	Kerosene	Kerosene	N	Blank	T	310	Blank	Y
A-890	50 Crude	Crude Unit		C	-	18.00	Crude	Crude	N	Blank	T	410	Blank	NA
A-892	50 Crude	Crude Unit		C	-	6.00	Kerosene	Kerosene	N	Blank	T	280	Blank	NA
A-894	50 Crude	Crude Unit		C	-	6.00	Kerosene	Kerosene	N	Blank	T	325	Blank	NA
A-896	50 Crude	Crude Unit		V	GT	2.50	AGO	Gas Oil	N	Blank	T	390	Blank	Y
A-898	50 Crude	Crude Unit		V	GT	2.50	AGO	Gas Oil	N	Blank	T	390	Blank	Y
A-900	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	Blank	T	120	Blank	Y
A-902	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	Blank	T	Blank	Blank	N
A-904	50 Crude	Crude Unit		C	-	2.00	AGO	Gas Oil	N	Blank	T	390	Blank	NA
A-906	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	Blank	T	Blank	Blank	N
A-908	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	Blank	T	Blank	Blank	N
A-910	50 Crude	Crude Unit		C	-	1.00	AGO	Gas Oil	N	Blank	T	Blank	Blank	NA
A-912	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	Blank	T	Blank	Blank	Y
A-914	50 Crude	Crude Unit		C	Bull Plug	1.00	AGO	Gas Oil	N	Blank	T	Blank	Blank	NA
A-916	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	Blank	T	Blank	Blank	Y
A-918	50 Crude	Crude Unit		V	GT	2.50	AGO	Gas Oil	N	Blank	T	430	Blank	Y
A-920	50 Crude	Crude Unit		V	GT	2.50	AGO	Gas Oil	N	Blank	T	430	Blank	Y
A-922	50 Crude	Crude Unit		C	-	2.50	AGO	Gas Oil	N	Blank	T	Blank	Blank	NA
A-924	50 Crude	Crude Unit		V	GT	8.00	AGO	Gas Oil	N	Blank	T	487	Blank	Y
A-926	50 Crude	Crude Unit		C	-	18.00	Crude	Crude	N	Blank	T	400	Blank	NA
A-928	50 Crude	Crude Unit		V	GT	1.00	Fractionater bottoms	Other	N	Blank	T	400	Blank	Y
A-928	50 Crude	Crude Unit		C	Bull Plug	1.00	Fractionater bottoms	Other	N	N	T	400	Blank	NA
A-930	50 Crude	Crude Unit		V	GT	1.00	Fractionater bottoms	Other	N	Blank	T	400	Blank	N
A-930	50 Crude	Crude Unit		V	GT	1.00	Fractionater bottoms	Other	N	N	T	175	Blank	Y
A-932	50 Crude	Crude Unit		V	GT	1.00	Fractionater bottoms	Other	N	Blank	T	400	Blank	Y
A-932	50 Crude	Crude Unit	-	C	-	6.00	Fractionater bottoms	Other	N	N	P	320	Blank	NA
A-934	50 Crude	Crude Unit		C	-	1.00	Fractionater bottoms	Other	N	Blank	T	400	Blank	NA
A-934	50 Crude	Crude Unit	-	C	-	6.00	Fractionater bottoms	Other	N	N	P	320	Blank	NA
A-936	50 Crude	Crude Unit		V	GT	1.00	Fractionater bottoms	Other	N	Blank	T	400	Blank	Y
A-936	50 Crude	Crude Unit	-	V	GT	1.00	Fractionater bottoms	Other	N	N	P	320	Blank	Y
A-938	50 Crude	Crude Unit	1st deck column	V	GT	6.00	Fractionater bottoms	Other	N	N	P	320	Blank	Y
A-940	50 Crude	Crude Unit	1st deck column	C	Access hatch	18.00	Fractionater bottoms	Other	N	N	P	425	Blank	NA
A-942	50 Crude	Crude Unit	1st deck column	V	GT	1.00	Fractionater bottoms	Other	N	N	P	325	Blank	Y
A-944	50 Crude	Crude Unit	1st deck column	V	GT	1.00	Fractionater bottoms	Other	N	N	P	360	Blank	Y
A-946	50 Crude	Crude Unit	1st deck column	C	Union	1.00	Fractionater bottoms	Other	N	N	P	360	Blank	NA
A-948	50 Crude	Crude Unit	1st deck column	V	GT	1.00	Fractionater bottoms	Other	N	N	P	325	Blank	Y
A-950	50 Crude	Crude Unit	1st deck column	C	Access hatch	10.00	Fractionater bottoms	Other	N	N	P	490	Blank	NA
A-952	50 Crude	Crude Unit	1st deck column	V	GT	1.00	AGO	Gas Oil	N	N	P	550	Blank	Y
A-954	50 Crude	Crude Unit	1st deck column	V	GT	1.50	Kerosene	Kerosene	N	N	P	375	Blank	Y
A-956	50 Crude	Crude Unit	Exchanger platform	V	GT	4.00	KS	Kerosene	N	N	P	100	Blank	Y
A-958	50 Crude	Crude Unit	Exchanger platform	C	-	4.00	KS	Kerosene	N	N	P	100	Blank	NA
A-960	50 Crude	Crude Unit	Exchanger platform	V	GT	3.00	KS	Kerosene	N	N	P	100	Blank	Y
A-962	50 Crude	Crude Unit	Exchanger platform	C	-	3.00	KS	Kerosene	N	N	P	100	Blank	NA
A-964	50 Crude	Crude Unit	Exchanger platform	V	GT	8.00	Resid	Resid	N	N	P	340	Blank	Y
A-966	50 Crude	Crude Unit	Exchanger platform	V	Control valve	3.00	KS	Kerosene	N	N	P	100	Blank	Y
A-968	50 Crude	Crude Unit	Exchanger platform	V	GT	4.00	KS	Kerosene	N	N	P	100	Blank	Y
A-970	50 Crude	Crude Unit	Exchanger platform	V	GT	1.00	AGO	Gas Oil	N	N	P	160	Blank	N
A-972	50 Crude	Crude Unit	Exchanger platform	V	GT	1.00	AGO	Gas Oil	N	N	P	170	Blank	Y
A-974	50 Crude	Crude Unit	Exchanger deck	C	-	4.00	AGO	Gas Oil	N	N	P	170	Blank	NA
A-976	50 Crude	Crude Unit	Exchanger deck	V	GT	4.00	AGO	Gas Oil	N	N	P	80	12	Y
A-978	50 Crude	Crude Unit	Exchanger deck	C	BP	1.25	AGO	Gas Oil	N	N	P	95	Blank	NA
A-980	50 Crude	Crude Unit	Exchanger deck	V	GT	1.00	AGO	Gas Oil	N	N	P	65	12	Y
A-982	50 Crude	Crude Unit	Exchanger deck	V	GT	1.00	AGO	Gas Oil	N	N	P	65	12	Y
A-984	50 Crude	Crude Unit	Exchanger deck	C	Flange	4.00	AGO	Gas Oil	N	N	P	75	12	NA
A-986	50 Crude	Crude Unit	Exchanger deck	V	GT	1.00	AGO	Gas Oil	N	N	P	100	Blank	N
A-988	50 Crude	Crude Unit	Exchanger deck	C	-	4.00	AGO	Gas Oil	N	N	P	105	Blank	N
A-990	50 Crude	Crude Unit	Exchanger deck	V	GT	1.25	AGO	Gas Oil	N	N	P	75	Blank	N
A-992	50 Crude	Crude Unit	Exchanger deck	V	GT	1.25	AGO	Gas Oil	N	N	P	75	Blank	N
A-994	50 Crude	Crude Unit	Exchanger deck	C	Union	1.25	AGO	Gas Oil	N	N	P	75	Blank	N
A-996	50 Crude	Crude Unit	Exchanger deck	V	GT	1.00	AGO	Gas Oil	N	N	P	75	8	N
A-998	50 Crude	Crude Unit	Exchanger deck	V	GT	1.00	AGO	Gas Oil	N	N	P	75	8	N
A-1000	50 Crude	Crude Unit	Exchanger deck	V	GT	1.25	AGO	Gas Oil	N	N	P	75	Blank	N
A-1002	50 Crude	Crude Unit	Exchanger deck	C	BP	1.25	AGO	Gas Oil	N	N	P	75	Blank	N
A-1004	50 Crude	Crude Unit	Exchange platform	V	GT	4.00	AGO	Gas Oil	N	N	P	70	8	Y
A-1006	50 Crude	Crude Unit	Exchange platform	C	-	14.00	AGO	Gas Oil	N	N	P	75	Blank	NA
A-1008	50 Crude	Crude Unit	Exchange platform	V	GT	4.00	KS	Kerosene	L	N	P	190	Blank	Y
A-1010	50 Crude	Crude Unit	Exchange platform	C	-	4.00	KS	Kerosene	L	N	P	190	Blank	NA
A-1012	50 Crude	Crude Unit	Exchange platform	V	GT	3.00	KS	Kerosene	N	N	P	115	Blank	Y
A-1014	50 Crude	Crude Unit	Exchange platform	V	GT	4.00	KS	Kerosene	L	N	P	80	Blank	Y
A-1016	50 Crude	Crude Unit	Exchange platform	V	GT	1.00	KS	Kerosene	N	N	P	80	Blank	Y
A-1018	50 Crude	Crude Unit	Exchange platform	C	BP	1.00	KS	Kerosene	N	N	P	80	Blank	NA
A-1020	50 Crude	Crude Unit	Exchange platform	V	GT	1.00	KS	Kerosene	N	N	P	80	Blank	Y
A-1022	50 Crude	Crude Unit	Exchange platform	C	BP	1.00	KS	Kerosene	N	N	P	75	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1024	50 Crude	Crude Unit	Exchange platform	V	GT	1.00	KS	Kerosene	N	N	P	80	Blank	Y
A-1026	50 Crude	Crude Unit	Exchange platform	C	Union	1.00	KS	Kerosene	N	N	P	80	Blank	NA
A-1028	50 Crude	Crude Unit	Exchange platform	C	-	6.00	LPA	Gas Oil	N	N	P	500	Blank	NA
A-1030	50 Crude	Crude Unit	Exchange platform	C	-	6.00	LPA	Gas Oil	N	N	P	620	Blank	NA
A-1032	50 Crude	Crude Unit	Exchange platform	V	GT	4.00	KS	Kerosene	L	N	P	295	Blank	Y
A-1034	50 Crude	Crude Unit	Exchange platform	V	GT	1.00	KS	Kerosene	L	N	P	200	Blank	Y
A-1036	50 Crude	Crude Unit	Exchange platform	C	-	4.00	KS	Kerosene	N	N	P	300	Blank	NA
A-1038	50 Crude	Crude Unit	Exchange platform	C	U	1.00	KS	Kerosene	N	N	P	100	Blank	NA
A-1040	50 Crude	Crude Unit	Exchange platform	C	-	4.00	KS	Kerosene	N	N	P	320	Blank	NA
A-1042	50 Crude	Crude Unit	Exchange platform	C	Threaded	0.75	KS	Kerosene	N	N	P	320	Blank	NA
A-1044	50 Crude	Crude Unit	Exchange platform	V	GT	2.00	KS	Kerosene	N	N	P	Blank	Blank	Y
A-1046	50 Crude	Crude Unit	Exchange platform	V	GT	1.00	KS	Kerosene	N	N	P	Blank	Blank	Y
A-1048	50 Crude	Crude Unit	Exchange platform	C	-	2.00	KS	Kerosene	N	N	P	Blank	Blank	NA
A-1050	50 Crude	Crude Unit	Exchange platform	C	Bull plug	1.00	KS	Kerosene	N	N	P	152	Blank	NA
A-1052	50 Crude	Crude Unit	Exchange platform	V	GT	1.00	KS	Kerosene	N	N	P	155	Blank	Y
A-1054	50 Crude	Crude Unit	Exchange platform	C	-	4.00	KS	Kerosene	N	N	P	150	Blank	NA
A-1056	50 Crude	Crude Unit	Exchange platform	V	GT	4.00	KS	Kerosene	N	N	P	150	Blank	Y
A-1058	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	200	Blank	Y
A-1060	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	Blank	Blank	Y
A-1062	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	270	Blank	Y
A-1064	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	Blank	Blank	Y
A-1068	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	Blank	Blank	Y
A-1070	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	Blank	Blank	Y
A-1072	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	Blank	Blank	Y
A-1074	50 Crude	Crude Unit		C	Bull plug	1.00	KS	Kerosene	N	N	P	Blank	Blank	NA
A-1076	50 Crude	Crude Unit		C	Union	1.00	KS	Kerosene	N	N	P	90	Blank	NA
A-1078	50 Crude	Crude Unit		V	GT	1.00	LPA	Gas Oil	N	N	P	630	Blank	Y
A-1080	50 Crude	Crude Unit		C	Flange	4.00	LPA	Gas Oil	N	N	P	630	Blank	NA
A-1082	50 Crude	Crude Unit		V	GT	1.00	LPA	Gas Oil	N	N	P	630	Blank	Y
A-1084	50 Crude	Crude Unit		C	Threaded	1.00	LPA	Gas Oil	N	N	P	540	Blank	NA
A-1086	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	N	N	G	150	Blank	Y
A-1088	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	N	N	P	150	Blank	Y
A-1090	50 Crude	Crude Unit		C	Tee	0.75	Resid	Resid	N	N	P	100	Blank	NA
A-1092	50 Crude	Crude Unit		C	Bull plug	1.00	Resid	Resid	N	N	P	100	Blank	NA
A-1094	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	N	N	P	70	Blank	Y
A-1096	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	60	Blank	N
A-1098	50 Crude	Crude Unit		C	Flange	1.00	KS	Kerosene	N	N	P	60	Blank	NA
A-1100	50 Crude	Crude Unit		V	GT	1.00	LPA	Gas Oil	N	N	P	80	Blank	N
A-1102	50 Crude	Crude Unit		C	-	1.00	Resid	Resid	N	N	P	80	Blank	NA
A-1104	50 Crude	Crude Unit		C	-	6.00	Resid	Resid	N	N	O	250	Blank	NA
A-1106	50 Crude	Crude Unit		V	GT	1.00	Resid	Resid	N	N	O	Blank	Blank	Y
A-1108	50 Crude	Crude Unit		C	Union	1.00	KS	Kerosene	N	N	P	Blank	Blank	NA
A-1110	50 Crude	Crude Unit		C	-	1.00	KS	Kerosene	N	N	P	60	Blank	NA
A-1112	50 Crude	Crude Unit		V	GT	1.00	KS	Kerosene	N	N	P	60	Blank	Y
A-1114	50 Crude	Crude Unit		V	GT	8.00	Resid	Resid	N	N	O	330	Blank	Y
A-1116	FCC	Catalytic Cracking	-	C	BP	0.75	HO	Heating Oil	L	N	G	100	164	NA
A-1118	FCC	Catalytic Cracking	-	V	GT	0.75	HO	Heating Oil	L	N	G	100	164	N
A-1120	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	L	N	G	305	164	Y
A-1122	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	L	N	G	305	164	N
A-1124	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	L	N	G	180	164	Y
A-1126	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	L	N	G	205	164	Y
A-1128	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	L	N	G	380	Blank	Y
A-1130	FCC	Catalytic Cracking	-	C	-	1.25	HO	Heating Oil	L	N	G	320	Blank	NA
A-1132	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	L	N	G	200	28	Y
A-1134	FCC	Catalytic Cracking	-	C	Union	0.63	HO	Heating Oil	L	N	G	115	Blank	NA
A-1136	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	L	N	G	170	28	N
A-1138	FCC	Catalytic Cracking	-	C	-	1.00	HO	Heating Oil	L	N	G	150	Blank	NA
A-1140	FCC	Catalytic Cracking	-	C	Union	0.75	HO	Heating Oil	L	N	G	125	Blank	NA
A-1142	FCC	Catalytic Cracking	-	V	GT	1.50	HO	Heating Oil	L	N	G	200	Blank	N
A-1144	FCC	Catalytic Cracking	-	C	Tee	0.75	HO	Heating Oil	L	N	G	180	Blank	NA
A-1146	FCC	Catalytic Cracking	-	V	GT	1.00	Heating Oil	Heating Oil	L	N	G	120	Blank	Y
A-1148	FCC	Catalytic Cracking	-	V	GT	0.75	Heating Oil	Heating Oil	L	N	G	155	Blank	Y
A-1150	FCC	Catalytic Cracking	-	C	BP	1.00	Heating Oil	Heating Oil	L	N	G	120	Blank	NA
A-1152	FCC	Catalytic Cracking	-	V	GT	1.00	Heating Oil	Heating Oil	L	N	G	140	28	Y
A-1154	FCC	Catalytic Cracking	-	V	GT	1.00	Heating Oil	Heating Oil	L	N	G	230	23	Y
A-1156	FCC	Catalytic Cracking	-	C	-	1.00	Heating Oil	Heating Oil	L	N	G	230	23	NA
A-1158	FCC	Catalytic Cracking	-	V	GT	1.00	Heating Oil	Heating Oil	L	N	G	120	23	Y
A-1160	FCC	Catalytic Cracking	-	V	GT	0.75	Heating Oil	Heating Oil	L	N	G	95	23	N
A-1162	FCC	Catalytic Cracking	-	V	GT	1.00	Heating Oil	Heating Oil	L	N	G	145	23	N
A-1164	FCC	Catalytic Cracking	-	C	Union	1.00	Heating Oil	Heating Oil	L	N	G	110	23	NA
A-1166	FCC	Catalytic Cracking	-	C	-	1.50	Flushing oil	Other	L	N	G	230	Blank	NA
A-1168	FCC	Catalytic Cracking	-	V	GT	1.50	Flushing oil	Other	L	N	G	230	Blank	Y
A-1170	FCC	Catalytic Cracking	-	V	GT	1.00	Flushing oil	Other	L	N	G	150	Blank	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1172	FCC	Catalytic Cracking	-	V	GT	1.50	Flushing oil	Other	L	N	G	290	Blank	Y
A-1174	FCC	Catalytic Cracking	-	C	-	1.00	FO	Flushing Oil	L	N	G	170	Blank	NA
A-1176	FCC	Catalytic Cracking	-	V	GT	1.50	HO	Heating Oil	N	N	G	100	Blank	Y
A-1178	FCC	Catalytic Cracking	-	V	GT	1.50	HO	Heating Oil	N	N	G	225	Blank	Y
A-1180	FCC	Catalytic Cracking	-	C	-	1.00	HO	Heating Oil	N	N	G	400	Blank	NA
A-1182	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	N	N	G	400	Blank	Y
A-1184	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	N	N	G	400	Blank	N
A-1186	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	N	N	G	215	Blank	N
A-1188	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	N	N	G	95	Blank	N
A-1190	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	N	N	G	85	Blank	Y
A-1192	FCC	Catalytic Cracking	-	C	-	1.00	HO	Heating Oil	N	N	G	75	Blank	NA
A-1194	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	N	N	G	445	Blank	Y
A-1196	FCC	Catalytic Cracking	-	C	BP	0.75	HO	Heating Oil	N	N	G	130	50	NA
A-1198	FCC	Catalytic Cracking	-	V	GT	0.75	HO	Heating Oil	N	N	G	130	50	N
A-1200	FCC	Catalytic Cracking	-	V	GT	1.00	HO	Heating Oil	N	N	G	230	50	Y
A-1202	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	N	N	G	450	50	Y
A-1204	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	N	N	G	455	Blank	Y
A-1206	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	N	N	G	425	Blank	Y
A-1208	FCC	Catalytic Cracking	-	C	-	1.25	HO	Heating Oil	N	N	G	425	Blank	NA
A-1210	FCC	Catalytic Cracking	-	V	Check valve	1.25	FO	Flushing Oil	N	N	G	80	Blank	Y
A-1212	FCC	Catalytic Cracking	-	C	BP	1.25	FO	Flushing Oil	N	N	G	85	Blank	NA
A-1214	FCC	Catalytic Cracking	-	V	GT	1.25	FO	Flushing Oil	N	N	G	85	Blank	Y
A-1216	FCC	Catalytic Cracking	-	V	GT	1.25	FO	Flushing Oil	N	N	G	95	Blank	Y
A-1218	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	N	N	G	310	Blank	Y
A-1220	FCC	Catalytic Cracking	-	C	-	1.00	FO	Flushing Oil	N	N	G	120	Blank	NA
A-1222	FCC	Catalytic Cracking	-	V	GT	1.00	FO	Flushing Oil	N	N	G	155	Blank	Y
A-1224	FCC	Catalytic Cracking	-	V	GT	1.00	FO	Flushing Oil	N	N	G	95	Blank	N
A-1226	FCC	Catalytic Cracking	-	V	GT	1.25	HO	Heating Oil	N	N	O	420	Blank	Y
A-1228	FCC	Catalytic Cracking	-	C	-	1.00	HO	Heating Oil	N	N	O	420	Blank	NA
A-1230	FCC	Catalytic Cracking		V	GT	2.00	Flush oil	Other	N	N	O	90	Blank	Y
A-1232	FCC	Catalytic Cracking		V	GT	1.25	Flush oil	Other	N	N	O	200	Blank	Y
A-1234	FCC	Catalytic Cracking		V	GT	1.00	Flush oil	Other	N	N	O	110	Blank	Y
A-1236	FCC	Catalytic Cracking		V	GT	1.00	Flush oil	Other	N	N	O	110	Blank	Y
A-1238	FCC	Catalytic Cracking		C	Bull plug	1.00	Flush oil	Other	N	N	O	110	Blank	NA
A-1240	FCC	Catalytic Cracking		V	GT	1.25	Flush oil	Other	N	N	O	160	Blank	Y
A-1242	FCC	Catalytic Cracking		V	GT	1.00	Flush oil	Other	N	N	O	260	Blank	Y
A-1244	FCC	Catalytic Cracking		V	GT	1.25	Flush oil	Other	N	N	O	180	Blank	Y
A-1246	FCC	Catalytic Cracking		C	-	1.25	Flush oil	Other	N	N	O	400	Blank	NA
A-1248	FCC	Catalytic Cracking		V	GT	1.00	Flush oil	Other	N	N	O	200	Blank	Y
A-1250	FCC	Catalytic Cracking		V	GT	1.00	Slurry	Slurry	N	N	G	200	Blank	Y
A-1252	FCC	Catalytic Cracking		V	GT	1.00	Slurry	Slurry	N	N	G	90	Blank	N
A-1254	FCC	Catalytic Cracking		V	GT	1.00	Slurry	Slurry	N	N	O	160	Blank	N
A-1256	FCC	Catalytic Cracking		V	GT	1.00	Slurry	Slurry	N	N	O	160	Blank	N
A-1258	FCC	Catalytic Cracking		V	GT	1.00	Slurry	Slurry	N	N	O	115	28	Y
A-1260	FCC	Catalytic Cracking		C	Union	1.00	Slurry	Slurry	N	N	G	140	28	NA
A-1262	FCC	Catalytic Cracking		V	GT	1.00	Heating Oil	Heating Oil	N	N	G	440	Blank	Y
A-1264	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	430	Blank	Y
A-1266	FCC	Catalytic Cracking		C	Flange	1.00	HO	Heating Oil	N	N	G	430	Blank	NA
A-1268	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	380	40	Y
A-1270	FCC	Catalytic Cracking		C	Union	1.00	HO	Heating Oil	N	N	G	200	40	NA
A-1272	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	200	40	Y
A-1274	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	320	Blank	Y
A-1276	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	200	Blank	Y
A-1278	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	200	Blank	Y
A-1280	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	460	Blank	Y
A-1282	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	250	Blank	Y
A-1284	FCC	Catalytic Cracking		V	GT	1.00	HO	Heating Oil	N	N	G	170	Blank	Y
A-1286	FCC	Catalytic Cracking		V	Bull plug	1.00	HO	Heating Oil	N	N	G	Blank	Blank	Y
A-1288	FCC	Catalytic Cracking		V	GT	1.25	HO	Heating Oil	N	N	G	280	Blank	Y
A-1290	FCC	Catalytic Cracking		V	GT	1.25	HO	Heating Oil	N	N	G	105	Blank	Y
A-1292	FCC	Catalytic Cracking		V	GT	1.25	HO	Heating Oil	N	N	G	100	Blank	Y
A-1294	FCC	Catalytic Cracking		C	-	1.25	HO	Heating Oil	N	N	G	100	Blank	NA
A-1296	FCC	Catalytic Cracking		V	GT	1.00	Flushing oil	Other	N	N	G	110	Blank	Y
A-1298	FCC	Catalytic Cracking		V	GT	1.00	Flushing oil	Other	N	N	G	110	Blank	Y
A-1300	FCC	Catalytic Cracking		C	-	1.00	Flushing oil	Other	N	N	G	120	Blank	NA
A-1302	FCC	Catalytic Cracking	HE 2779	V	GT	1.00	AGO	Gas Oil	N	N	G	380	Blank	Y
A-1304	FCC	Catalytic Cracking	HE 2780	C	-	4.00	AGO	Gas Oil	N	N	G	540	Blank	N
A-1306	FCC	Catalytic Cracking	HE 2781	V	GT	1.00	AGO	Gas Oil	N	N	G	300	Blank	N
A-1308	FCC	Catalytic Cracking	HE 2782	V	GT	1.00	AGO	Gas Oil	N	N	G	210	Blank	Y
A-1310	FCC	Catalytic Cracking	HE 2783	C	Bull plug	0.75	AGO	Gas Oil	N	N	G	210	Blank	NA
A-1312	FCC	Catalytic Cracking	HE 2784	V	GT	6.00	AGO	Gas Oil	N	N	G	530	Blank	Y
A-1314	FCC	Catalytic Cracking	HE 2785	C	-	6.00	AGO	Gas Oil	N	N	G	250	Blank	NA
A-1316	FCC	Catalytic Cracking	HE 2786	V	GT	6.00	AGO	Gas Oil	N	N	G	300	Blank	Y

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A-1318	FCC	Catalytic Cracking	HE 2787	V	GT	1.00	AGO	Gas Oil	N	N	G	235	Blank	N
A-1320	FCC	Catalytic Cracking	HE 2788	C	-	6.00	AGO	Gas Oil	N	N	G	300	Blank	NA
A-1322	FCC	Catalytic Cracking	HE 2789	V	GT	6.00	AGO	Gas Oil	N	N	G	220	Blank	Y
A-1324	FCC	Catalytic Cracking	HE 2790	V	GT	1.00	AGO	Gas Oil	N	N	G	Blank	Blank	Y
A-1326	FCC	Catalytic Cracking	HE 2791	C	-	4.00	AGO	Gas Oil	N	N	G	280	Blank	NA
A-1328	FCC	Catalytic Cracking	HE 2792	C	-	2.00	AGO	Gas Oil	N	N	O	180	Blank	NA
A-1330	FCC	Catalytic Cracking	HE 2793	C	-	6.00	AGO	Gas Oil	N	N	G	520	Blank	NA
A-1332	50 Crude	Crude Unit		V	GT	6.00	AGO	Gas Oil	N	N	G	540	Blank	Y
A-1334	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	N	G	190	Blank	N
A-1336	50 Crude	Crude Unit		V	Control	4.00	AGO	Gas Oil	N	N	G	550	Blank	Y
A-1338	50 Crude	Crude Unit		C	-	4.00	AGO	Gas Oil	N	N	G	550	Blank	NA
A-1340	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	N	G	200	Blank	N
A-1342	50 Crude	Crude Unit		V	GT	6.00	AGO	Gas Oil	N	N	G	530	Blank	Y
A-1344	50 Crude	Crude Unit		V	GT	4.00	AGO	Gas Oil	N	N	G	450	Blank	Y
A-1346	50 Crude	Crude Unit		C	-	4.00	AGO	Gas Oil	N	N	G	440	Blank	NA
A-1348	50 Crude	Crude Unit		C	-	4.00	AGO	Gas Oil	N	N	G	450	Blank	NA
A-1350	50 Crude	Crude Unit		V	GT	4.00	AGO	Gas Oil	N	N	G	500	Blank	Y
A-1352	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	N	G	185	Blank	N
A-1354	50 Crude	Crude Unit		C	-	4.00	AGO	Gas Oil	N	N	G	500	Blank	NA
A-1356	50 Crude	Crude Unit		V	GT	4.00	AGO	Gas Oil	N	N	G	410	Blank	Y
A-1358	50 Crude	Crude Unit		V	Control	4.00	AGO	Gas Oil	N	N	G	410	Blank	Y
A-1360	50 Crude	Crude Unit		V	GT	1.00	AGO	Gas Oil	N	N	G	210	Blank	N
A-1362	50 Crude	Crude Unit		V	GT	4.00	AGO	Gas Oil	N	N	G	490	Blank	Y
A-1364	50 Crude	Crude Unit		C	-	4.00	AGO	Gas Oil	N	N	G	490	Blank	NA
A-1366	50 Crude	Crude Unit		C	Bull plug	0.75	AGO	Gas Oil	N	N	G	210	Blank	NA
A-1368	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1370	50 Crude	Crude Unit	FF	C	Tube fitting	0.75	MPA	Kerosene	N	N	P	Blank	Blank	NA
A-1372	50 Crude	Crude Unit	FF	V	GT	6.00	MPA	Kerosene	N	N	P	305	Blank	Y
A-1374	50 Crude	Crude Unit	FF	V	GT	2.00	MPA	Kerosene	N	N	P	305	Blank	Y
A-1376	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1378	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1380	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1382	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1384	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1386	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1388	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1390	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1392	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	305	Blank	NA
A-1394	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	305	Blank	NA
A-1396	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	305	Blank	NA
A-1398	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	305	Blank	NA
A-1400	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	305	Blank	NA
A-1402	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	315	Blank	NA
A-1404	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	315	Blank	NA
A-1406	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	315	Blank	NA
A-1408	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	315	Blank	NA
A-1410	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	315	Blank	NA
A-1412	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	315	Blank	NA
A-1414	50 Crude	Crude Unit	FF	C	Hexagon plug	1.00	MPA	Kerosene	N	N	P	315	Blank	NA
A-1416	50 Crude	Crude Unit	FF	C	HP	1.00	MPA	Kerosene	N	N	P	330	Blank	NA
A-1418	50 Crude	Crude Unit	FF	C	HP	1.00	MPA	Kerosene	N	N	P	330	Blank	NA
A-1420	50 Crude	Crude Unit	FF	C	HP	1.00	MPA	Kerosene	N	N	P	330	Blank	NA
A-1422	50 Crude	Crude Unit	FF	C	HP	1.00	MPA	Kerosene	N	N	P	330	Blank	NA
A-1424	50 Crude	Crude Unit	FF	V	GT	1.00	MPA	Kerosene	N	N	P	250	Blank	Y
A-1426	50 Crude	Crude Unit	FF	C	BP	1.00	MPA	Kerosene	N	N	P	155	Blank	NA
A-1428	50 Crude	Crude Unit	FF	C	-	6.00	MPA	Kerosene	N	N	P	300	Blank	NA
A-1430	50 Crude	Crude Unit	FF	V	GT	1.00	MPA	Kerosene	N	N	P	200	Blank	Y
A-1432	50 Crude	Crude Unit	FF	V	GT	1.00	MPA	Kerosene	N	N	P	200	Blank	N
A-1434	50 Crude	Crude Unit	FF	V	GT	6.00	MPA	Kerosene	N	N	P	350	Blank	Y
A-1436	50 Crude	Crude Unit	FF	V	GT	1.00	MPA	Kerosene	N	N	P	230	Blank	N
A-1438	50 Crude	Crude Unit	FF	C	BP	1.00	MPA	Kerosene	N	N	P	230	Blank	NA
A-1440	50 Crude	Crude Unit	FF	V	GT	1.50	MPA	Kerosene	N	N	P	305	Blank	Y
A-1442	50 Crude	Crude Unit	FF	C	Union	1.00	MPA	Kerosene	N	N	P	295	Blank	NA
A-1444	50 Crude	Crude Unit	FF	V	GT	6.00	MPA	Kerosene	N	N	P	285	Blank	Y
A-1446	50 Crude	Crude Unit	FF	C	-	6.00	MPA	Kerosene	N	N	P	285	Blank	NA
A-1448	50 Crude	Crude Unit	FF	C	BP	1.00	MPA	Kerosene	N	N	P	170	Blank	NA
A-1450	50 Crude	Crude Unit	FF	V	GT	1.00	MPA	Kerosene	N	N	P	170	Blank	Y
A-1452	50 Crude	Crude Unit	FF	C	-	6.00	MPA	Kerosene	N	N	P	355	Blank	NA
A-1454	50 Crude	Crude Unit	FF	V	GT	1.00	MPA	Kerosene	N	N	P	320	Blank	Y
A-1456	3HDS	Hydrotreater	Pump area	V	GT	4.00	diesel	Diesel	L	N	G	68	40	Y
A-1458	3HDS	Hydrotreater	P8817	C	Flange	4.00	diesel	Diesel	L	N	G	68	40	NA
A-1460	3HDS	Hydrotreater	P8817	V	GT	1.00	diesel	Diesel	L	N	G	68	40	N
A-1462	3HDS	Hydrotreater	P8817	C	PL	1.00	diesel	Diesel	L	N	G	68	40	NA

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A-1464	3HDS	Hydrotreater	P8817	C	Flange	3.00	diesel	Diesel	L	N	G	150	40	NA
A-1466	3HDS	Hydrotreater	P8817	V	GT	2.00	diesel	Diesel	L	N	G	55	40	Y
A-1468	3HDS	Hydrotreater	P8817	C	Flange	2.00	diesel	Diesel	L	N	G	55	40	NA
A-1470	3HDS	Hydrotreater	P8818	V	GT	4.00	diesel	Diesel	L	N	G	395	170	Y
A-1472	3HDS	Hydrotreater	P8818	V	GT	1.00	diesel	Diesel	L	N	G	145	170	Y
A-1474	3HDS	Hydrotreater	P8818	C	PL	1.00	diesel	Diesel	L	N	G	145	170	NA
A-1476	3HDS	Hydrotreater	P8818	V	GT	2.00	diesel	Diesel	L	N	G	290	170	Y
A-1478	3HDS	Hydrotreater	P8818	C	Flange	4.00	diesel	Diesel	L	N	G	410	170	NA
A-1480	3HDS	Hydrotreater	P8818	C	Flange	3.00	diesel	Diesel	L	N	G	410	170	NA
A-1482	3HDS	Hydrotreater	P8821	V	GT	10.00	diesel	Diesel	L	N	G	160	60	Y
A-1484	3HDS	Hydrotreater	P8821	C	Flange	10.00	diesel	Diesel	L	N	O	160	60	NA
A-1486	3HDS	Hydrotreater	P8822	V	GT	10.00	Frac btms	Other	L	N	O	565	150	Y
A-1488	3HDS	Hydrotreater	P8822	C	Flange	10.00	Frac btms	Other	L	N	G	565	150	NA
A-1490	3HDS	Hydrotreater	Sample station	V	GT	1.00	Frac btms	Other	L	N	G	350	Blank	Y
A-1492	3HDS	Hydrotreater	Sample station	V	GT	1.00	Frac btms	Other	L	N	G	350	Blank	Y
A-1494	3HDS	Hydrotreater	Sample station	V	GT	1.00	Frac btms	Other	L	N	G	350	Blank	Y
A-1496	3HDS	Hydrotreater	Sample station	V	GT	1.00	Frac btms	Other	L	N	G	350	Blank	Y
A-1498	3HDS	Hydrotreater	Sample station	V	BL	1.00	Frac btms	Other	L	N	G	350	Blank	Y
A-1500	3HDS	Hydrotreater	CLPS to stripper	V	GT	1.00	Frac btms	Other	L	N	G	350	Blank	Y
A-1502	3HDS	Hydrotreater	CLPS to stripper	V	BL	0.50	Frac btms	Other	L	N	G	350	Blank	Y
A-1504	3HDS	Hydrotreater	CLPS to stripper	C	TC	1.00	Frac btms	Other	L	N	G	350	Blank	NA
A-1506	3HDS	Hydrotreater	CLPS to stripper	V	GT	6.00	diesel	Diesel	L	N	O	100	Blank	Y
A-1508	3HDS	Hydrotreater	CLPS to stripper	V	GT	6.00	diesel	Diesel	L	N	G	100	Blank	Y
A-1510	3HDS	Hydrotreater	CLPS to stripper	V	GL	3.00	diesel	Diesel	L	N	G	100	Blank	Y
A-1512	3HDS	Hydrotreater	CLPS to stripper	V	GT	6.00	diesel	Diesel	L	N	G	100	Blank	Y
A-1514	3HDS	Hydrotreater	CLPS to stripper	V	GT	3.00	diesel	Diesel	L	N	G	100	Blank	Y
A-1516	3HDS	Hydrotreater	CLPS to stripper from V3	V	GT	1.00	diesel	Diesel	N	N	G	100	Blank	Y
A-1518	3HDS	Hydrotreater	CLPS to stripper from V3	C	Flange	6.00	diesel	Diesel	N	N	G	100	Blank	NA
A-1520	3HDS	Hydrotreater	Exchangers E4652	V	GL	8.00	Gas oil	Gas Oil	L	N	G	300	Blank	Y
A-1522	3HDS	Hydrotreater	Exchangers E4653	V	GL	8.00	Gas oil	Gas Oil	L	N	O	415	Blank	Y
A-1524	3HDS	Hydrotreater	Feed pump	V	GT	10.00	Gas oil	Gas Oil	L	N	P	422	Blank	Y
A-1526	3HDS	Hydrotreater	Feed pump	V	GT	10.00	Gas oil	Gas Oil	L	N	P	360	Blank	Y
A-1528	3HDS	Hydrotreater	Feed pump	V	GT	10.00	Gas oil	Gas Oil	L	N	P	360	Blank	Y
A-1530	3HDS	Hydrotreater	Feed pump	V	GT	10.00	Gas oil	Gas Oil	L	N	P	360	Blank	Y
A-1532	3HDS	Hydrotreater	Feed pump	V	GT	1.00	Gas oil	Gas Oil	L	N	P	137	Blank	Y
A-1534	3HDS	Hydrotreater	Feed pump	V	GT	1.00	Gas oil	Gas Oil	L	N	P	120	Blank	Y
A-1536	3HDS	Hydrotreater	Feed pump	V	GT	14.00	Gas oil	Gas Oil	L	N	P	380	Blank	Y
A-1538	3HDS	Hydrotreater	Feed pump	V	GT	14.00	Gas oil	Gas Oil	L	N	P	280	Blank	Y
A-1540	3HDS	Hydrotreater	Feed pump	V	GT	1.00	Gas oil	Gas Oil	L	N	P	60	Blank	Y
A-1542	3HDS	Hydrotreater	Feed pump	V	GT	1.00	Gas oil	Gas Oil	L	N	P	60	Blank	Y
A-1544	3HDS	Hydrotreater	Feed pump	V	GT	2.00	Gas oil	Gas Oil	L	N	P	100	Blank	Y
A-1546	3HDS	Hydrotreater	Feed pump	V	GT	2.00	Gas oil	Gas Oil	L	N	P	115	Blank	Y
A-1548	3HDS	Hydrotreater	Feed pump	V	GT	2.00	Gas oil	Gas Oil	L	N	P	115	Blank	Y
A-1550	3HDS	Hydrotreater	Feed pump	V	GT	1.00	Gas oil	Gas Oil	L	N	G	75	70	Y
A-1552	3HDS	Hydrotreater	Feed pump	C	Threaded connector	1.00	Gas oil	Gas Oil	L	N	G	75	70	NA
A-1554	3HDS	Hydrotreater	V1	V	GT	6.00	Gas oil	Gas Oil	N	N	G	70	15	Y
A-1556	3HDS	Hydrotreater	V1 Surge Drum	V	GT	6.00	Gas oil	Gas Oil	N	N	G	70	70	Y
A-1558	3HDS	Hydrotreater	V1	V	GT	1.00	Gas oil	Gas Oil	N	N	G	70	15	Y
A-1560	3HDS	Hydrotreater	V1	V	Control valve	3.00	Gas oil	Gas Oil	N	N	G	80	70	Y
A-1562	3HDS	Hydrotreater	V1	C	Plug	1.00	Gas oil	Gas Oil	N	N	G	70	15	NA
A-1564	3HDS	Hydrotreater	V1	V	GT	6.00	Gas oil	Gas Oil	N	N	G	80	15	Y
A-1566	3HDS	Hydrotreater	V1	V	GT	1.00	Gas oil	Gas Oil	N	N	G	80	70	Y
A-1568	3HDS	Hydrotreater	V1	V	GT	6.00	Gas oil	Gas Oil	N	N	G	70	70	Y
A-1570	3HDS	Hydrotreater	V1	V	GT	1.00	Gas oil	Gas Oil	N	N	G	80	15	Y
A-1572	3HDS	Hydrotreater	V1	C	Flange	3.00	Gas oil	Gas Oil	N	N	G	90	15	NA
A-1574	3HDS	Hydrotreater	V1	V	GT	1.00	Gas oil	Gas Oil	N	N	G	60	15	N
A-1576	3HDS	Hydrotreater	V1	V	Control valve	3.00	Gas oil	Gas Oil	N	N	G	90	15	Y
A-1578	3HDS	Hydrotreater	V1	V	GT	1.00	Gas oil	Gas Oil	N	N	G	90	70	Y
A-1580	3HDS	Hydrotreater	V1	C	Plug	1.00	Gas oil	Gas Oil	N	N	G	90	70	NA
A-1582	3HDS	Hydrotreater	V1	C	Flange	12.00	Gas oil	Gas Oil	N	N	P	440	Blank	NA
A-1584	3HDS	Hydrotreater	V1 Surge Drum	V	GT	1.00	Gas oil	Gas Oil	L	N	P	440	Blank	Y
A-1586	3HDS	Hydrotreater	V1 Surge Drum	C	Threaded connector	1.00	Gas oil	Gas Oil	L	N	P	440	Blank	NA
A-1588	3HDS	Hydrotreater	V1 Surge Drum	V	GT	10.00	Gas oil	Gas Oil	L	N	P	330	Blank	Y
A-1590	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	3.00	Gas oil	Gas Oil	L	N	P	280	Blank	NA
A-1592	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	24.00	Gas oil	Gas Oil	L	N	P	370	Blank	NA
A-1594	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	4.00	Gas oil	Gas Oil	L	N	P	370	Blank	NA
A-1596	3HDS	Hydrotreater	V1 Surge Drum	V	GT	3.00	Gas oil	Gas Oil	L	N	P	167	Blank	Y
A-1598	3HDS	Hydrotreater	V1 Surge Drum	V	GT	6.00	Gas oil	Gas Oil	L	N	P	376	Blank	Y
A-1600	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	3.00	Gas oil	Gas Oil	L	N	P	167	Blank	NA
A-1602	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	6.00	Gas oil	Gas Oil	L	N	P	376	Blank	NA
A-1604	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	14.00	Gas oil	Gas Oil	L	N	P	436	Blank	NA
A-1606	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	6.00	Gas oil	Gas Oil	L	N	P	376	Blank	NA
A-1608	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	3.00	Gas oil	Gas Oil	L	N	P	180	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1610	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	20.00	Gas oil	Gas Oil	L	N	P	215	Blank	NA
A-1612	3HDS	Hydrotreater	V1 Surge Drum	V	GT	2.00	Gas oil	Gas Oil	L	N	P	160	Blank	Y
A-1614	3HDS	Hydrotreater	V1 Surge Drum	V	GT	2.00	Gas oil	Gas Oil	L	N	P	133	Blank	Y
A-1616	3HDS	Hydrotreater	V1 Surge Drum	C	Flange	0.50	Gas oil	Gas Oil	L	N	P	160	Blank	NA
A-1618	3HDS	Hydrotreater	V1 Surge Drum	C	P	0.50	Gas oil	Gas Oil	L	N	P	160	Blank	NA
A-1620	3HDS	Hydrotreater	Feed filters	V	GT	1.00	Cold gas oil	Gas Oil	L	N	G	80	68	Y
A-1622	3HDS	Hydrotreater	Feed filters	V	GT	10.00	Cold gas oil	Gas Oil	L	N	P	88	68	Y
A-1624	3HDS	Hydrotreater	Feed filters	V	GT	1.00	Cold gas oil	Gas Oil	L	N	P	66	68	Y
A-1626	3HDS	Hydrotreater	Feed filters	C	Flange	10.00	Cold gas oil	Gas Oil	L	N	P	102	68	NA
A-1628	3HDS	Hydrotreater	Feed filters	V	GT	0.75	Cold gas oil	Gas Oil	L	N	P	59	68	Y
A-1630	3HDS	Hydrotreater	Feed filters	V	GT	1.00	Cold gas oil	Gas Oil	L	N	P	59	68	Y
A-1632	3HDS	Hydrotreater	Feed filters	V	GT	10.00	Cold gas oil	Gas Oil	L	N	P	109	68	Y
A-1634	3HDS	Hydrotreater	Feed filters	V	GT	1.00	Cold gas oil	Gas Oil	L	N	P	55	68	Y
A-1636	3HDS	Hydrotreater	Feed filters	V	GT	10.00	Cold gas oil	Gas Oil	L	N	P	60	65	Y
A-1638	3HDS	Hydrotreater	Feed filters	V	GT	1.00	Cold gas oil	Gas Oil	L	N	P	66	68	Y
A-1640	3HDS	Hydrotreater	Feed filters	V	GT	2.00	Cold gas oil	Gas Oil	L	N	G	66	Blank	Y
A-1642	3HDS	Hydrotreater	Feed filters	V	GT	2.00	Cold gas oil	Gas Oil	L	N	G	66	Blank	Y
A-1644	3HDS	Hydrotreater	Feed filters	V	GT	0.75	Cold gas oil	Gas Oil	L	N	G	65	Blank	Y
A-1646	3HDS	Hydrotreater	Feed filters	V	GT	2.00	Cold gas oil	Gas Oil	L	N	G	65	Blank	N
A-1648	3HDS	Hydrotreater	Feed filters	V	GT	1.00	Cold gas oil	Gas Oil	L	N	G	65	Blank	N
A-1650	3HDS	Hydrotreater	Feed filters	V	GT	0.75	Cold gas oil	Gas Oil	L	N	G	65	Blank	Y
A-1652	3HDS	Hydrotreater	Feed filters	V	GT	10.00	Cold gas oil	Gas Oil	L	N	G	65	Blank	Y
A-1654	3HDS	Hydrotreater	Feed filters	C	Cover	48.00	Cold gas oil	Gas Oil	L	N	P	65	Blank	NA
A-1656	DCU	Coker	Pumps	P	P10283	6.00	Gas oil LCGO	Gas Oil	N	N	G	170	50	NA
A-1658	DCU	Coker	Pumps	P	P10260	6.00	LCGO	Gas Oil	L	N	G	200	85	NA
A-1660	DCU	Coker	Pumps	P	P10229	8.00	HHCGO	Gas Oil	L	N	G	350	25	NA
A-1662	DCU	Coker	Pumps	P	P10228	8.00	HHCGO	Gas Oil	N	N	G	250	50	NA
A-1664	DCU	Coker	Pumps	P	P-10227	10.00	Frac btms	Other	N	N	G	120	250	NA
A-1666	DCU	Coker	Pumps	P	P-10226	10.00	Frac btms	Other	L	N	G	230	250	NA
A-1668	DCU	Coker	Pumps	P	P10272	10.00	Frac feed	Other	N	N	G	195	75	NA
A-1670	DCU	Coker	Pumps	P	P10273	10.00	Frac feed	Other	L	N	G	180	50	NA
A-1672	DCU	Coker	Pumps	P	P10233	10.00	HCGO	Gas Oil	L	N	G	310	475	NA
A-1674	DCU	Coker	Pumps	P	P10232	10.00	HCGO	Gas Oil	L	N	G	241	50	NA
A-1676	DCU	Coker	Pumps	P	P10250	4.00	Distillate recycle	Diesel	N	N	G	65	0	NA
A-1678	DCU	Coker	Pumps	P	P10249	4.00	Distillate recycle	Diesel	N	N	G	65	0	NA
A-1680	DCU	Coker	Pumps	P	P10234	6.00	MCGO	Gas Oil	L	N	G	416	300	NA
A-1682	DCU	Coker	Pumps	P	P10235	6.00	MCGO	Gas Oil	L	N	G	488	180	NA
A-1684	DCU	Coker	Pumps	P	P10251	6.00	LCGO	Gas Oil	L	N	G	377	150	NA
A-1688	DCU	Coker	Pumps	P	P10252	6.00	LCGO	Gas Oil	L	N	G	406	155	NA
A-1690	DCU	Coker	Pumps	P	P10230	6.00	FZGO Decant oil	Gas Oil	L	N	G	368	52	NA
A-1692	DCU	Coker	Pumps	P	P10231	6.00	FZGO Decant oil	Gas Oil	L	N	G	350	50	NA
A-1694	3HDS	Hydrotreater	Backwash	V	GT	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1696	3HDS	Hydrotreater	Feed filters	C	CAP	48.00	Gas oil	Gas Oil	N	N	P	90.5	Blank	NA
A-1698	3HDS	Hydrotreater	Backwash	V	GT	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1700	3HDS	Hydrotreater	Backwash	V	GT	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1702	3HDS	Hydrotreater	Backwash	V	GT	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1704	3HDS	Hydrotreater	Backwash	V	BF	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1706	3HDS	Hydrotreater	Backwash	V	BF	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1708	3HDS	Hydrotreater	Backwash	V	BF	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1710	3HDS	Hydrotreater	Backwash	V	BF	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1712	3HDS	Hydrotreater	Backwash	V	BF	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1714	3HDS	Hydrotreater	Backwash	V	BF	4.00	Gas oil	Gas Oil	N	N	P	60	Blank	Y
A-1716	2HDS	Hydrotreater	Pumps	P	P3944	6.00	Diesel	Diesel	L	Y	G	475	100	NA
A-1718	2HDS	Hydrotreater	Pumps	P	P3945	6.00	Diesel	Diesel	L	Y	G	450	30	NA
A-1720	2HDS	Hydrotreater	Pumps	P	P3943	6.00	Diesel	Diesel	L	Y	G	400	Gauge Broken	NA
A-1722	2HDS	Hydrotreater	Pumps	P	P3942	6.00	Diesel	Diesel	L	Y	G	340	240	NA
A-1724	2HDS	Hydrotreater	Pumps	P	P3938	4.00	Diesel	Diesel	L	Y	G	130	0	NA
A-1726	2HDS	Hydrotreater	Pumps	P	P3939	4.00	Diesel	Diesel	L	Y	G	72	0	NA
A-1728	1HDA	Hydrotreater	Pumps	P	P9668	4.00	Diesel	Diesel	L	Y	G	180	1300	NA
A-1730	1HDA	Hydrotreater	Pumps	P	P9669	4.00	Diesel	Diesel	L	Y	G	150	350	NA
A-1732	1FP	Other	Pumps	P	P9921	6.00	Vac. Twr. Sidecut	Other	L	Y	G	400	230	NA
A-1734	1FP	Other	Pumps	P	P8092	6.00	Vac. Twr. Sidecut	Other	L	Y	G	400	0	NA
A-1736	1FP	Other	Pumps	P	P8125	6.00	Vac. Twr. Bottoms	Vacuum Tower Bottoms	L	Y	G	600	115	NA
A-1738	1FP	Other	Pumps	P	P0438	4.00	Vac. Twr. Bottoms	Vacuum Tower Bottoms	L	Y	G	640	115	NA
A-1740	1FP	Other	Pumps	P	P8089	4.00	Vac. Twr. Bottoms	Vacuum Tower Bottoms	L	Y	G	600	200	NA
A-1742	HCU-1	Hydrotreater	Pumps	P	P9627	6.00	STG-1 Feed	Gas Oil	L	Y	G	140	2000	NA
A-1744	50 Crude	Crude Unit	Heat X	C	-	4.00	diesel	Diesel	N	N	G	187	Blank	NA
A-1746	50 Crude	Crude Unit	Heat X	V	GT	4.00	diesel	Diesel	N	N	G	230	Blank	Y
A-1748	50 Crude	Crude Unit	Heat X	V	GT	6.00	diesel	Diesel	N	N	G	310	Blank	Y
A-1750	50 Crude	Crude Unit	Heat X	C	-	6.00	diesel	Diesel	N	N	G	330	Blank	NA
A-1752	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	195	Blank	Y
A-1754	50 Crude	Crude Unit	Heat X	C	BP	1.00	diesel	Diesel	N	N	G	120	Blank	NA
A-1756	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	288	Blank	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1758	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	60	Blank	N
A-1760	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	55	Blank	Y
A-1762	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	55	Blank	N
A-1764	50 Crude	Crude Unit	Heat X	C	-	42.00	diesel	Diesel	N	N	G	340	Blank	NA
A-1766	50 Crude	Crude Unit	Heat X	C	-	46.00	diesel	Diesel	N	N	G	414	Blank	NA
A-1768	50 Crude	Crude Unit	Heat X	V	GT	6.00	diesel	Diesel	N	N	G	410	Blank	Y
A-1770	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	192	Blank	Y
A-1772	50 Crude	Crude Unit	Heat X	C	-	1.00	diesel	Diesel	N	N	G	250	Blank	NA
A-1774	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	76	Blank	Y
A-1776	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	82	Blank	Y
A-1780	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	74	Blank	Y
A-1782	50 Crude	Crude Unit	Heat X	V	GT	1.00	diesel	Diesel	N	N	G	341	Blank	N
A-1784	50 Crude	Crude Unit	Heat X	C	Union	1.00	diesel	Diesel	N	N	G	413	Blank	NA
A-1786	50 Crude	Crude Unit	Heat X	C	-	4.00	Resid	Resid	N	N	G	161	Blank	NA
A-1788	50 Crude	Crude Unit	Heat X	V	GT	4.00	Resid	Resid	N	N	G	253	Blank	Y
A-1790	50 Crude	Crude Unit	Heat X	V	GT	8.00	Resid	Resid	N	N	G	490	Blank	Y
A-1792	50 Crude	Crude Unit	Heat X	C	-	1.00	Resid	Resid	N	N	G	488	Blank	NA
A-1794	50 Crude	Crude Unit	Heat X	V	GT	1.00	Resid	Resid	N	N	G	129	Blank	Y
A-1796	50 Crude	Crude Unit	Heat X	C	Elbow	1.00	Resid	Resid	N	N	G	114	Blank	NA
A-1798	50 Crude	Crude Unit	Heat X	C	Elbow	1.00	Resid	Resid	N	N	G	111	Blank	NA
A-1800	50 Crude	Crude Unit	Heat X	C	Union	1.00	Resid	Resid	N	N	G	204	Blank	NA
A-1802	50 Crude	Crude Unit	Heat X	V	GT	1.00	Resid	Resid	N	N	G	322	Blank	N
A-1804	50 Crude	Crude Unit	HE 4646	V	GT	1.00	Resid	Resid	N	N	G	70	Blank	Y
A-1806	50 Crude	Crude Unit	HE 4646	V	GT	1.00	Resid	Resid	N	N	G	68	Blank	Y
A-1808	50 Crude	Crude Unit	HE 4646	V	-	8.00	Resid	Resid	N	N	G	67	Blank	Y
A-1810	50 Crude	Crude Unit	HE 4647	C	GT	8.00	Resid	Resid	N	N	G	502	Blank	NA
A-1812	50 Crude	Crude Unit	HE 4647	V	Elbow	1.00	Resid	Resid	N	N	G	527	Blank	Y
A-1814	50 Crude	Crude Unit	HE 4647	C	GT	1.00	Resid	Resid	N	N	G	230	Blank	NA
A-1816	50 Crude	Crude Unit	HE 4647	V	GT	1.00	Resid	Resid	N	N	G	160	Blank	Y
A-1818	50 Crude	Crude Unit	HE 4647	V	GT	1.00	Resid	Resid	N	N	G	129	Blank	Y
A-1820	50 Crude	Crude Unit	HE 4647	V	GT	1.00	Resid	Resid	N	N	G	116	Blank	Y
A-1822	50 Crude	Crude Unit	HE 4647	V	GT	1.00	Resid	Resid	N	N	G	99	Blank	Y
A-1824	50 Crude	Crude Unit	HE 4647	C	Bolt plug	1.00	Resid	Resid	N	N	G	99	Blank	NA
A-1826	50 Crude	Crude Unit	HE 4647	C	-	6.00	Resid	Resid	N	N	G	516	Blank	NA
A-1828	50 Crude	Crude Unit	HE 4647	V	GT	1.00	Resid	Resid	N	N	G	278	Blank	N
A-1830	50 Crude	Crude Unit	HE 4647	C	-	1.00	Resid	Resid	N	N	G	84	Blank	NA
A-1832	50 Crude	Crude Unit	HE	V	GT	2.00	diesel	Diesel	N	N	G	135	Blank	Y
A-1834	50 Crude	Crude Unit	HE	C	-	6.00	diesel	Diesel	N	N	G	199	Blank	NA
A-1836	50 Crude	Crude Unit	HE	V	GT	6.00	diesel	Diesel	N	N	G	196	Blank	Y
A-1838	50 Crude	Crude Unit	HE	V	Control	4.00	diesel	Diesel	N	N	G	207	Blank	Y
A-1840	50 Crude	Crude Unit	HE	C	-	4.00	diesel	Diesel	N	N	G	200	Blank	NA
A-1842	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	N	N	G	91	Blank	Y
A-1844	50 Crude	Crude Unit	HE	V	GT	6.00	diesel	Diesel	N	N	G	200	Blank	Y
A-1846	50 Crude	Crude Unit	HE	C	-	4.00	diesel	Diesel	N	N	G	197	Blank	NA
A-1848	50 Crude	Crude Unit	HE	V	GT	4.00	diesel	Diesel	N	N	G	154	Blank	Y
A-1850	50 Crude	Crude Unit	HE	V	GT	6.00	diesel	Diesel	N	N	O	390	Blank	Y
A-1852	50 Crude	Crude Unit	HE	C	-	6.00	diesel	Diesel	N	N	O	400	Blank	NA
A-1854	50 Crude	Crude Unit	HE	V	GT	6.00	diesel	Diesel	N	N	O	500	Blank	Y
A-1856	50 Crude	Crude Unit	HE	C	-	6.00	diesel	Diesel	N	N	O	505	Blank	NA
A-1858	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	N	N	O	250	Blank	Y
A-1860	50 Crude	Crude Unit	HE	C	BP	1.00	diesel	Diesel	N	N	O	250	Blank	NA
A-1862	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	N	N	G	380	Blank	Y
A-1864	50 Crude	Crude Unit	HE	C	BP	1.00	diesel	Diesel	N	N	G	320	Blank	NA
A-1866	50 Crude	Crude Unit	HE	V	GT	8.00	Resid	Resid	N	N	O	420	Blank	Y
A-1868	50 Crude	Crude Unit	HE	V	GT	1.00	Resid	Resid	N	N	O	200	Blank	N
A-1870	50 Crude	Crude Unit	HE	C	BP	1.00	Resid	Resid	N	N	O	200	Blank	NA
A-1872	50 Crude	Crude Unit	HE	V	GT	8.00	Resid	Resid	N	N	O	510	175	Y
A-1874	50 Crude	Crude Unit	HE	V	GT	1.00	Resid	Resid	N	N	O	450	175	Y
A-1876	50 Crude	Crude Unit	HE	V	GT	6.00	diesel	Diesel	L	N	P	195	Blank	Y
A-1878	50 Crude	Crude Unit	HE	C	-	6.00	diesel	Diesel	L	N	P	195	Blank	NA
A-1880	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	L	N	P	100	Blank	Y
A-1882	50 Crude	Crude Unit	HE	V	GT	2.00	Flush oil	Other	L	N	P	60	Blank	Y
A-1884	50 Crude	Crude Unit	HE	C	-	2.00	Flush oil	Other	L	N	P	60	Blank	NA
A-1886	50 Crude	Crude Unit	HE	V	GT	4.00	Flush oil	Other	L	N	P	165	Blank	Y
A-1888	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	L	N	P	100	Blank	N
A-1890	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	L	N	P	55	Blank	N
A-1892	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	L	N	P	55	Blank	N
A-1894	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	L	N	P	55	Blank	N
A-1896	50 Crude	Crude Unit	HE	C	BP	1.00	diesel	Diesel	L	N	P	50	Blank	N
A-1898	50 Crude	Crude Unit	HE	V	GT	6.00	diesel	Diesel	L	N	P	335	Blank	Y
A-1900	50 Crude	Crude Unit	HE	C	-	6.00	diesel	Diesel	L	N	P	340	Blank	NA
A-1902	50 Crude	Crude Unit	HE	V	GT	1.00	diesel	Diesel	L	N	P	215	Blank	Y
A-1904	50 Crude	Crude Unit	HE	V	GT	2.00	AGO	Gas Oil	N	N	P	85	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
A-1906	50 Crude	Crude Unit	HE	C	-	2.00	AGO	Gas Oil	N	N	P	70	Blank	NA
A-1908	50 Crude	Crude Unit	HE	V	GT	4.00	AGO	Gas Oil	N	N	P	155	Blank	Y
A-1910	50 Crude	Crude Unit	HE	C	-	4.00	AGO	Gas Oil	N	N	P	150	Blank	NA
A-1912	50 Crude	Crude Unit	HE	V	GT	1.00	AGO	Gas Oil	N	N	P	65	Blank	N
A-1914	50 Crude	Crude Unit	HE	V	GT	1.00	AGO	Gas Oil	N	N	P	60	Blank	N
A-1916	50 Crude	Crude Unit	HE	V	GT	1.00	AGO	Gas Oil	N	N	P	65	Blank	N
A-1918	50 Crude	Crude Unit	HE	C	BP	1.00	AGO	Gas Oil	N	N	P	60	Blank	N
A-1920	50 Crude	Crude Unit	HE	V	Needle	0.63	AGO	Gas Oil	N	N	P	65	Blank	N
A-1922	50 Crude	Crude Unit	HE	C	BP	1.00	AGO	Gas Oil	N	N	P	60	Blank	N
A-1924	50 Crude	Crude Unit	HE	C	-	6.00	AGO	Gas Oil	N	N	P	365	Blank	N
A-1926	50 Crude	Crude Unit	HE	V	GT	1.00	MPA	Kerosene	L	N	P	65	Blank	Y
A-1928	50 Crude	Crude Unit	HE	V	GT	1.00	MPA	Kerosene	L	N	P	65	Blank	N
A-1930	50 Crude	Crude Unit	HE	V	GT	1.00	MPA	Kerosene	L	N	P	65	Blank	Y
A-1932	50 Crude	Crude Unit	HE	C	BP	1.00	MPA	Kerosene	L	N	P	65	Blank	NA
A-1934	50 Crude	Crude Unit	HE	V	GT	1.00	MPA	Kerosene	L	N	P	265	Blank	N
A-1936	50 Crude	Crude Unit	HE	V	GT	4.00	MPA	Kerosene	L	N	P	330	Blank	Y
A-1938	50 Crude	Crude Unit	HE	V	GT	6.00	MPA	Kerosene	L	N	P	360	Blank	Y
A-1940	Cracking	Catalytic Cracking	Pumps	P	P0356	4.00	Gas oil - fuel	Gas Oil	N	Blank	G	58	0	NA
A-1942	Cracking	Catalytic Cracking	Pumps	P	P3089	4.00	Fuel oil	Fuel Oil	N	Blank	G	65	40	NA
A-1944	Cracking	Catalytic Cracking	Pumps	P	P3223	4.00	Cutter diesel	Diesel	N	Blank	G	65	0	NA
A-1946	Cracking	Catalytic Cracking	Pumps	P	P8565	8.00	Fuel oil (TK430)	Fuel Oil	N	Blank	G	65	0	NA
A-1948	Clarifying	Other	Pumps	P	P10140	12.00	Coker feed (TK895)	Other	L	N	G	280	65	NA
A-1950	Clarifying	Other	Pumps	P	P10142	12.00	Coker feed (TK895)	Other	N	Blank	G	300	10	NA
A-1952	Cracking	Catalytic Cracking	Pumps	P	P3398	4.00	Cutter diesel	Diesel	N	Blank	G	65	0	NA
A-1954	Tract 3	Tank Farm	Pumps	P	P10193	6.00	Diesel	Diesel	N	Blank	G	90	70	NA
A-1956	Tract 3	Tank Farm	Pumps	P	P10194	6.00	Diesel	Diesel	N	Blank	G	90	35	NA
A-1958	Tract 3	Tank Farm	Pumps	P	P244	8.00	Heavy oil transfer	Other	N	Blank	G	60	40	NA
A-1960	Tract 3	Tank Farm	Pumps	P	P247	8.00	Heavy oil transfer	Other	N	Blank	G	60	40	NA
A-1962	Tract 3	Tank Farm	Pumps	P	P3138	6.00	Diesel	Diesel	N	Blank	G	56	5.5	NA
A-1964	Tract 3	Tank Farm	Pumps	P	P676	8.00	Cutter	Other	N	Blank	G	70	4	NA
A-1966	Tract 3	Tank Farm	Pumps	PRD	Line valve	1.00	Cutter diesel	Diesel	N	Blank	G/P	70	4	NA
A-1968	Tract 3	Tank Farm	Pumps	PRD	Line valve	1.00	Cutter diesel	Diesel	N	Blank	G	70	4	NA
B-1	246	Hydrocracker	Cold feed	V	GT	6.00	Cold feed	Gas Oil	N	N	P	110	Blank	Y
B-3	246	Hydrocracker	Cold feed	V	GT	6.00	Cold feed	Gas Oil	N	N	P	110	Blank	Y
B-5	246	Hydrocracker	Cold feed	V	GT	0.75	Cold feed	Gas Oil	N	N	P	69	Blank	N
B-7	246	Hydrocracker	Cold feed	C	Plug (P)	1.00	Cold feed	Gas Oil	N	N	P	69	Blank	NA
B-9	246	Hydrocracker	Cold feed	C	F	6.00	Diesel	Diesel	L	N	P	69	Blank	NA
B-11	246	Hydrocracker	Cold feed	V	GT	6.00	Diesel	Diesel	L	N	P	69	Blank	Y
B-13	246	Hydrocracker	Cold feed	V	GT	1.00	Diesel	Diesel	L	N	P	69	Blank	Y
B-15	246	Hydrocracker	Cold feed	C	P	1.00	Diesel	Diesel	L	N	P	69	Blank	NA
B-17	246	Hydrocracker	Cold feed	V	GT	6.00	Diesel	Diesel	L	N	P	69	Blank	Y
B-19	246	Hydrocracker	Cold feed	C	F	6.00	Diesel	Diesel	L	N	P	69	Blank	NA
B-21	246	Hydrocracker	Cold feed	V	GT	1.00	Diesel	Diesel	L	N	P	69	Blank	Y
B-23	246	Hydrocracker	Cold feed	V	GT	1.00	Cold feed	Gas Oil	L	N	P	85	Blank	Y
B-25	246	Hydrocracker	Cold feed	V	Gt	6.00	Cold feed	Gas Oil	L	N	P	120	Blank	Y
B-27	246	Hydrocracker	Cold feed	V	GT	1.00	Cold feed	Gas Oil	L	N	P	90	Blank	Y
B-29	246	Hydrocracker	Cold feed	C	P	1.00	Cold feed	Gas Oil	L	N	P	90	Blank	NA
B-31	246	Hydrocracker	Cold feed	V	GT	6.00	Cold feed	Gas Oil	L	N	P	120	Blank	Y
B-33	246	Hydrocracker	Cold feed	V	GT	2.00	Cold feed	Gas Oil	L	N	P	100	Blank	Y
B-35	246	Hydrocracker	Cold feed	V	GT	1.00	Cold feed	Gas Oil	L	N	P	86	Blank	N
B-37	246	Hydrocracker	Cold feed	C	F	6.00	Cold feed	Gas Oil	L	N	P	138	Blank	NA
B-39	246	Hydrocracker	Cold feed P-017B	P	P-017B	6.00	Cold feed	Gas Oil	L	N	G	151	124	NA
B-41	246	Hydrocracker	Cold feed P-017B	V	GT	1.00	Cold feed	Gas Oil	L	N	G	95	124	Y
B-43	246	Hydrocracker	Cold feed P-017B	V	GT	6.00	Cold feed	Gas Oil	L	N	G	125	124	Y
B-45	246	Hydrocracker	Cold feed P-017B	C	Plug	1.00	Cold feed	Gas Oil	L	N	G	95	124	NA
B-47	246	Hydrocracker	Cold feed P-017B	V	GT	1.00	Cold feed	Gas Oil	L	N	G	95	124	N
B-49	246	Hydrocracker	Cold feed P-017B	V	GT	1.00	Cold feed	Gas Oil	L	N	G	95	124	N
B-51	246	Hydrocracker	Cold feed P-017B	V	GT	1.00	Cold feed	Gas Oil	L	N	G	95	124	N
B-53	246	Hydrocracker	Cold feed P-017B	V	GT	6.00	Cold feed	Gas Oil	L	N	G	115	124	Y
B-55	246	Hydrocracker	Cold feed P-017B	V	GT	1.00	Cold feed	Gas Oil	L	N	G	87	124	Y
B-57	246	Hydrocracker	Cold feed P-017B	V	GT	2.00	Cold feed	Gas Oil	L	N	G	85	124	Y
B-59	246	Hydrocracker	Cold feed P-017B	C	F	6.00	Cold feed	Gas Oil	L	N	G	130	124	NA
B-61	246	Hydrocracker	Cold feed P-017B	V	GT	1.00	Cold feed	Gas Oil	L	N	G	98	124	Y
B-63	246	Hydrocracker	P-017 B	V	GT	2.00	Cold feed	Gas Oil	L	N	G	96	124	Y
B-65	246	Hydrocracker	Cold Feed P-017A	P	P-0174	6.00	Cold feed	Gas Oil	L	N	G	158	119	NA
B-67	246	Hydrocracker	Cold Feed P-017A	C	F	6.00	Cold feed	Gas Oil	L	N	G	124.5	119	NA
B-69	246	Hydrocracker	Cold Feed P-017A	C	Plug	1.00	Cold feed	Gas Oil	L	N	G	94	119	NA
B-71	246	Hydrocracker	Cold Feed P-017A	V	GT	1.00	Cold feed	Gas Oil	L	N	G	94	119	N
B-73	246	Hydrocracker	Cold Feed P-017A	V	GT	1.00	Cold feed	Gas Oil	L	N	G	102	119	N
B-75	246	Hydrocracker	Cold Feed P-017A	V	GT	1.00	Cold feed	Gas Oil	L	N	G	102	119	N
B-77	246	Hydrocracker	Cold Feed P-017A	V	GT	6.00	Cold feed	Gas Oil	L	N	G	138	Blank	Y
B-79	246	Hydrocracker	Cold Feed P-017A	V	GT	6.00	Cold feed	Gas Oil	L	N	G	132	Blank	Y
B-81	246	Hydrocracker	Cold Feed P-017A	C	F	6.00	Cold feed	Gas Oil	L	N	G	142	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-83	246	Hydrocracker	Cold Feed	V	GT	3.00	Cold feed	Gas Oil	L	N	G	87.5	Blank	Y
B-85	246	Hydrocracker	Cold Feed	V	GT	1.00	Cold feed	Gas Oil	L	N	G	90	Blank	Y
B-87	246	Hydrocracker	Cold Feed	V	CV	3.00	Cold feed	Gas Oil	L	N	G	76.5	Blank	Y
B-89	246	Hydrocracker	Cold Feed	V	GT	1.00	Cold feed	Gas Oil	L	N	G	90	Blank	Y
B-91	246	Hydrocracker	Cold Feed	V	GT	3.00	Cold feed	Gas Oil	L	N	G	93	Blank	Y
B-93	246	Hydrocracker	Cold Feed	V	GT	0.50	Cold Feed	Gas Oil	L	N	G	86	55	Y
B-95	246	Hydrocracker	Cold Feed	V	GT	1.00	Cold Feed	Gas Oil	L	N	G	86	55	Y
B-97	246	Hydrocracker	Cold Feed	C	Pressure Gauge	0.50	Cold feed	Gas Oil	L	N	G	86	55	NA
B-99	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold feed	Gas Oil	L	N	G	150	Blank	Y
B-101	246	Hydrocracker	Cold Feed	V	GT	1.00	Cold feed	Gas Oil	L	N	G	150	Blank	Y
B-103	246	Hydrocracker	Cold Feed	C	Plug	1.00	Cold Feed	Gas Oil	L	N	G	150	Blank	NA
B-105	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	G	150	Blank	Y
B-107	246	Hydrocracker	Cold Feed	V	GT	1.00	Cold Feed	Gas Oil	L	N	G	150	Blank	Y
B-109	246	Hydrocracker	Cold Feed	C	Plug	1.00	Cold feed	Gas Oil	L	N	G	150	Blank	NA
B-111	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold feed	Gas Oil	L	N	G	70	Blank	N
B-113	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold feed	Gas Oil	L	N	G	60	Blank	N
B-115	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold feed	Gas Oil	L	N	G	70	Blank	N
B-117	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold feed	Gas Oil	L	N	G	70	Blank	N
B-119	246	Hydrocracker	Cold Feed	C	Flange	0.75	Cold feed	Gas Oil	L	N	G	70	Blank	NA
B-121	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold Feed	Gas Oil	L	N	G	70	Blank	N
B-123	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold Feed	Gas Oil	L	N	G	70	Blank	N
B-125	246	Hydrocracker	Cold Feed	C	Plug	0.75	Cold Feed	Gas Oil	L	N	G	70	Blank	NA
B-127	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold feed	Gas Oil	L	N	G	70	Blank	N
B-129	246	Hydrocracker	Cold feed	V	GT	4.00	Cold Feed	Gas Oil	L	N	G	145	Blank	Y
B-131	246	Hydrocracker	Cold Feed	V	GT	5.00	Cold feed	Gas Oil	L	N	G	80	Blank	Y
B-133	246	Hydrocracker	Cold Feed	V	Control Valve	4.00	Cold Feed	Gas Oil	L	N	G	90	Blank	Y
B-135	246	Hydrocracker	Cold Feed	V	GT	4.00	Cold feed	Gas Oil	L	N	G	90	Blank	Y
B-137	246	Hydrocracker	Cold Feed	V	GT	0.75	Cold Feed	Gas Oil	L	N	G	90	Blank	Y
B-139	246	Hydrocracker	Cold Feed	C	Flange	6.00	Cold feed	Gas Oil	L	N	G	110	Blank	NA
B-141	246	Hydrocracker	Cold Feed	V	GT	1.00	Cold Feed	Gas Oil	L	N	G	80	Blank	Y
B-143	246	Hydrocracker	Cold Feed	V	Control Valve	6.00	Cold feed	Gas Oil	L	N	G	80	Blank	Y
B-145	246	Hydrocracker	Cold Feed	V	GT	3.00	Cold feed	Gas Oil	L	N	G	110	Blank	Y
B-147	246	Hydrocracker	Cold Feed	V	GT	2.00	Cold Feed	Gas Oil	L	N	G	110	Blank	Y
B-149	246	Hydrocracker	Cold Feed	V	Control Valve	3.00	Cold Feed	Gas Oil	L	N	G	110	Blank	Y
B-151	246	Hydrocracker	Cold Feed	V	GT	3.00	Cold feed	Gas Oil	L	N	G	110	Blank	Y
B-153	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	G	100	Blank	Y
B-155	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	G	130	Blank	Y
B-157	246	Hydrocracker	Cold Feed	C	Flange	8.00	Cold Feed	Gas Oil	L	N	G	100	120	NA
B-159	246	Hydrocracker	Cold Feed	C	Flange	8.00	Cold Feed	Gas Oil	L	N	G	100	120	NA
B-161	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	140	Blank	Y
B-163	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	160	Blank	Y
B-165	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	120	Blank	Y
B-167	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	116	Blank	Y
B-169	246	Hydrocracker	Cold Feed	C	Flange	6.00	Cold Feed	Gas Oil	L	N	P	140	Blank	NA
B-171	246	Hydrocracker	Cold Feed	V	GT	1.00	Cold Feed	Gas Oil	L	N	G	91	Blank	Y
B-173	246	Hydrocracker	Cold Feed	V	GT	6.00	Cold Feed	Gas Oil	L	N	G	128	Blank	Y
B-175	246	Hydrocracker	Cold Feed	V	GT	2.00	Cold Feed	Gas Oil	L	N	G	96	Blank	Y
B-177	246	Hydrocracker	Cold Feed	C	Flange	2.00	Cold Feed	Gas Oil	L	N	G	96	Blank	NA
B-179	246	Hydrocracker	Cold Feed	V	GT	2.00	Cold Feed	Gas Oil	L	N	G	96	Blank	Y
B-181	246	Hydrocracker	Cold Feed	C	Flange	2.00	Cold Feed	Gas Oil	L	N	G	96	Blank	NA
B-183	246	Hydrocracker	Cold Feed E845	C	Flange	30.00	Cold feed	Gas Oil	N	N	P	115	Blank	NA
B-185	246	Hydrocracker	Cold Feed E845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	142	Blank	N
B-187	246	Hydrocracker	Cold Feed E845	V	GT	4.00	Cold feed	Gas Oil	L	N	P	172	Blank	Y
B-189	246	Hydrocracker	Cold Feed E845	C	Flange	4.00	Cold feed	Gas Oil	L	N	P	172	Blank	NA
B-191	246	Hydrocracker	Cold Feed E845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	369	Blank	Y
B-193	246	Hydrocracker	Cold Feed E845	V	Control Valve	6.00	Cold Feed	Gas Oil	L	N	P	237	Blank	Y
B-195	246	Hydrocracker	Cold Feed E845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	121	Blank	Y
B-197	246	Hydrocracker	Cold Feed E845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	121	Blank	Y
B-199	246	Hydrocracker	Cold Feed E845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	118	Blank	Y
B-201	246	Hydrocracker	Cold Feed E845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	143	Blank	Y
B-203	246	Hydrocracker	Cold Feed E845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	125	Blank	Y
B-205	246	Hydrocracker	Cold Feed E845	C	Plug	1.00	Cold Feed	Gas Oil	L	N	P	125	Blank	NA
B-207	246	Hydrocracker	Cold Feed E845	C	Flange	2.00	Cold Feed	Gas Oil	L	N	P	150	Blank	NA
B-209	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	170	Blank	Y
B-211	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	Cold feed	Gas Oil	L	N	P	100	Blank	Y
B-213	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	100	Blank	Y
B-215	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	100	Blank	Y
B-217	246	Hydrocracker	Cold Feed E-846/845	C	Plug	1.00	Cold Feed	Gas Oil	L	N	P	100	Blank	NA
B-219	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	Heavy Diesel	Diesel	L	N	P	200	Blank	Y
B-221	246	Hydrocracker	Cold Feed E-846/845	V	GT	1.00	Heavy Diesel	Diesel	L	N	P	200	Blank	N
B-223	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	Heavy Diesel	Diesel	L	N	P	200	Blank	N
B-225	246	Hydrocracker	Cold Feed E-846/845	V	GT	1.00	Heavy Diesel	Diesel	L	N	P	200	Blank	N
B-227	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	HUK	Gas Oil	L	N	P	125	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-229	246	Hydrocracker	Cold Feed E-846/845	V	GT	1.00	HUK	Gas Oil	L	N	P	125	Blank	Y
B-231	246	Hydrocracker	Cold Feed E-846/845	C	Plug	1.00	HUK	Gas Oil	L	N	P	125	Blank	NA
B-233	246	Hydrocracker	Cold Feed E-846/845	V	GT	6.00	HUK	Gas Oil	L	N	P	125	Blank	Y
B-235	246	Hydrocracker	Cold Feed E-846/845	V	GT	0.50	Cold Feed	Gas Oil	L	N	P	70	50	Y
B-237	246	Hydrocracker	Cold Feed E-846/845	V	GT	0.50	Cold Feed	Gas Oil	L	N	P	70	50	Y
B-239	246	Hydrocracker	E-846 E-845	C	Flange	1.00	Cold Feed	Gas Oil	L	N	P	70	50	NA
B-241	246	Hydrocracker	E-846 E-845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	70	50	Y
B-243	246	Hydrocracker	E-846 E-845	V	GT	0.75	Cold Feed	Gas Oil	L	N	P	70	50	Y
B-245	246	Hydrocracker	E-846 E-845	V	GT	0.75	Cold Feed	Gas Oil	L	N	P	70	50	Y
B-247	246	Hydrocracker	E-846 E-845	V	GT	6.00	Cold feed	Gas Oil	L	N	P	100	50	Y
B-249	246	Hydrocracker	E-846 E-845	C	Threaded Conn	0.50	Cold feed	Gas Oil	L	N	P	100	50	NA
B-251	246	Hydrocracker	E-846 E-845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	76	Blank	Y
B-253	246	Hydrocracker	E-846 E-845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	95	Blank	Y
B-255	246	Hydrocracker	E-846 E-845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	95	Blank	N
B-257	246	Hydrocracker	E-846 E-845	C	Plug	1.00	Cold Feed	Gas Oil	L	N	P	95	Blank	NA
B-259	246	Hydrocracker	E-846 E-845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	95	Blank	N
B-261	246	Hydrocracker	E-846 E-845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	85	Blank	Y
B-263	246	Hydrocracker	E-846 E-845	C	Plug	1.00	Cold Feed	Gas Oil	L	N	P	85	Blank	NA
B-265	246	Hydrocracker	E-846 E-845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	100	Blank	Y
B-267	246	Hydrocracker	E-846 E-845	V	Control Valve	6.00	Cold Feed	Gas Oil	L	N	P	100	Blank	Y
B-269	246	Hydrocracker	E-846 E-845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	87	Blank	Y
B-271	246	Hydrocracker	E-846 E-845	C	Plug	1.00	Cold Feed	Gas Oil	L	N	P	87	Blank	NA
B-273	246	Hydrocracker	E-846 E-845	V	GT	6.00	Cold Feed	Gas Oil	L	N	P	150	Blank	Y
B-275	246	Hydrocracker	E-846 E-845	C	Flange	6.00	Cold Feed	Gas Oil	L	N	P	150	Blank	NA
B-277	246	Hydrocracker	E-846 E-845	V	GT	3.00	Cold Feed	Gas Oil	L	N	P	110	Blank	Y
B-279	246	Hydrocracker	E-846 E-845	V	GT	1.00	Cold Feed	Gas Oil	L	N	P	100	Blank	Y
B-281	246	Hydrocracker	E-846 E-845	C	Plug	1.00	Cold Feed	Gas Oil	L	N	P	100	Blank	NA
B-283	246	Hydrocracker	E-846 E-845	C	Flange	8.00	Cold Feed	Gas Oil	L	N	P	100	Blank	NA
B-285	246	Hydrocracker	Pump area	P	G-809	8.00	TPA/HUK	Gas Oil	H	N	G	225	60	NA
B-287	246	Hydrocracker	Pump area	C	Flange	6.00	TPA/HUK	Gas Oil	L	N	G	250	Blank	NA
B-289	246	Hydrocracker	Pump area	C	Flange	8.00	TPA/HUK	Gas Oil	L	N	G	250	Blank	NA
B-291	246	Hydrocracker	Pump area	V	GT	1.00	TPA/HUK	Gas Oil	L	N	G	100	Blank	Y
B-293	246	Hydrocracker	Pump area	C	Flange	8.00	TPA/HUK	Gas Oil	L	N	G	230	Blank	NA
B-295	246	Hydrocracker	Pump area	V	GT	1.00	TPA/HUK	Gas Oil	L	N	G	100	Blank	Y
B-297	246	Hydrocracker	Pump area	V	GT	1.00	TPA/HUK	Gas Oil	L	N	G	100	Blank	Y
B-299	246	Hydrocracker	Pump area	V	GT	1.00	TPA/HUK	Gas Oil	L	N	G	100	Blank	Y
B-301	246	Hydrocracker	Pump area	V	GT	8.00	TPA/HUK	Gas Oil	L	N	G	200	Blank	Y
B-303	246	Hydrocracker	Pump area	V	GT	2.00	TPA/HUK	Gas Oil	L	N	G	200	Blank	Y
B-305	246	Hydrocracker	Pump area	C	Flange	12.00	TPA/HUK	Gas Oil	L	N	G	245	Blank	NA
B-307	246	Hydrocracker	Pump area	V	GT	12.00	TPA/HUK	Gas Oil	L	N	G	245	Blank	Y
B-309	246	Hydrocracker	Pump area	P		Blank	TPA/HUK	Gas Oil	H	N	G	154	Blank	NA
B-311	246	Hydrocracker	Pump area	P		Blank	Vacuum Column Bottoms	Gas Oil	H	N	G	158	Blank	NA
B-313	246	Hydrocracker	Pump area	P		8.00	Vacuum Column Bottoms	Gas Oil	H	N	G	350	Blank	NA
B-315	246	Hydrocracker	Pump area	P		Blank	Vacuum Column Bottoms	Gas Oil	H	N	G	279	Blank	NA
B-317	246	Hydrocracker	Hot feed	V	GT	8.00	Hydro treater charge	Gas Oil	N	N	G	300	Blank	Y
B-319	246	Hydrocracker	Hot Feed	V	GT	8.00	Hydro treater charge	Gas Oil	N	N	G	307	Blank	Y
B-321	246	Hydrocracker	Hot feed	V	GT	1.00	Hydro treater charge	Gas Oil	N	N	G	80	Blank	N
B-323	246	Hydrocracker	Hot feed	V	GT	8.00	Hydro treater charge	Gas Oil	N	N	G	333	Blank	Y
B-325	246	Hydrocracker	Hot feed	C	Flange	8.00	Hydro treater charge	Gas Oil	N	N	G	266	Blank	NA
B-327	246	Hydrocracker	Hot feed	C	Flange	8.00	Hydro treater charge	Gas Oil	N	N	G	273	Blank	NA
B-329	246	Hydrocracker	Hot feed	V	GT	1.00	Hydro treater charge	Gas Oil	N	N	G	82	Blank	N
B-331	246	Hydrocracker	Hot feed	V	GT	4.00	Hydro treater charge	Gas Oil	N	N	G	256	Blank	Y
B-333	246	Hydrocracker	Hot feed	V	GT	1.00	Hydro treater charge	Gas Oil	N	N	G	90	Blank	N
B-335	246	Hydrocracker	Hot Feed	V	GT	4.00	Hydro treater charge	Gas Oil	N	N	G	230	Blank	Y
B-337	246	Hydrocracker	F-802	V	GT	2.00	F-802 Bottoms	Gas Oil	L	N	P	165	Blank	Y
B-339	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	60	Blank	N
B-341	246	Hydrocracker	F-802	V	Plug	1.00	F-802 Bottoms	Gas Oil	L	N	P	60	Blank	Y
B-343	246	Hydrocracker	F-802	C	Flange	10.00	F-802 Bottoms	Gas Oil	L	N	P	360	Blank	NA
B-345	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	65	Blank	N
B-347	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	65	Blank	N
B-349	246	Hydrocracker	F-802	C	Flange	1.00	F-802 Bottoms	Gas Oil	L	N	P	65	Blank	NA
B-351	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	65	Blank	N
B-353	246	Hydrocracker	F-802	V	GT	2.00	F-802 Bottoms	Gas Oil	L	N	P	90	Blank	Y
B-355	246	Hydrocracker	F-802	V	GT	2.00	F-802 Bottoms	Gas Oil	L	N	P	200	Blank	Y
B-357	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	140	Blank	Y
B-359	246	Hydrocracker	F-802	V	Plug	1.00	F-802 Bottoms	Gas Oil	L	N	P	140	Blank	Y
B-361	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	80	Blank	Y
B-363	246	Hydrocracker	F-802	V	Plug	1.00	F-802 Bottoms	Gas Oil	L	N	P	80	Blank	Y
B-365	246	Hydrocracker	F-802	V	GT	2.00	F-802 Bottoms	Gas Oil	L	N	P	170	Blank	Y
B-367	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	150	Blank	Y
B-369	246	Hydrocracker	F-802	C	Plug	1.00	F-802 Bottoms	Gas Oil	L	N	P	170	Blank	NA
B-371	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	p	80	Blank	Y
B-373	246	Hydrocracker	F-802	C	Plug	1.00	F-802 Bottoms	Gas Oil	L	N	P	80	Blank	NA

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B-375	246	Hydrocracker	F-802	C	Flange	24.00	F-802 Bottoms	Gas Oil	L	N	P	360	Blank	NA
B-377	246	Hydrocracker	F-802	V	GT	3.00	F-802 Bottoms	Gas Oil	L	N	P	170	Blank	Y
B-379	246	Hydrocracker	F-802	C	Flange	12.00	F-802 Bottoms	Gas Oil	L	N	P	360	Blank	NA
B-381	246	Hydrocracker	F-802	V	GT	12.00	F-802 Bottoms	Gas Oil	L	N	P	360	Blank	Y
B-383	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	130	Blank	Y
B-385	246	Hydrocracker	F-802	C	Plug	1.00	F-802 Bottoms	Gas Oil	L	N	P	130	Blank	NA
B-387	246	Hydrocracker	F-802	V	GT	12.00	F-802 Bottoms	Gas Oil	L	N	P	360	Blank	Y
B-389	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	L	N	P	240	Blank	Y
B-391	246	Hydrocracker	F-802	C	Plug	1.00	F-802 Bottoms	Gas Oil	L	N	P	240	Blank	NA
B-393	246	Hydrocracker	G-801	P	Oil ISO 32	8.00	F-802 Bottoms	Gas Oil	L	N	G	172	Blank	NA
B-395	246	Hydrocracker	F-802	V	GT	10.00	F-802 Bottoms	Gas Oil	L	N	G	320	Blank	Y
B-397	246	Hydrocracker	F-802	V	GT	1.00	F-802 Bottoms	Gas Oil	N	N	G	114	Blank	N
B-399	246	Hydrocracker	F-802	C	Plug	1.00	F-802 Bottoms	Gas Oil	N	N	G	92	Blank	NA
B-401	246	Hydrocracker	F-802	C	Flange	10.00	F-802 Bottoms	Gas Oil	N	N	G	347	Blank	NA
B-403	246	Hydrocracker	G801 - E805	V	GT	4.00	HT Charge	Gas Oil	L	N	G	231	Blank	Y
B-405	246	Hydrocracker	G801 - E805	V	Control Valve	3.00	HT Charge	Gas Oil	L	N	G	243	Blank	Y
B-407	246	Hydrocracker	From 8E- 829	V	GT	6.00	Heavy Diesel	Diesel	L	N	G	99	Blank	Y
B-409	246	Hydrocracker	From 8E-829	C	Flange	6.00	Heavy Diesel	Diesel	L	N	G	104	Blank	NA
B-411	246	Hydrocracker	From 8E-829	V	GT	1.00	Heavy Diesel	Diesel	L	N	G	77	Blank	N
B-413	246	Hydrocracker	From 8E-829	C	Plug	1.00	Heavy Diesel	Diesel	L	N	G	77	Blank	NA
B-415	246	Hydrocracker	From 8E-829	V	Control Valve	4.00	Heavy Diesel	Diesel	L	N	G	98.5	Blank	Y
B-417	246	Hydrocracker	From 8E-829	V	GT	1.00	Heavy Diesel	Diesel	L	N	G	78	Blank	Y
B-419	246	Hydrocracker	From 8E-829	C	Plug	1.00	Heavy Diesel	Diesel	L	N	G	78	Blank	NA
B-421	246	Hydrocracker	From 8E-829	V	GT	6.00	Heavy Diesel	Diesel	L	N	G	95.5	Blank	Y
B-423	246	Hydrocracker	From 8E-829	C	Flange	4.00	Heavy Diesel	Diesel	L	N	G	88	Blank	NA
B-425	246	Hydrocracker	From 8E-829	V	GT	4.00	Heavy Diesel	Diesel	L	N	G	85	Blank	Y
B-427	246	Hydrocracker	8E-829	V	GT	1.00	Heavy Diesel	Diesel	L	N	G	80	Blank	Y
B-429	246	Hydrocracker	8E-829	V	GT	1.00	Heavy Diesel	Diesel	L	N	G	102	Blank	Y
B-431	246	Hydrocracker	8E-829	C	TC	1.00	Heavy Diesel	Diesel	L	N	G	89	Blank	NA
B-433	246	Hydrocracker	8E-829	V	GT	1.00	Heavy Diesel	Diesel	L	N	G	94	Blank	Y
B-435	246	Hydrocracker	8E-830	V	GT	4.00	Recycled Oil	Other	L	N	G	290	Blank	Y
B-437	246	Hydrocracker	8E-830	V	GT	4.00	Recycled Oil	Other	L	N	G	306	Blank	Y
B-439	246	Hydrocracker	8F-805	V	GT	4.00	Recycled Oil	Other	L	N	G	355	Blank	Y
B-441	246	Hydrocracker	8F-805	V	GT	4.00	Recycled Oil	Other	L	N	G	322	Blank	Y
B-443	246	Hydrocracker	G808A Pumps	V	GT	1.00	Bottoms	Gas Oil	L	N	G	102	Blank	Y
B-445	246	Hydrocracker	G 808A	V	GT	1.00	Bottoms	Gas Oil	L	N	G	116	Blank	Y
B-447	246	Hydrocracker	G 808A	C	Flange	4.00	Bottoms	Gas Oil	L	N	G	366	Blank	NA
B-449	246	Hydrocracker	G 808A	V	GT	4.00	Bottoms	Gas Oil	L	N	G	371	Blank	Y
B-451	246	Hydrocracker	G 808A	V	GT	1.00	Bottoms	Gas Oil	L	N	G	160	Blank	Y
B-453	246	Hydrocracker	G 808A	C	Plug	1.00	Bottoms	Gas Oil	L	N	G	189	Blank	NA
B-455	246	Hydrocracker	G 808A	V	GT	4.00	Bottoms	Gas Oil	L	N	G	196	Blank	Y
B-457	246	Hydrocracker	Pumps G808A	V	GT	8.00	Bottoms	Gas Oil	L	N	G	174	Blank	Y
B-459	246	Hydrocracker	Pumps G808A	V	GT	8.00	Bottoms	Gas Oil	L	N	G	163	Blank	Y
B-461	246	Hydrocracker	Pumps G808A	V	GT	1.00	Bottoms	Gas Oil	L	N	G	94	Blank	Y
B-463	246	Hydrocracker	Pumps G808A	C	Plug	1.00	Bottoms	Gas Oil	L	N	G	94	Blank	NA
B-465	246	Hydrocracker	G 808B Pumps	V	GT	8.00	Bottoms	Gas Oil	L	N	G	194	Blank	Y
B-467	246	Hydrocracker	G 808B Pumps	V	GT	1.00	Bottoms	Gas Oil	L	N	G	83	Blank	Y
B-469	246	Hydrocracker	G 808B Pumps	C	Plug	1.00	Bottoms	Gas Oil	L	N	G	83	Blank	NA
B-471	246	Hydrocracker	G 808B Pumps	V	GT	8.00	Bottoms	Gas Oil	L	N	G	188	Blank	Y
B-473	246	Hydrocracker	G 808B Pumps	V	GT	4.00	Bottoms	Gas Oil	L	N	G	194	Blank	Y
B-475	246	Hydrocracker	G 808B Pumps	V	GT	1.00	Bottoms	Gas Oil	L	N	G	110	Blank	Y
B-477	246	Hydrocracker	G 808B Pumps	C	Plug	1.00	Bottoms	Gas Oil	L	N	G	110	Blank	NA
B-479	246	Hydrocracker	G 808B Pumps	V	GT	4.00	Bottoms	Gas Oil	L	N	G	199	Blank	Y
B-481	246	Hydrocracker	G 808B Pumps	C	Flange	4.00	Bottoms	Gas Oil	L	N	G	223	Blank	NA
B-483	246	Hydrocracker	G 808B Pumps	V	GT	1.00	Bottoms	Gas Oil	L	N	G	109	Blank	Y
B-485	246	Hydrocracker	G 808B Pumps	V	GT	1.00	Bottoms	Gas Oil	L	N	G	105	Blank	Y
B-487	200 / Coker	Coker	Pumps	P	P-216A	6.00	Blank	Unknown	L	N	G	267	130	NA
B-489	200 / Coker	Coker	Pumps	P	P-216	6.00	Blank	Unknown	L	N	G	131	80	NA
B-491	200 / Coker	Coker	Pumps	P	P-217	6.00	Blank	Unknown	L	N	G	350	Blank	NA
B-493	200 / Coker	Coker	Pumps	P	P-217A	6.00	Blank	Unknown	L	N	G	154	Blank	NA
B-495	200 / Coker	Coker	Pumps	P	P-222	3.00	LCGO	Gas Oil	L	N	G	153	Blank	NA
B-497	200 / Coker	Coker	Pumps	P	P-222A	3.00	LCGO	Gas Oil	L	N	G	296	Blank	NA
B-499	200 / Coker	Coker	Pumps	P	P-227	3.00	HCGO	Gas Oil	L	N	G	372	Blank	NA
B-501	200 / Coker	Coker	Pumps	P	P-227A	3.00	HCGO	Gas Oil	L	N	G	367	Blank	NA
B-503	200 / Coker	Coker	Pumps	P	P-213	12.00	Blank	Unknown	L	N	G	504	Blank	NA
B-505	200 / Coker	Coker	Pumps	P	P-213A	12.00	Blank	Unknown	L	N	G	436	Blank	NA
B-507	200 / Coker	Coker	Pumps	P	P-218	3.00	coke bottoms	Coke	L	N	G	192	Blank	NA
B-509	267	Crude Unit	Pumps	P	GM- 260	3.00	Purge Oil	Gas Oil	L	N	G	160	70	NA
B-511	267	Crude Unit	Pumps	P	GM-51	4.00	Recovered Oil	Recovered Oil	L	N	G	230	45	NA
B-513	267	Crude Unit	Pumps	P	G-55	2.00	Slop?	Slop Oil	L	N	G	225	10	NA
B-515	267	Crude Unit	pumps	P	G-612A	4.00	Bottoms	Gas Oil	L	N	G	220	110	NA
B-517	267	Crude Unit	Pumps	P	G-612	4.00	Bottoms	Gas Oil	L	N	G	240	120	NA
B-519	267	Crude Unit	Pumps	P	G-615A	6.00	Heavy Diesel	Diesel	L	N	G	150	75	NA

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B-521	267	Crude Unit	Pumps	P	GM-615	6.00	Heavy Diesel	Diesel	L	N	G	150	240	NA
B-523	267	Crude Unit	Pumps	P	G-617A	4.00	VT Bottoms	Gas Oil	L	N	G	200	30	NA
B-525	267	Crude Unit	Pumps	P	G-617	3.00	VT Bottoms	Gas Oil	L	N	G	230	5	NA
B-527	76	Blending / Tank Farm	Pumps	P	G-26	Blank	Cetane	Cetane Improver	L	N	G	75	0	NA
B-529	76	Blending / Tank Farm	Pumps	P	G-462	Blank	Diesel	Diesel	L	N	G	100	140	NA
B-531	244	Catalytic Reformer	Pumps	P	G-507B	Blank	Lube oil	Lube Oil	L	N	G	80	70	NA
B-533	244	Catalytic Reformer	Pumps	P	G-507A	Blank	Lube oil	Lube Oil	L	N	G	100	70	NA
B-535	248	Aromatic Saturation	Pumps	P	G-606A	Blank	hot oil	Hot Oil	L	N	G	500	160	NA
B-537	248	Aromatic Saturation	Pumps	P	G-606B	Blank	hot oil	Hot Oil	L	N	G	500	75	NA
B-539	248	Aromatic Saturation	Pumps	P	G-605A	6.00	Turbine Fuel	Turbine Fuel	L	N	G	129	160	NA
B-541	248	Aromatic Saturation	Pumps	P	G605B	6.00	Turbine Fuel	Turbine Fuel	L	N	G	138	160	NA
B-543	248	Aromatic Saturation	Pumps	P	G-611A	Blank	Lube oil	Lube Oil	L	N	G	135	65	NA
B-545	248	Aromatic Saturation	Pumps	P	G611B	Blank	Lube oil	Lube Oil	L	N	G	129	65	NA
B-547	240	Hydrocracker	Pumps	P	G-311	6.00	HUK	Gas Oil	L	N	G	247	185	NA
B-549	240	Hydrocracker	Pump	P	G314A	Blank	Lean Sponge Oil	Slop Oil	L	N	G	76.5	130	NA
B-551	240	Hydrocracker	Pumps	P	G314B	6.00	Lean Sponge Oil	Slop Oil	L	N	G	75.5	130	NA
B-553	240	Hydrocracker	Pumps	P	G312A	Blank	Frac reboil	Diesel	L	N	G	388	150	NA
B-555	240-3	Fractionation	Pumps	P	G-312B	Blank	hot oil	Hot Oil	L	N	G	500	160	NA
B-557	80	Tank Farm	Pumps	P	G-8	Blank	Turbine Fuel	Turbine Fuel	L	N	G	65	0	NA
B-559	80	Tank Farm	Pumps	P	G-407	Blank	Seasonal storage(diesel)	Diesel	L	N	G	68	50	NA
B-561	230	Hydrotreater	Pumps	P	G-400	Blank	reboil make up	Diesel	N	N	G	100.5	40	NA
B-563	230	Hydrotreater	Pumps	P	G111A	Blank	Seal oil	Seal Oil	L	N	G	222	Blank	NA
B-565	229	Hydrotreater	Pumps	P	G306A	Blank	reboil circulation	Diesel	L	N	G	131	Blank	NA
B-567	229	Hydrotreater	Pumps	P	G306A	Blank	reboil circulation	Diesel	L	N	G	290	Blank	NA
B-569	228	Isomerization	Pumps	P	G548	Blank	deisopentanizer	Condensate	L	N	G	148	Blank	NA
B-571	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	8.00	VTHGO	Gas Oil	L	N	P	400	Blank	NA
B-573	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	8.00	VTHGO	Gas Oil	L	N	P	475	Blank	NA
B-575	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	1.50	VTHGO	Gas Oil	L	N	P	400	Blank	NA
B-577	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	8.00	VTHGO	Gas Oil	L	N	P	550	Blank	NA
B-579	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	6.00	VTHGO	Gas Oil	L	N	P	500	Blank	NA
B-581	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	1.50	VTHGO	Gas Oil	L	N	P	500	Blank	NA
B-583	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	1.50	VTHGO	Gas Oil	L	N	P	500	Blank	NA
B-585	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	1.50	VTHGO	Gas Oil	L	N	P	450	Blank	NA
B-587	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	1.50	VTHGO	Gas Oil	L	N	P	450	Blank	NA
B-589	200	Crude Unit / Coker	Heat Exchanger 237	C	TC	1.00	VTHGO	Gas Oil	L	N	P	100	Blank	NA
B-591	200	Crude Unit / Coker	Heat Exchanger 237	V	GT	1.00	VTHGO	Gas Oil	L	N	P	100	Blank	Y
B-593	200	Crude Unit / Coker	Heat Exchanger 237	V	GT	1.50	VTHGO	Gas Oil	L	N	P	100	Blank	Y
B-595	200	Crude Unit / Coker	Heat Exchanger 237	C	Flange	1.00	VTHGO	Gas Oil	L	N	P	100	Blank	NA
B-597	200	Crude Unit / Coker	Heat Exchanger 237	V	GT	1.50	VTHGO	Gas Oil	L	N	P	100	Blank	Y
B-599	200	Crude Unit / Coker	Heat Exchanger 237	V	GT	2.00	VTHGO	Gas Oil	L	N	P	75	Blank	Y
B-601	200	Crude Unit / Coker	Strainer	V	GT	1.00	VTLGO	Gas Oil	L	N	P	80	Blank	Y
B-603	200	Crude Unit / Coker	Strainer	C	Flange	1.00	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-605	200	Crude Unit / Coker	Strainer	V	GT	1.00	VTLGO	Gas Oil	L	N	P	80	Blank	Y
B-607	200	Crude Unit / Coker	Strainer	C	Flange	8.00	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-609	200	Crude Unit / Coker	Strainer	V	GT	8.00	VTLGO	Gas Oil	L	N	P	80	Blank	Y
B-611	200	Crude Unit / Coker	Strainer	V	GT	8.00	VTLGO	Gas Oil	L	N	P	80	Blank	Y
B-613	200	Crude Unit / Coker	Strainer	V	GT	1.00	VTLGO	Gas Oil	L	N	P	80	Blank	Y
B-615	200	Crude Unit / Coker	Strainer	C	Plug	1.00	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-617	200	Crude Unit / Coker	Strainer	C	Flange	1.50	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-619	200	Crude Unit / Coker	Strainer	V	GT	1.50	VTLGO	Gas Oil	L	N	P	80	Blank	Y
B-621	200	Crude Unit / Coker	Strainer	C	Plug	1.50	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-623	200	Crude Unit / Coker	Strainer	C	Flange	8.00	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-625	200	Crude Unit / Coker	Strainer	V	GT	8.00	VTLGO	Gas Oil	L	N	P	80	Blank	Y
B-627	200	Crude Unit / Coker	Strainer	C	Flange	8.00	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-629	200	Crude Unit / Coker	Strainer	C	Flange	8.00	VTLGO	Gas Oil	L	N	P	80	Blank	NA
B-631	200	Crude Unit / Coker	Strainer	V	GT	8.00	VTHGO	Gas Oil	L	N	P	250	Blank	Y
B-633	200	Crude Unit / Coker	Strainer	V	GT	8.00	VTHGO	Gas Oil	L	N	P	250	Blank	Y
B-635	200	Crude Unit / Coker	Strainer	V	GT	1.00	VTHGO	Gas Oil	L	N	P	250	Blank	Y
B-637	200	Crude Unit / Coker	Strainer	V	GT	1.00	VTHGO	Gas Oil	L	N	P	100	Blank	Y
B-639	200	Crude Unit / Coker	Strainer	V	GT	1.00	VTHGO	Gas Oil	L	N	P	115	Blank	Y
B-641	200	Crude Unit / Coker	Strainer	C	Plug	1.00	VTHGO	Gas Oil	L	N	P	115	Blank	NA
B-643	200	Crude Unit / Coker	Strainer	C	Flange	4.00	VTHGO	Gas Oil	L	N	P	115	Blank	NA
B-645	200	Crude Unit / Coker	Strainer	V	GT	1.00	VTHGO	Gas Oil	L	N	P	70	Blank	Y
B-647	200	Crude Unit / Coker	Strainer	C	Flange	1.00	VTHGO	Gas Oil	L	N	P	70	Blank	NA
B-649	200	Crude Unit / Coker	Strainer	V	0.3	8.00	VTHGO	Gas Oil	L	N	P	250	Blank	Y
B-651	200	Crude Unit / Coker	Strainer	V	GT	8.00	VTHGO	Gas Oil	L	N	P	250	Blank	Y
B-653	200	Crude Unit / Coker	Strainer	V	GT	1.50	Slops	Slop Oil	L	N	P	100	Blank	Y
B-655	200	Crude Unit / Coker	Strainer	C	Flange	1.50	Slops	Slop Oil	L	N	P	100	Blank	NA
B-657	200	Crude Unit / Coker	Strainer	V	GT	1.50	Slops	Slop Oil	L	N	P	100	Blank	Y
B-659	200	Crude Unit / Coker	Strainer	C	Flange	1.50	Slops	Slop Oil	L	N	P	100	Blank	NA
B-661	200	Crude Unit / Coker	E-210	V	GT	4.00	SCTGO	Gas Oil	L	N	G	450	Blank	Y
B-663	200	Crude Unit / Coker	E-104	C	F	Blank	Blank	Unknown	L	N	G	85	Blank	NA
B-665	200	Crude Unit / Coker	E-104	V	GT	1.00	Blank	Unknown	L	N	G	79	Blank	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-667	200	Crude Unit / Coker	E-104	C	Plug	1.00	Blank	Unknown	L	N	G	77	Blank	NA
B-669	200	Crude Unit / Coker	E-104	C	Flange	4.00	Blank	Unknown	L	N	G	90	Blank	NA
B-671	200	Crude Unit / Coker	E-104	V	GT	1.00	Blank	Unknown	L	N	G	86	Blank	Y
B-673	200	Crude Unit / Coker	E-104	C	Plug	1.00	Blank	Unknown	L	N	G	93	Blank	NA
B-675	200	Crude Unit / Coker	E-104	V	GT	3.00	Blank	Unknown	L	N	G	94	Blank	Y
B-677	200	Crude Unit / Coker	E-104	V	GT	3.00	Blank	Unknown	L	N	G	82	Blank	Y
B-679	200	Crude Unit / Coker	E-104	C	Flange	3.00	Blank	Unknown	L	N	G	77	Blank	NA
B-681	200	Crude Unit / Coker	E-104	V	GT	1.00	Blank	Unknown	L	N	G	87	Blank	N
B-683	200	Crude Unit / Coker	E-104	C	Flange	8.00	Blank	Unknown	L	N	G	80	Blank	NA
B-685	200	Crude Unit / Coker	E-104	V	GT	1.00	Blank	Unknown	L	N	G	89	Blank	Y
B-687	200	Crude Unit / Coker	E-104	V	GT	3.00	Blank	Unknown	L	N	G	100	Blank	Y
B-689	200	Crude Unit / Coker	E-104	C	Flange	3.00	Blank	Unknown	L	N	G	86	Blank	NA
B-691	200	Crude Unit / Coker	E-104	V	GT	3.00	Blank	Unknown	N	N	G	86	Blank	Y
B-693	200	Crude Unit / Coker	E-104	V	GT	3.00	Blank	Unknown	N	N	G	108	Blank	Y
B-695	200	Crude Unit / Coker	E-104	C	Flange	3.00	Blank	Unknown	N	N	G	142	Blank	NA
B-697	200	Crude Unit / Coker	E-104	C	Flange	8.00	Blank	Unknown	N	N	G	141	Blank	NA
B-699	200	Crude Unit / Coker	E-104	V	GT	1.00	Blank	Unknown	N	N	G	120	Blank	Y
B-701	200	Crude Unit / Coker	E-104	V	GT	3.00	Blank	Unknown	N	N	G	146	Blank	Y
B-703	200	Crude Unit / Coker	E-104	C	Flange	3.00	Blank	Unknown	N	N	G	147	Blank	NA
B-705	200	Crude Unit / Coker	E-104	C	Threaded	0.50	Blank	Unknown	N	N	G	116	Blank	NA
B-707	200	Crude Unit / Coker	E-104	V	GT	3.00	Blank	Unknown	N	N	G	127	Blank	Y
B-709	200	Crude Unit / Coker	E-104	V	GT	1.00	Blank	Unknown	N	N	G	104	Blank	Y
B-711	200	Crude Unit / Coker	E-104	C	Plug	1.00	Blank	Unknown	N	N	G	104	Blank	NA
B-713	200	Crude Unit / Coker	E-54	C	sight glass	0.75	Blank	Unknown	N	N	P	85	Blank	NA
B-715	200	Crude Unit / Coker	E-54	V	GT	0.75	Blank	Unknown	N	N	G	88	Blank	Y
B-717	200	Crude Unit / Coker	E-54	V	GT	0.75	Blank	Unknown	N	N	G	92	Blank	Y
B-719	200	Crude Unit / Coker	E-54	C	Flange	1.00	Blank	Unknown	N	N	G	100	Blank	NA
B-721	200	Crude Unit / Coker	E-54	C	Flange	18.00	Blank	Unknown	N	N	P	143	Blank	NA
B-723	200	Crude Unit / Coker	E-54	V	GT	0.75	Blank	Unknown	N	N	P	93	Blank	Y
B-725	200	Crude Unit / Coker	E-54	C	sight glass	0.75	Blank	Unknown	N	N	P	85	Blank	NA
B-727	200	Crude Unit / Coker	E-54	V	GT	0.75	Blank	Unknown	N	N	P	95	Blank	Y
B-729	200	Crude Unit / Coker	E-54	C	Flange	1.00	Blank	Unknown	N	N	P	91	Blank	NA
B-731	200	Crude Unit / Coker	E-54	V	GT	0.75	Blank	Unknown	N	N	P	85	Blank	Y
B-733	200	Crude Unit / Coker	E-54	V	GT	1.50	Blank	Unknown	N	N	P	95	Blank	Y
B-735	200	Crude Unit / Coker	E-54	V	GT	3.00	Blank	Unknown	N	N	P	88	Blank	Y
B-737	200	Crude Unit / Coker	E-54	V	GT	1.00	Blank	Unknown	N	N	P	88	Blank	Y
B-739	200	Crude Unit / Coker	E-54	C	Plug	1.00	Blank	Unknown	N	N	P	100	Blank	NA
B-741	200	Crude Unit / Coker	E-54	V	GT	3.00	Blank	Unknown	N	N	P	93	Blank	Y
B-743	200	Crude Unit / Coker	E-54	V	GT	3.00	Blank	Unknown	N	N	P	93	Blank	Y
B-745	200 / Coker	Coker	F-54	V	butterfly	3.00	F-54 BTMs	Gas Oil	L	N	P	100	Blank	Y
B-747	200 / Coker	Coker	F-54	V	GT	1.00	F-54 BTMs	Gas Oil	Blank	Blank	Blank	90	Blank	Y
B-749	200 / Coker	Coker	F-54	V	GT	3.00	F-54 BTMs	Gas Oil	Blank	Blank	Blank	90	Blank	Y
B-751	200 / Coker	Coker	F-57	C	Flange	16.00	F-57 Btms	Slop Oil	Blank	Blank	Blank	160	Blank	NA
B-753	200 / Coker	Coker	F-57	V	GT	16.00	Blank	Unknown	Blank	Blank	Blank	160	Blank	Y
B-755	200 / Coker	Coker	F-57	V	GT	4.00	Blank	Unknown	Blank	Blank	Blank	125	Blank	Y
B-757	200 / Coker	Coker	F-57	C	P	1.50	Blank	Unknown	Blank	Blank	Blank	110	Blank	NA
B-759	200 / Coker	Coker	F-57	C	Flange	16.00	Blank	Unknown	Blank	Blank	Blank	125	Blank	NA
B-761	200 / Coker	Coker	F-57	V	GT	4.00	Blank	Unknown	Blank	Blank	Blank	115	Blank	Y
B-763	200 / Coker	Coker	F-57	V	CV	14.00	Blank	Unknown	Blank	Blank	Blank	180	Blank	Y
B-765	200 / Coker	Coker	F-57	V	GT	16.00	Blank	Unknown	Blank	Blank	Blank	155	Blank	Y
B-767	200 / Coker	Coker	F-57	V	GT	8.00	Blank	Unknown	Blank	Blank	Blank	95	Blank	Y
B-769	200	Crude Unit / Coker	coker bottoms	V	GT	16.00	Blank	Unknown	N	N	O	385	Blank	Y
B-771	200	Crude Unit / Coker	coker bottoms	C	Flange	10.00	Blank	Unknown	N	N	O	766	Blank	NA
B-773	200	Crude Unit / Coker	coker bottoms	C	Flange	16.00	Blank	Unknown	N	N	P	230	Blank	NA
B-775	200	Crude Unit / Coker	coker bottoms	V	GT	16.00	Blank	Unknown	N	N	P	88	Blank	Y
B-777	200	Crude Unit / Coker	coker bottoms	C	Flange	16.00	Blank	Unknown	N	N	P	78	Blank	NA
B-779	200	Crude Unit / Coker	coker bottoms	C	Flange	16.00	Blank	Unknown	N	N	P	80	Blank	NA
B-781	200	Crude Unit / Coker	coker bottoms	V	GT	16.00	Blank	Unknown	N	N	P	90	Blank	Y
B-783	200	Crude Unit / Coker	coker bottoms	C	Flange	16.00	Blank	Unknown	N	N	P	184	Blank	NA
B-785	200	Crude Unit / Coker	coker bottoms	V	OT	16.00	Blank	Unknown	N	Y	P	300	Blank	Y
B-787	200	Crude Unit / Coker	coker bottoms	C	Flange	16.00	Blank	Unknown	N	N	P	262	Blank	NA
B-789	200	Crude Unit / Coker	coker bottoms	C	Flange	16.00	Blank	Unknown	N	N	P	112	Blank	NA
B-791	200	Crude Unit / Coker	coker bottoms	V	GT	16.00	Blank	Unknown	N	N	P	172	Blank	Y
B-793	200	Crude Unit / Coker	coker bottoms	C	Flange	16.00	Blank	Unknown	N	N	P	207	Blank	NA
B-795	200	Crude Unit / Coker	B-202	C	Flange	3.00	Blank	Unknown	N	N	G	465	Blank	NA
B-797	200	Crude Unit / Coker	B-202	V	GT	3.00	Blank	Unknown	N	N	G	580	Blank	Y
B-799	200	Crude Unit / Coker	B-202	C	Flange	3.00	Blank	Unknown	N	N	G	447	Blank	NA
B-801	200	Crude Unit / Coker	B-202	V	GT	1.00	Blank	Unknown	N	N	G	155	Blank	Y
B-803	200 / Coker	Coker	GM-222	C	Flange	4.00	LCGO	Gas Oil	L	N	G	400	100	NA
B-805	200 / Coker	Coker	GM-222	C	Flange	6.00	LCGO	Gas Oil	L	N	G	400	100	NA
B-807	200 / Coker	Coker	GM-222	V	GT	1.00	LCGO	Gas Oil	L	N	G	300	100	Y
B-809	200 / Coker	Coker	GM-222	V	GT	1.00	LCGO	Gas Oil	L	N	G	200	100	Y
B-811	200 / Coker	Coker	GM-222	C	Flange	2.00	LCGO	Gas Oil	L	N	G	140	100	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-813	200 / Coker	Coker	GM-222	V	GT	33.00	LCGO	Gas Oil	L	N	G	320	100	Y
B-815	200 / Coker	Coker	GM-222	V	GT	2.00	LCGO	Gas Oil	L	N	G	300	100	Y
B-817	200 / Coker	Coker	GM-222A	C	Flange	2.00	LCGO	Gas Oil	L	N	G	400	120	NA
B-819	200 / Coker	Coker		C	TC	0.50	LCGO	Gas Oil	L	N	G	240	120	NA
B-821	200 / Coker	Coker		V	GT	3.00	LCGO	Gas Oil	L	N	G	400	120	Y
B-823	200 / Coker	Coker		V	GT	6.00	LCGO	Gas Oil	L	N	G	400	120	Y
B-825	200 / Coker	Coker		V	GT	1.00	LCGO	Gas Oil	L	N	G	200	120	Y
B-827	200 / Coker	Coker	GM-227	V	GT	2.00	HCGO	Gas Oil	L	N	G	110	75	Y
B-829	200 / Coker	Coker		C	Flange	1.00	HCGO	Gas Oil	L	N	G	200	Blank	NA
B-831	200 / Coker	Coker		V	GT	4.00	HCGO	Gas Oil	L	N	G	120	Blank	Y
B-833	200 / Coker	Coker	GM-227A	C	Flange	1.50	HCGO	Gas Oil	L	N	G	275	200	NA
B-835	200 / Coker	Coker	GM-227A	V	GT	2.00	HCGO	Gas Oil	L	N	G	600	Blank	Y
B-837	200 / Coker	Coker	GM-227A	C	Flange	2.00	HCGO	Gas Oil	L	N	G	600	Blank	NA
B-839	200 / Coker	Coker	GM-227A	V	GT	1.00	HCGO	Gas Oil	L	N	G	180	Blank	Y
B-841	200 / Coker	Coker	GM-227A	V	GT	1.00	HCGO	Gas Oil	L	N	G	100	Blank	Y
B-843	200 / Coker	Coker	GM-227A	V	GT	1.00	HCGO	Gas Oil	L	N	G	450	Blank	Y
B-845	200 / Coker	Coker	GM-227A	C	Flange	2.00	HCGO	Gas Oil	L	N	G	315	Blank	NA
B-847	200 / Coker	Coker	GM-227A	C	Flange	2.00	HCGO	Gas Oil	L	N	G	520	Blank	NA
B-849	200 / Coker	Coker	GM-217	V	GT	2.00	HCGO	Gas Oil	L	N	G	430	80	Y
B-851	200 / Coker	Coker	GM-217	C	Flange	2.00	HCGO	Gas Oil	L	N	G	430	Blank	NA
B-853	200 / Coker	Coker	GM-217	V	GT	1.00	HCGO	Gas Oil	L	N	G	410	Blank	Y
B-855	200 / Coker	Coker	GM-217	V	GT	1.00	HCGO	Gas Oil	L	N	G	230	Blank	Y
B-857	200 / Coker	Coker	GM-217	V	GT	8.00	HCGO	Gas Oil	L	N	G	640	Blank	Y
B-859	200 / Coker	Coker	GM-217	V	GT	2.00	HCGO	Gas Oil	L	N	G	220	Blank	Y
B-861	200 / Coker	Coker	GM-217	V	GT	10.00	HCGO	Gas Oil	L	N	G	550	Blank	Y
B-863	200 / Coker	Coker	GM-217	C	Flange	10.00	HCGO	Gas Oil	L	N	G	620	80	NA
B-865	200 / Coker	Coker	GM-217	C	Flange	12.00	Blank	Unknown	Blank	Blank	Blank	480	Blank	NA
B-867	200 / Coker	Coker	GM-217	C	Flange	1.00	Blank	Unknown	Blank	Blank	Blank	300	Blank	NA
B-869	200 / Coker	Coker	GM-217	V	GT	10.00	Blank	Unknown	Blank	Blank	Blank	690	Blank	Y
B-871	200 / Coker	Coker	GM-217	V	GT	2.00	Blank	Unknown	Blank	Blank	Blank	630	Blank	Y
B-873	200 / Coker	Coker	GM-217 A	V	GT	8.00	Blank	Unknown	Blank	Blank	Blank	300	Blank	Y
B-875	200 / Coker	Coker		V	GT	8.00	Blank	Unknown	Blank	Blank	Blank	300	Blank	Y
B-877	200 / Coker	Coker		V	GT	4.00	Blank	Unknown	Blank	Blank	Blank	380	Blank	Y
B-879	200 / Coker	Coker		V	GT	8.00	Blank	Unknown	Blank	Blank	Blank	75	Blank	Y
B-881	200 / Coker	Coker	GM217 A	C	Flange	6.00	Blank	Unknown	N	Blank	Blank	104	Blank	NA
B-883	200 / Coker	Coker	GM 216	C	Flange	8.00	Blank	Unknown	Blank	Blank	Blank	88	Blank	NA
B-885	200 / Coker	Coker	GM 216	C	Flange	10.00	Blank	Unknown	Blank	Blank	Blank	80	Blank	NA
B-887	200 / Coker	Coker	GM 216	V	GT/open	10.00	Blank	Unknown	Blank	Blank	Blank	86	Blank	Y
B-889	200 / Coker	Coker	GM 216	V	GT/Closed	2.00	Blank	Unknown	Blank	Blank	Blank	79	Blank	Y
B-891	200 / Coker	Coker	GM 216	C	Flange	2.00	Blank	Unknown	Blank	Blank	Blank	84	Blank	NA
B-893	200	Crude Unit / Coker	216 A	C	Flange	8.00	LCGO	Gas Oil	Blank	Blank	Blank	451	130	NA
B-895	200	Crude Unit / Coker	216A	C	Flange	10.00	LCGO	Gas Oil	Blank	Blank	Blank	250	Blank	NA
B-897	200	Crude Unit / Coker	216A	V	GT/ OPEN	10.00	LCGO	Gas Oil	Blank	Blank	Blank	317	Blank	Y
B-899	200	Crude Unit / Coker	216A	V	GL/ OPEN	8.00	LCGO	Gas Oil	Blank	Blank	Blank	269	Blank	Y
B-901	200	Crude Unit / Coker	216 A	C	Flange	8.00	LCGO	Gas Oil	Blank	Blank	Blank	386	Blank	NA
B-903	200	Crude Unit / Coker	GM 218	C	Flange	4.00	BT coke	Coke	Blank	Blank	Blank	204	60	NA
B-905	200	Crude Unit / Coker	GM 218	C	Flange	6.00	BT coke	Coke	Blank	Blank	Blank	169	Blank	NA
B-907	200	Crude Unit / Coker	GM 218	V	gl / Closed	2.00	BT coke	Coke	Blank	Blank	Blank	108	Blank	Y
B-909	200	Crude Unit / Coker	GM 218	V	gl/ Closed	1.00	BT coke	Coke	Blank	Blank	Blank	136	Blank	Y
B-911	200	Crude Unit / Coker	GM 218	V	GT/ closed	1.00	BT coke	Coke	Blank	Blank	Blank	98	Blank	Y
B-913	200	Crude Unit / Coker	GM 218	V	GT/ Closed	1.00	BT coke	Coke	Blank	Blank	Blank	88	Blank	Y
B-915	200	Crude Unit / Coker	GM 218	C	Flange	3.00	BT coke	Coke	Blank	Blank	Blank	145	Blank	NA
B-917	200	Crude Unit / Coker	GM 218	V	check	3.00	BT coke	Coke	Blank	Blank	Blank	150	Blank	Y
B-919	200	Crude Unit / Coker	GM 218	V	GT/ Open	3.00	BT coke	Coke	Blank	Blank	Blank	143	Blank	Y
B-921	200	Crude Unit / Coker	GM 218	V	GL/ Closed	2.00	Slops	Slop Oil	Blank	Blank	Blank	94	Blank	Y
B-923	250 ULSD	Hydrotreater	G-707A	C	Flange	6.00	Dried Diesel	Diesel	L	N	G	200	0	NA
B-925	250 ULSD	Hydrotreater	G-707A	V	GT- Open	2.00	Dried Diesel	Diesel	L	N	G	150	0	Y
B-927	250 ULSD	Hydrotreater	G-707A	C	Flange	2.00	Dried Diesel	Diesel	L	N	G	200	0	NA
B-929	250 ULSD	Hydrotreater	G-707A	V	GT-closed	1.00	Dried Diesel	Diesel	L	N	G	100	0	N
B-931	250 ULSD	Hydrotreater	G-707A	V	GT- Open	0.50	Dried Diesel	Diesel	L	N	G	100	0	Y
B-933	250 ULSD	Hydrotreater	G-707A	C	Plug	0.50	Dried Diesel	Diesel	L	n	G	100	0	NA
B-935	250 ULSD	Hydrotreater	G-707A	C	TC	0.50	Dried Diesel	Diesel	L	n	G	100	0	NA
B-937	250 ULSD	Hydrotreater	G-707A	C	Flange	4.00	Dried Diesel	Diesel	L	n	G	200	0	NA
B-939	250 ULSD	Hydrotreater	G-707A	V	GT- Open	1.00	Dried Diesel	Diesel	L	N	G	90	0	Y
B-941	250 ULSD	Hydrotreater	G-707A	V	GT-closed	0.50	Dried Diesel	Diesel	L	N	G	90	0	Y
B-943	250 ULSD	Hydrotreater	G-707A	C	Plug	0.50	Dried Diesel	Diesel	L	N	G	90	0	NA
B-945	250 ULSD	Hydrotreater	G-707A	V	GT-closed	0.75	Dried Diesel	Diesel	L	N	G	100	0	N
B-947	250 ULSD	Hydrotreater	G-707A	C	Plug	0.75	Dried Diesel	Diesel	L	N	G	100	0	NA
B-949	250 ULSD	Hydrotreater	G-707A	C	Flange	8.00	Dried Diesel	Diesel	L	N	G	250	0	NA
B-951	250 ULSD	Hydrotreater	G-707A	V	GT- Open	4.00	Dried Diesel	Diesel	L	N	G	190	0	Y
B-953	250 ULSD	Hydrotreater	G-707A	C	Flange	4.00	Dried Diesel	Diesel	L	N	G	200	0	NA
B-955	250 ULSD	Hydrotreater	G-707A	C	Flange	8.00	Dried Diesel	Diesel	L	N	G	125	0	NA
B-957	250 ULSD	Hydrotreater	G-707A	V	Check	8.00	Dried Diesel	Diesel	L	N	G	100	0	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-959	250 ULSD	Hydrotreater	G-707A	V	GT-closed	0.75	Dried Diesel	Diesel	L	N	G	75	0	N
B-961	250 ULSD	Hydrotreater	G-707A	C	Plug	0.75	Dried Diesel	Diesel	L	N	G	75	0	NA
B-963	250 ULSD	Hydrotreater	G-707A	C	Flange	8.00	Dried Diesel	Diesel	L	N	G	180	0	NA
B-965	250 ULSD	Hydrotreater	G-707A	V	GT-open	8.00	Dried Diesel	Diesel	L	N	G	200	0	Y
B-967	250 ULSD	Hydrotreater	G-707A	C	Flange	8.00	Dried Diesel	Diesel	L	N	G	200	0	NA
B-969	250 ULSD	Hydrotreater	G-707B	C	Flange	8.00	Dried Diesel	Diesel	L	N	G	230	220	NA
B-971	250 ULSD	Hydrotreater	G-707B	V	GT-open	8.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-973	250 ULSD	Hydrotreater	G-707B	V	GT-closed	0.75	Dried Diesel	Diesel	L	N	G	100	220	N
B-975	250 ULSD	Hydrotreater	G-707B	C	Plug	0.75	Dried Diesel	Diesel	L	N	G	100	220	NA
B-977	250 ULSD	Hydrotreater	G-707B	V	Check	8.00	Dried Diesel	Diesel	L	N	G	220	220	Y
B-979	250 ULSD	Hydrotreater	G-707B	C	Flange	8.00	Dried Diesel	Diesel	L	N	G	240	220	NA
B-981	250 ULSD	Hydrotreater	G-707B	C	Flange	4.00	Dried Diesel	Diesel	L	N	G	230	220	NA
B-983	250 ULSD	Hydrotreater	G-707B	V	GT-open	4.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-985	250 ULSD	Hydrotreater	G-707B	V	GT-open	4.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-987	250 ULSD	Hydrotreater	G-707B	V	GT-open	4.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-989	250 ULSD	Hydrotreater	G-707B	V	GT-open	4.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-991	250 ULSD	Hydrotreater	G-707B	V	GT-open	4.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-993	250 ULSD	Hydrotreater	G-707B	V	GT-open	4.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-995	250 ULSD	Hydrotreater	G-707B	V	GT-open	4.00	Dried Diesel	Diesel	L	N	G	200	220	Y
B-997	250 ULSD	Hydrotreater	G-707B	V	GT-closed	2.00	Dried Diesel	Diesel	L	N	G	120	Blank	Y
B-999	250 ULSD	Hydrotreater	G-707B	C	Flange	2.00	Dried Diesel	Diesel	L	N	G	110	Blank	NA
B-1001	250 ULSD	Hydrotreater	G-707B	V	GT-open	1.00	Dried Diesel	Diesel	L	N	G	110	Blank	N
B-1003	250 ULSD	Hydrotreater	G-707B	V	GT-closed	0.75	Dried Diesel	Diesel	L	N	G	110	Blank	N
B-1005	250 ULSD	Hydrotreater	G-707B	C	Plug	0.75	Dried Diesel	Diesel	L	N	G	110	Blank	NA
B-1007	250 ULSD	Hydrotreater	G-707B	C	TC	0.75	Dried Diesel	Diesel	L	N	G	110	Blank	NA
B-1009	250 ULSD	Hydrotreater	G-707B	C	Flange	8.00	Dried Diesel	Diesel	L	N	G	225	Blank	NA
B-1011	250 ULSD	Hydrotreater	G-707B	C	Flange	1.00	Dried Diesel	Diesel	L	N	G	145	Blank	NA
B-1013	250 ULSD	Hydrotreater	F-721	C	Flange	36.00	Dried Diesel	Diesel	N	N	G	72.5	Blank	NA
B-1017	250	Hydrotreater	D-711	C	Flange	1.00	DSL	Diesel	N	N	P	135.4	Unknown	NA
B-1019	250	Hydrotreater	D-711	V	Gate	1.00	DSL	Diesel	N	N	P	112	Unknown	Y
B-1021	250	Hydrotreater	D-711	V	Gate	1.00	DSL	Diesel	N	N	P	110	Unknown	Y
B-1023	250	Hydrotreater	D-711	C	Union	1.00	DSL	Diesel	N	N	P	94	Unknown	NA
B-1025	250	Hydrotreater	D-711	V	Gate	3.00	DSL	Diesel	N	N	P	170	Unknown	Y
B-1027	250	Hydrotreater	D-711	C	Flange	3.00	DSL	Diesel	N	N	P	169	Unknown	NA
B-1029	250	Hydrotreater	D-711	C	Flange	3.00	DSL	Diesel	N	N	P	191	Unknown	NA
B-1031	250	Hydrotreater	D-711	C	Union	1.00	DSL	Diesel	N	N	P	170	Unknown	NA
B-1033	250	Hydrotreater	D-711	V	Gate	1.00	DSL	Diesel	N	N	P	61	Unknown	Y
B-1035	250	Hydrotreater	D-711	C	Flange	3.00	DSL	Diesel	N	N	P	170	Unknown	NA
B-1037	250	Hydrotreater	D-711	V	Gate	3.00	DSL	Diesel	N	N	P	165	Unknown	Y
B-1039	250	Hydrotreater	D-711	C	Flange	3.00	DSL	Diesel	N	N	P	181	Unknown	NA
B-1041	250	Hydrotreater	D-711	V	Gate	1.00	DSL	Diesel	N	N	P	155	Unknown	Y
B-1043	250	Hydrotreater	D-711	C	Flange	1.00	DSL	Diesel	N	N	P	125	Unknown	NA
B-1045	250	Hydrotreater	D-711	C	Flange	6.00	DSL	Diesel	N	N	P	210	Unknown	NA
B-1047	250	Hydrotreater	D-711	C	Flange	3.00	DSL	Diesel	N	N	P	155	Unknown	NA
B-1049	250	Hydrotreater	D-711	V	Globe	3.00	DSL	Diesel	N	N	P	81	Unknown	Y
B-1051	250	Hydrotreater	D-711	C	Flange	3.00	DSL	Diesel	N	N	P	80	Unknown	NA
B-1053	250	Hydrotreater	D-711	C	BP	1.00	DSL	Diesel	N	N	G	60	Unknown	NA
B-1055	250	Hydrotreater	D-711	V	Gate	1.00	DSL	Diesel	N	N	G	48	Unknown	Y
B-1057	250	Hydrotreater	D-711	V	Gate	1.00	DSL	Diesel	N	N	G	70	Unknown	Y
B-1059	250	Hydrotreater	D-711	C	Flange	8.00	DSL	Diesel	N	N	G	91	Unknown	NA
B-1061	250	Hydrotreater	D-711	V	Check	8.00	DSL	Diesel	N	N	G	83	Unknown	Y
B-1063	250	Hydrotreater	D-711	C	Flange	8.00	DSL	Diesel	N	N	G	90	Unknown	NA
B-1065	250	Hydrotreater	D-711	C	Flange	8.00	DSL	Diesel	N	N	G	93	Unknown	NA
B-1067	250	Hydrotreater	D-711	V	Gate	8.00	DSL	Diesel	N	N	G	79	Unknown	Y
B-1069	250	Hydrotreater	D-711	C	Flange	8.00	DSL	Diesel	N	N	G	89	Unknown	NA
B-1071	250	Hydrotreater	D-711	C	Flange	8.00	DSL	Diesel	N	N	G	92	Unknown	NA
B-1073-1	250	Hydrotreater	D-711	V	Control	8.00	DSL	Diesel	N	N	G	83	Unknown	Y
B-1073-2	250	Hydrotreater	D-711	V	Globe	8.00	DSL	Diesel	N	N	G	53	84	Y
B-1075	250	Hydrotreater	G-736	V	Gate	4.00	DSL	Diesel	L	N	G	84	280	Y
B-1077	250	Hydrotreater	G-736	V	Control	4.00	DSL	Diesel	L	N	G	105	280	Y
B-1079	250	Hydrotreater	G-736	C	Plug	1.00	DSL	Diesel	L	N	G	62	280	NA
B-1081	250	Hydrotreater	G-736	V	Gate	1.00	DSL	Diesel	L	N	G	66	280	Y
B-1083	250	Hydrotreater	G-736	V	Gate	6.00	DSL	Diesel	L	N	G	90	280	Y
B-1085	250	Hydrotreater	G-736	V	Gate	4.00	DSL	Diesel	L	N	G	80	280	Y
B-1087	250	Hydrotreater	G-736	V	Gate	4.00	DSL	Diesel	L	N	G	96	280	Y
B-1089	250	Hydrotreater	G-736	C	Flange	4.00	DSL	Diesel	L	N	G	104	280	NA
B-1091	250	Hydrotreater	G-736	P	P	Blank	DSL	Diesel	H	N	G	90	280	NA
B-1093	250	Hydrotreater	G-721B	V	Ball	0.75	DSL	Diesel	N	N	G	77	0	Y
B-1095	250	Hydrotreater	G-721B	V	Ball	0.75	DSL	Diesel	N	N	G	75	0	Y
B-1097	250	Hydrotreater	G-721B	V	Ball	0.75	DSL	Diesel	N	N	G	84	0	Y
B-1099	250	Hydrotreater	G-721B	C	Cap	0.75	DSL	Diesel	N	N	G	76	0	NA
B-1101	250	Hydrotreater	G-721B	PRD	PRV	1.50	DSL	Diesel	N	N	G	73	0	NA
B-1103	250	Hydrotreater	G-721B	V	Ball	0.75	DSL	Diesel	N	N	G	72	0	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1105	250	Hydrotreater	G-721B	V	Gate	0.75	DSL	Diesel	N	N	G	78	0	Y
B-1107	250	Hydrotreater	G-721B	C	Flange	0.75	DSL	Diesel	N	N	G	75	0	NA
B-1109	250	Hydrotreater	G-721B	V	Gate	0.75	DSL	Diesel	N	N	G	73	0	Y
B-1111	250	Hydrotreater	G-721B	V	Ball	0.75	DSL	Diesel	N	N	G	78	0	Y
B-1113	250	Hydrotreater	G-721B	V	Ball	0.75	DSL	Diesel	N	N	G	74	0	Y
B-1115	250	Hydrotreater	G-721B	V	Gate	0.75	DSL	Diesel	N	N	G	72	0	Y
B-1117	250	Hydrotreater	G-721B	C	Union	1.50	DSL	Diesel	N	N	G	76	0	NA
B-1119	250	Hydrotreater	G-721B	V	Gate	1.50	DSL	Diesel	N	N	G	71	0	Y
B-1121	250	Hydrotreater	G-721B	V	Ball	1.50	DSL	Diesel	N	N	G	74	0	Y
B-1123	250	Hydrotreater	G-721B	V	Ball	1.50	DSL	Diesel	N	N	G	72	0	Y
B-1125	250	Hydrotreater	G-721B	C	Cap	1.00	DSL	Diesel	N	N	G	61	0	NA
B-1127	250	Hydrotreater	G-721B	V	Ball	0.75	DSL	Diesel	N	N	G	73	200	Y
B-1129	MP-30	Hydrotreater	B-103	V	Bleed	2.00	Reboil Oil	Diesel	N	N	G	129	203	Y
B-1131	MP-30	Hydrotreater	B-103	C	Plug	2.00	Reboil Oil	Diesel	N	N	G	101.2	203	NA
B-1133	MP-30	Hydrotreater	B-103	V	Bleed	0.75	Reboil Oil	Diesel	N	N	G	163.4	203	Y
B-1135	MP-30	Hydrotreater	B-103	C	Flange	3.00	Reboil Oil	Diesel	N	N	G	409.2	203	NA
B-1137	MP-30	Hydrotreater	B-103	V	Bleed	2.00	Reboil Oil	Diesel	N	N	G	290.2	203	Y
B-1139	MP-30	Hydrotreater	B-103	C	Flange	3.00	Reboil Oil	Diesel	N	N	G	498.6	203	NA
B-1141	MP-30	Hydrotreater	B-103	C	Plug	2.00	Reboil Oil	Diesel	N	N	G	253	203	NA
B-1143	MP-30	Hydrotreater	B-103	V	Bleed	2.00	Reboil Oil	Diesel	N	N	G	96.8	203	Y
B-1145	MP-30	Hydrotreater	B-103	C	Flange	3.00	Reboil Oil	Diesel	N	N	G	365.8	203	NA
B-1147	MP-30	Hydrotreater	B-103	V	Bleed	0.75	Reboil Oil	Diesel	N	N	G	165.5	203	Y
B-1149	MP-30	Hydrotreater	B-103	C	Flange	3.00	Reboil Oil	Diesel	N	N	G	490.8	203	NA
B-1151	MP-30	Hydrotreater	D-104	V	Gate	8.00	Reboil Oil	Diesel	L	N	G	401.4	Blank	Y
B-1153	MP-30	Hydrotreater	D-104	V	Control Valve	6.00	Reboil Oil	Diesel	L	N	G	348.2	Blank	Y
B-1155	MP-30	Hydrotreater	D-104	V	Gate	8.00	Reboil Oil	Diesel	L	N	G	376.1	Blank	Y
B-1157	MP-30	Hydrotreater	D-104	V	Gate	8.00	Reboil Oil	Diesel	L	N	G	225.2	Blank	Y
B-1159	MP-30	Hydrotreater	F-309A	V	Gate	1.50	Reboil Oil	Diesel	L	N	G	113	82	Y
B-1161	MP-30	Hydrotreater	F-309A	C	Flange	1.50	Reboil Oil	Diesel	L	N	G	113	82	NA
B-1163	MP-30	Hydrotreater	F-309A	V	Needle	0.75	Reboil Oil	Diesel	L	N	G	95.8	82	Y
B-1165	MP-30	Hydrotreater	F-309A	V	Needle	0.50	Reboil Oil	Diesel	L	N	G	95.8	82	Y
B-1167	MP-30	Hydrotreater	F-309A	C	Plug	0.75	DSL	Diesel	L	N	G	71.4	83	NA
B-1171	MP-30	Hydrotreater	E-314	V	Gate	3.00	DSL	Diesel	L	N	G	103.3	96	Y
B-1173	MP-30	Hydrotreater	E-314	C	Flange	3.00	DSL	Diesel	L	N	G	108.2	96	NA
B-1175	MP-30	Hydrotreater	E-314	V	Gate	0.75	DSL	Diesel	L	N	G	77.7	96	N
B-1177	MP-30	Hydrotreater	E-314	V	Gate	2.00	DSL	Diesel	L	N	G	111.1	96	Y
B-1179	MP-30	Hydrotreater	E-314	C	Flange	2.00	Reboil Oil	Diesel	L	N	G	105.6	96	NA
B-1181	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	80.2	96	N
B-1183	MP-30	Hydrotreater	E-314	V	Gate	2.00	Reboil Oil	Diesel	L	N	G	97.6	96	Y
B-1185	MP-30	Hydrotreater	E-314	V	Gate	1.50	Reboil Oil	Diesel	L	N	G	99.4	96	N
B-1187	MP-30	Hydrotreater	E-314	V	Check	1.50	Reboil Oil	Diesel	L	N	G	88	96	Y
B-1189	MP-30	Hydrotreater	E-314	V	Gate	1.50	Reboil Oil	Diesel	L	N	G	112.2	96	N
B-1191	MP-30	Hydrotreater	E-314	V	Gate	1.50	Reboil Oil	Diesel	L	N	G	104.6	96	Y
B-1193	MP-30	Hydrotreater	E-314	C	Flange	1.50	Reboil Oil	Diesel	L	N	G	104.5	96	NA
B-1195	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	G	73.7	96	Y
B-1197	MP-30	Hydrotreater	E-314	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	72.1	98	NA
B-1199	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	74.4	98	N
B-1201	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	104.7	98	N
B-1203	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	113	186	N
B-1205	MP-30	Hydrotreater	E-314	C	Union	0.50	Reboil Oil	Diesel	L	N	G	110.2	186	NA
B-1207	MP-30	Hydrotreater	E-314	V	Needle	0.75	Reboil Oil	Diesel	L	N	G	99.9	186	N
B-1209	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	G	83.5	186	Y
B-1211	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	126.6	98	N
B-1213	MP-30	Hydrotreater	E-314	C	Pressure gauge	0.50	Reboil Oil	Diesel	L	N	G	120.4	98	NA
B-1215	MP-30	Hydrotreater	E-314	V	Needle	0.75	Reboil Oil	Diesel	L	N	G	101.5	98	Y
B-1217	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	G	113.7	98	Y
B-1219	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	115.1	98	N
B-1221	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	106.1	186	N
B-1223	MP-30	Hydrotreater	E-314	C	Union	0.50	Reboil Oil	Diesel	L	N	G	106.7	186	NA
B-1225	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	100.5	131	N
B-1227	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	92.8	131	N
B-1229	MP-30	Hydrotreater	E-314	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	80.3	131	NA
B-1231	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	80.1	131	N
B-1233	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	95.4	96	N
B-1235	MP-30	Hydrotreater	E-314	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	99.7	96	NA
B-1237	MP-30	Hydrotreater	E-314	C	Flange	1.00	Reboil Oil	Diesel	L	N	G	103.5	131	NA
B-1239	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	104.5	131	N
B-1241	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	109.7	131	N
B-1243	MP-30	Hydrotreater	E-314	V	Control Valve	1.50	Reboil Oil	Diesel	L	N	G	108.2	131	Y
B-1245	MP-30	Hydrotreater	E-314	C	Flange	1.50	Reboil Oil	Diesel	L	N	G	103.9	131	NA
B-1247	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	100.1	131	N
B-1249	MP-30	Hydrotreater	E-314	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	99.8	131	NA
B-1251	MP-30	Hydrotreater	E-314	V	Gate	2.00	Reboil Oil	Diesel	L	N	G	123.6	131	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1253	MP-30	Hydrotreater	E-314	V	Globe	1.50	Reboil Oil	Diesel	L	N	G	121.2	131	N
B-1255	MP-30	Hydrotreater	E-314	C	Flange	2.00	Reboil Oil	Diesel	L	N	G	114.7	131	NA
B-1257	MP-30	Hydrotreater	E-314	V	Gate	2.00	Reboil Oil	Diesel	L	N	G	121.1	131	Y
B-1259	MP-30	Hydrotreater	E-314	C	Flange	2.00	Reboil Oil	Diesel	L	N	G	125.8	131	NA
B-1261	MP-30	Hydrotreater	E-314	V	Gate	1.00	Reboil Oil	Diesel	L	N	G	130.8	131	N
B-1263	MP-30	Hydrotreater	E-314	V	Gate	1.00	Reboil Oil	Diesel	L	N	G	122.2	131	N
B-1265	MP-30	Hydrotreater	E-314	C	Union	0.50	Reboil Oil	Diesel	L	N	G	172.2	131	NA
B-1267	MP-30	Hydrotreater	G-306	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	75.1	26	Y
B-1269	MP-30	Hydrotreater	G-306	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	167.6	26	Y
B-1271	MP-30	Hydrotreater	G-306	C	Plug	0.75	Reboil Oil	Diesel	L	N	G	111.8	26	NA
B-1273	MP-30	Hydrotreater	G-306	V	Gate	20.00	Reboil Oil	Diesel	L	N	G	320.7	26	Y
B-1275	MP-30	Hydrotreater	D-303	V	Control Valve	4.00	Reboil Oil	Diesel	L	N	P	112.3	Blank	Y
B-1277	MP-30	Hydrotreater	D-303	V	Gate	4.00	Reboil Oil	Diesel	L	N	P	106.8	Blank	Y
B-1279	MP-30	Hydrotreater	D-303	C	Flange	4.00	Reboil Oil	Diesel	L	N	P	73	Blank	NA
B-1281	MP-30	Hydrotreater	D-303	V	Gate	4.00	Reboil Oil	Diesel	L	N	P	80	Blank	Y
B-1283	MP-30	Hydrotreater	D-303	C	Flange	4.00	Reboil Oil	Diesel	L	N	P	90.5	Blank	NA
B-1285	MP-30	Hydrotreater	D-303	V	Gate	4.00	Reboil Oil	Diesel	L	N	P	112	Blank	Y
B-1287	MP-30	Hydrotreater	D-303	C	Flange	4.00	Reboil Oil	Diesel	L	N	P	105.8	Blank	NA
B-1289	MP-30	Hydrotreater	E-116	C	Flange	2.00	Reboil Oil	Diesel	N	N	G	99	90	NA
B-1291	MP-30	Hydrotreater	E-116	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	78	90	N
B-1293	MP-30	Hydrotreater	E-116	C	Flange	4.00	Reboil Oil	Diesel	L	N	G	99	90	NA
B-1295	MP-30	Hydrotreater	E-116	C	Cap	0.75	Reboil Oil	Diesel	L	N	G	90	90	NA
B-1297	MP-30	Hydrotreater	E-116	C	Flange	2.00	Reboil Oil	Diesel	L	N	G	112	90	NA
B-1299	MP-30	Hydrotreater	E-116	V	Hex Root	1.00	Reboil Oil	Diesel	L	N	G	77	90	Y
B-1301	MP-30	Hydrotreater	E-116	V	Needle	0.75	Reboil Oil	Diesel	L	N	G	70	90	Y
B-1303	MP-30	Hydrotreater	E-116	V	Gate	1.50	Reboil Oil	Diesel	L	N	G	83	90	N
B-1305	MP-30	Hydrotreater	E-116	V	Gate	2.00	Reboil Oil	Diesel	L	N	G	111	90	Y
B-1307	MP-30	Hydrotreater	E-116	C	Flange	2.00	Reboil Oil	Diesel	L	N	G	88	90	NA
B-1309	MP-30	Hydrotreater	E-116	V	Gate	2.00	Reboil Oil	Diesel	L	N	G	69	90	Y
B-1311	MP-30	Hydrotreater	E-116	V	Hex Root	1.00	Reboil Oil	Diesel	L	N	G	66	90	Y
B-1313	MP-30	Hydrotreater	D-303	C	Flange	8.00	Reboil Oil	Diesel	M	N	P	218	166	NA
B-1315	MP-30	Hydrotreater	D-303	V	Gate	8.00	Reboil Oil	Diesel	M	N	P	264	165	Y
B-1317	MP-30	Hydrotreater	D-303	C	Flange	8.00	Reboil Oil	Diesel	M	N	P	260	164	NA
B-1319	MP-30	Hydrotreater	D-303	V	Control Valve	8.00	Reboil Oil	Diesel	M	N	P	464	165	Y
B-1321	MP-30	Hydrotreater	D-303	V	Gate	8.00	Reboil Oil	Diesel	M	N	P	378	165	Y
B-1323	MP-30	Hydrotreater	D-303	C	Flange	8.00	Reboil Oil	Diesel	M	N	P	490	165	NA
B-1325	MP-30	Hydrotreater	D-303	V	Gate	8.00	Reboil Oil	Diesel	M	N	P	307	165	Y
B-1327	MP-30	Hydrotreater	D-303	V	Gate	1.00	Reboil Oil	Diesel	M	N	P	266	164	N
B-1329	MP-30	Hydrotreater	D-303	C	Plug	1.00	Reboil Oil	Diesel	M	N	P	315	165	NA
B-1331	Unit 267	Crude Unit	E-614A	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	102	Blank	Y
B-1333	Unit 267	Crude Unit	E-614A	C	Plug	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	102	Blank	NA
B-1335	Unit 267	Crude Unit	G-612	V	Gate	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	533	100	Y
B-1339	Unit 267	Crude Unit	G-612	V	Check	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	551	100	Y
B-1343	Unit 267	Crude Unit	G-612	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	551	100	NA
B-1345	Unit 267	Crude Unit	G-612	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	492	100	NA
B-1347	Unit 267	Crude Unit	G-612	C	Flange	6.00	Atmospheric Bottoms	Gas Oil	N	N	G	555	100	NA
B-1349	Unit 267	Crude Unit	G-612	C	Flange	6.00	Atmospheric Bottoms	Gas Oil	N	N	G	544	100	NA
B-1351	Unit 267	Crude Unit	G-612	V	Gate	6.00	Atmospheric Bottoms	Gas Oil	N	N	G	544	100	Y
B-1355	Unit 267	Crude Unit	G-612	C	Flange	6.00	Atmospheric Bottoms	Gas Oil	N	N	G	544	100	NA
B-1357	Unit 267	Crude Unit	G-612	V	Gate	8.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	920	3	Y
B-1359	Unit 267	Crude Unit	G-615A	C	Bonnet	8.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	920	3	Y
B-1361	Unit 267	Crude Unit	G-615A	C	Flange	8.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	310	5	NA
B-1363	Unit 267	Crude Unit	G-615A	C	Flange	8.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	310	5	NA
B-1365	Unit 267	Crude Unit	G-617A	V	Globe	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	150	Blank	Y
B-1369	Unit 267	Crude Unit	G-617A	C	Flange	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	150	Blank	NA
B-1371	Unit 267	Crude Unit	G-617A	C	Flange	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	150	Blank	NA
B-1373	Unit 267	Crude Unit	G-617A	V	Globe	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	150	Blank	Y
B-1377	Unit 267	Crude Unit	G-617A	C	Plug	1.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	72	Blank	NA
B-1379	Unit 267	Crude Unit	G-617A	C	Flange	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	72	Blank	NA
B-1381	Unit 267	Crude Unit	G-617A	C	Flange	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	72	Blank	NA
B-1383	Unit 267	Crude Unit	G-617A	V	Gate	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	224	Blank	Y
B-1387	Unit 267	Crude Unit	G-617A	C	Flange	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	273	Blank	NA
B-1389	Unit 267	Crude Unit	G-617A	C	Flange	2.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	274	Blank	NA
B-1391	Unit 267	Crude Unit	B-601	V	Gate	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	474	0	Y
B-1395	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	460	0	NA
B-1397	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	355	0	NA
B-1399	Unit 267	Crude Unit	B-601	V	Gate	0.75	Atmospheric Bottoms	Gas Oil	N	N	G	208	0	Y
B-1403	Unit 267	Crude Unit	B-601	C	Plug	0.75	Atmospheric Bottoms	Gas Oil	N	N	G	143	0	NA
B-1405	Unit 267	Crude Unit	B-601	V	Control Valve	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	498	0	Y
B-1409	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	444	0	NA
B-1411	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	451	0	NA
B-1413	Unit 267	Crude Unit	B-601	V	Globe	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	397	0	Y
B-1417	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	434	0	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1419	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	364	0	NA
B-1421	Unit 267	Crude Unit	B-601	V	Gate	0.75	Atmospheric Bottoms	Gas Oil	N	N	G	269	0	Y
B-1425	Unit 267	Crude Unit	B-601	C	Plug	0.75	Atmospheric Bottoms	Gas Oil	N	N	G	149	0	NA
B-1427	Unit 267	Crude Unit	B-601	V	Gate	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	478	0	Y
B-1431	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	430	0	NA
B-1433	Unit 267	Crude Unit	B-601	C	Flange	4.00	Atmospheric Bottoms	Gas Oil	N	N	G	501	0	NA
B-1435	Unit 267	Crude Unit	B-601	V	Gate	3.00	Atmospheric Bottoms	Gas Oil	N	N	G	346	0	Y
B-1439	Unit 267	Crude Unit	B-601	C	Flange	3.00	Atmospheric Bottoms	Gas Oil	N	N	G	330	0	NA
B-1441	Unit 267	Crude Unit	B-601	C	Flange	3.00	Atmospheric Bottoms	Gas Oil	N	N	G	378	0	NA
B-1443	Unit 267	Crude Unit	B-601	V	Gate	1.75	Atmospheric Bottoms	Gas Oil	N	N	G	297	0	Y
B-1447	Unit 267	Crude Unit	B-601	C	Reducer	0.50	Atmospheric Bottoms	Gas Oil	N	N	G	156	0	NA
B-1449	Unit 267	Crude Unit	B-601	C	Tube Fitting	0.50	Atmospheric Bottoms	Gas Oil	N	N	G	155	0	NA
B-1451	Unit 267	Crude Unit	B-601	V	Gate	0.75	Atmospheric Bottoms	Gas Oil	N	N	G	231	0	Y
B-1455	Unit 267	Crude Unit	B-601	C	Plug	0.75	Atmospheric Bottoms	Gas Oil	N	N	G	185	0	NA
B-1457	Unit 267	Crude Unit	B-601	V	Check	2.00	Atmospheric Bottoms	Gas Oil	N	N	G	99	0	Y
B-1459	Unit 267	Crude Unit	B-601	C	Plug	0.25	Atmospheric Bottoms	Gas Oil	N	N	G	95	0	NA
B-1461	Unit 267	Crude Unit	B-601	C	Plug	0.25	Atmospheric Bottoms	Gas Oil	N	N	G	93	0	NA
B-1463	Unit 267	Crude Unit	B-601	C	Flange	2.00	Atmospheric Bottoms	Gas Oil	N	N	G	115	0	NA
B-1465	Unit 267	Crude Unit	B-601	C	Flange	2.00	Atmospheric Bottoms	Gas Oil	N	N	G	90	0	NA
B-1467	Unit 267	Crude Unit	B-601	V	Needle	0.50	Atmospheric Bottoms	Gas Oil	N	N	G	108	0	Y
B-1469	Unit 267	Crude Unit	B-601	V	Needle	0.50	Atmospheric Bottoms	Gas Oil	N	N	G	116	0	Y
B-1471	Unit 267	Crude Unit	B-601	C	Elbow	0.50	Atmospheric Bottoms	Gas Oil	N	N	G	109	0	NA
B-1473	Unit 267	Crude Unit	B-601	C	Elbow	0.50	Atmospheric Bottoms	Gas Oil	N	N	G	105	0	NA
B-1475	Unit 267	Crude Unit	E-616	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	75	200	N
B-1477	Unit 267	Crude Unit	E-616	V	Gate	1.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	68	200	N
B-1479	Unit 267	Crude Unit	E-616	V	Gate	0.50	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	56	200	N
B-1481	Unit 267	Crude Unit	E-616	C	Plug	0.50	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	58	200	NA
B-1483	Unit 267	Crude Unit	E-616	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	111	Blank	Y
B-1485	Unit 267	Crude Unit	E-616	V	Gate	1.50	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	59	Blank	Y
B-1487	Unit 267	Crude Unit	E-616	V	Control Valve	3.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	92	Blank	Y
B-1489	Unit 267	Crude Unit	E-616	C	Flange	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	140	Blank	NA
B-1491	Unit 267	Crude Unit	E-616	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	103	Blank	Y
B-1493	Unit 267	Crude Unit	E-617	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	164	25	Y
B-1495	Unit 267	Crude Unit	E-617	V	Control Valve	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	158	25	Y
B-1497	Unit 267	Crude Unit	E-617	C	Plug	1.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	68	25	NA
B-1499	Unit 267	Crude Unit	E-617	V	Gate	1.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	83	Blank	Y
B-1501	Unit 267	Crude Unit	E-617	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	112	Blank	Y
B-1503	Unit 267	Crude Unit	E-617	V	Globe	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	70	Blank	Y
B-1505	Unit 267	Crude Unit	F-612	V	Gate	1.00	Flushing Oil	Other	N	N	P	57	Blank	N
B-1507	Unit 267	Crude Unit	F-612	V	Gate	1.00	Flushing Oil	Other	N	N	P	60	Blank	N
B-1509	Unit 267	Crude Unit	F-612	V	Gate	2.00	Flushing Oil	Other	N	N	P	60	Blank	Y
B-1511	Unit 267	Crude Unit	F-612	C	Flange	2.00	Flushing Oil	Other	N	N	P	61	Blank	NA
B-1513	Unit 267	Crude Unit	F-612	V	Gate	2.00	Flushing Oil	Other	N	N	P	61	Blank	Y
B-1515	Unit 267	Crude Unit	F-612	V	Gate	1.50	Flushing Oil	Other	N	N	P	65	Blank	N
B-1517	Unit 267	Crude Unit	F-612	V	Gate	1.00	Flushing Oil	Other	N	N	P	64	Blank	N
B-1519	Unit 267	Crude Unit	F-612	C	Plug	1.00	Flushing Oil	Other	N	N	P	62	Blank	NA
B-1521	Unit 267	Crude Unit	F-612	V	Gate	1.50	Flushing Oil	Other	N	N	P	62	Blank	N
B-1523	Unit 267	Crude Unit	F-612	V	Gate	0.75	Flushing Oil	Other	N	N	P	71	Blank	N
B-1525	Unit 267	Crude Unit	F-612	V	Gate	0.75	Flushing Oil	Other	N	N	P	64	Blank	N
B-1527	Unit 267	Crude Unit	F-612	C	Plug	0.75	Flushing Oil	Other	N	N	P	64	Blank	NA
B-1529	Unit 267	Crude Unit	F-612	V	Gate	0.75	Flushing Oil	Other	N	N	P	64	Blank	Y
B-1531	Unit 267	Crude Unit	F-612	V	Gate	1.00	Flushing Oil	Other	N	N	P	67	Blank	N
B-1533	Unit 267	Crude Unit	E-603	V	Gate	6.00	LVGO Reflux	Gas Oil	N	N	P	65	Blank	Y
B-1535	Unit 267	Crude Unit	E-603	V	Gate	1.00	LVGO Reflux	Gas Oil	N	N	P	161	Blank	Y
B-1537	Unit 267	Crude Unit	E-603	V	Control Valve	4.00	LVGO Reflux	Gas Oil	N	N	P	172	Blank	Y
B-1539	Unit 267	Crude Unit	E-603	C	Flange	4.00	LVGO Reflux	Gas Oil	N	N	P	161	Blank	NA
B-1541	Unit 267	Crude Unit	E-603	V	Gate	6.00	LVGO Reflux	Gas Oil	N	N	P	162	Blank	Y
B-1543	Unit 267	Crude Unit	E-603	V	Globe	3.00	LVGO Reflux	Gas Oil	N	N	P	142	Blank	Y
B-1545	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	250	30	Y
B-1547	Unit 267	Crude Unit	D-604	C	Flange	1.00	Heavy Diesel	Diesel	N	N	P	170	30	NA
B-1549	Unit 267	Crude Unit	D-604	V	Gate	1.00	Heavy Diesel	Diesel	N	N	P	74	30	Y
B-1551	Unit 267	Crude Unit	D-604	C	Flange	1.00	Heavy Diesel	Diesel	N	N	P	69	30	NA
B-1553	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	80	30	Y
B-1555	Unit 267	Crude Unit	D-604	C	Plug	0.75	Heavy Diesel	Diesel	N	N	P	81	30	NA
B-1557	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	290	30	Y
B-1559	Unit 267	Crude Unit	D-604	C	Flange	1.00	Heavy Diesel	Diesel	N	N	P	206	30	NA
B-1561	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	86	30	Y
B-1563	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	N	N	P	110	30	NA
B-1565	Unit 267	Crude Unit	D-604	C	Flange	4.00	Heavy Diesel	Diesel	N	N	P	74	30	NA
B-1567	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	167	30	Y
B-1569	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	87	30	Y
B-1571	Unit 267	Crude Unit	D-604	V	Gate	4.00	Heavy Diesel	Diesel	N	N	P	180	30	Y
B-1573	Unit 267	Crude Unit	D-604	C	Plug	0.75	Heavy Diesel	Diesel	N	N	P	58	30	NA

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B-1575	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	54	30	N
B-1577	Unit 267	Crude Unit	D-604	C	Tee	0.75	Heavy Diesel	Diesel	N	N	P	61	30	NA
B-1579	Unit 267	Crude Unit	D-604	V	Gate	1.00	Heavy Diesel	Diesel	N	N	P	82	30	Y
B-1581	Unit 267	Crude Unit	D-604	C	Flange	1.00	Heavy Diesel	Diesel	N	N	P	195	30	NA
B-1583	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	214	30	Y
B-1585	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	119	30	Y
B-1587	Unit 267	Crude Unit	D-604	C	Plug	0.75	Heavy Diesel	Diesel	N	N	P	43	30	NA
B-1589	Unit 267	Crude Unit	D-604	C	Manway	24.00	Heavy Diesel	Diesel	N	N	P	368	30	NA
B-1591	Unit 267	Crude Unit	D-604	C	Manway	24.00	Heavy Diesel	Diesel	N	N	P	291	Blank	NA
B-1593	Unit 267	Crude Unit	D-604	C	Flange	4.00	Heavy Diesel	Diesel	N	N	P	129	Blank	NA
B-1595	Unit 267	Crude Unit	D-604	V	Gate	10.00	Heavy Diesel	Diesel	N	N	P	111	Blank	Y
B-1597	Unit 267	Crude Unit	D-604	C	Flange	10.00	Heavy Diesel	Diesel	N	N	P	68	Blank	NA
B-1599	Unit 267	Crude Unit	D-604	C	Flange	10.00	Heavy Diesel	Diesel	N	N	P	145	Blank	NA
B-1601	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	N	N	P	65	Blank	Y
B-1603	Unit 267	Crude Unit	D-604	C	Flange	0.75	Heavy Diesel	Diesel	N	N	P	64	Blank	NA
B-1605	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	114	0	Y
B-1607	Unit 267	Crude Unit	D-604	C	Reducer	0.50	Heavy Diesel	Diesel	L	N	P	89	0	NA
B-1609	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Heavy Diesel	Diesel	L	N	P	86	0	NA
B-1611	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	81	0	Y
B-1613	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	96	0	Y
B-1615	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	86	0	Y
B-1617	Unit 267	Crude Unit	D-604	C	Tee	0.50	Heavy Diesel	Diesel	L	N	P	70	0	NA
B-1619	Unit 267	Crude Unit	D-604	C	Screw Fitting	0.50	Heavy Diesel	Diesel	L	N	P	73	0	NA
B-1621	Unit 267	Crude Unit	D-604	C	Screw Fitting	0.50	Heavy Diesel	Diesel	L	N	P	64	0	NA
B-1623	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Heavy Diesel	Diesel	L	N	P	92	0	NA
B-1625	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Heavy Diesel	Diesel	L	N	P	93	0	NA
B-1627	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Heavy Diesel	Diesel	L	N	P	66	0	NA
B-1629	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Heavy Diesel	Diesel	L	N	P	63	0	NA
B-1631	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Heavy Diesel	Diesel	L	N	P	77	0	NA
B-1633	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Heavy Diesel	Diesel	L	N	P	84	0	NA
B-1635	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	135	30	Y
B-1637	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	90	30	Y
B-1639	Unit 267	Crude Unit	D-604	C	Plug	0.75	Flushing Oil	Other	L	N	P	64	30	NA
B-1641	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	130	30	Y
B-1643	Unit 267	Crude Unit	D-604	C	Flange	10.00	Flushing Oil	Other	L	N	P	153	30	NA
B-1645	Unit 267	Crude Unit	D-604	V	Gate	0.50	Flushing Oil	Other	L	N	P	147	30	N
B-1647	Unit 267	Crude Unit	D-604	V	Gate	0.50	Flushing Oil	Other	L	N	P	79	30	Y
B-1649	Unit 267	Crude Unit	D-604	C	Flange	10.00	Flushing Oil	Other	L	N	P	128	30	NA
B-1651	Unit 267	Crude Unit	D-604	C	Plug	0.50	Flushing Oil	Other	L	N	P	74	30	NA
B-1653	Unit 267	Crude Unit	D-604	V	Gate	0.50	Flushing Oil	Other	L	N	P	71	30	Y
B-1655	Unit 267	Crude Unit	D-604	V	Gate	1.50	Flushing Oil	Other	L	N	P	104	30	Y
B-1657	Unit 267	Crude Unit	D-604	V	Check	1.50	Flushing Oil	Other	L	N	P	73	30	Y
B-1659	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	113	30	Y
B-1661	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	70	30	Y
B-1663	Unit 267	Crude Unit	D-604	C	Plug	0.75	Flushing Oil	Other	L	N	P	70	30	NA
B-1665	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	125	30	Y
B-1667	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	62	30	Y
B-1669	Unit 267	Crude Unit	D-604	C	Reducer	0.50	Flushing Oil	Other	L	N	P	57	30	NA
B-1671	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Flushing Oil	Other	L	N	P	64	30	NA
B-1673	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	82	0	Y
B-1675	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	89	0	Y
B-1677	Unit 267	Crude Unit	D-604	C	Plug	0.75	Flushing Oil	Other	L	N	P	73	0	NA
B-1681	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	68	0	Y
B-1683	Unit 267	Crude Unit	D-604	V	Gate	1.00	Flushing Oil	Other	L	N	P	69.8	0	Y
B-1685	Unit 267	Crude Unit	D-604	V	Check	1.00	Flushing Oil	Other	L	N	P	70	0	Y
B-1687	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	95	0	Y
B-1689	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	71	0	N
B-1691	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	69	0	NA
B-1693	Unit 267	Crude Unit	D-604	C	Plug	0.50	Flushing Oil	Other	L	N	P	72	0	NA
B-1695	Unit 267	Crude Unit	D-604	C	Flange	10.00	Flushing Oil	Other	L	N	P	66	0	NA
B-1697	Unit 267	Crude Unit	D-604	V	Gate	1.00	Flushing Oil	Other	L	N	P	69	0	Y
B-1699	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	59	0	NA
B-1701	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	76	0	Y
B-1703	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	68	0	Y
B-1705	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	65	0	NA
B-1707	Unit 267	Crude Unit	D-604	V	Gate	6.00	Flushing Oil	Other	L	N	P	95	0	Y
B-1709	Unit 267	Crude Unit	D-604	C	Manway	24.00	Flushing Oil	Other	L	N	P	223	0	NA
B-1711	Unit 267	Crude Unit	D-604	V	Gate	0.50	Flushing Oil	Other	L	N	P	75	0	Y
B-1713	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	97	Blank	NA
B-1715	Unit 267	Crude Unit	D-604	V	Gate	0.50	Flushing Oil	Other	L	N	P	78	Blank	Y
B-1717	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	97	Blank	NA
B-1719	Unit 267	Crude Unit	D-604	V	Gate	0.50	Flushing Oil	Other	L	N	P	104	Blank	Y
B-1721	Unit 267	Crude Unit	D-604	V	Gate	1.50	Flushing Oil	Other	L	N	P	103	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1723	Unit 267	Crude Unit	D-604	C	Flange	2.00	Flushing Oil	Other	L	N	P	254	Blank	NA
B-1725	Unit 267	Crude Unit	D-604	C	Flange	2.00	Flushing Oil	Other	L	N	P	167	Blank	NA
B-1727	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	101	Blank	Y
B-1729	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	95	Blank	NA
B-1731	Unit 267	Crude Unit	D-604	V	Gate	2.00	Flushing Oil	Other	L	N	P	98	Blank	Y
B-1733	Unit 267	Crude Unit	D-604	C	Flange	2.00	Flushing Oil	Other	L	N	P	76	Blank	NA
B-1735	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	51	Blank	Y
B-1737	Unit 267	Crude Unit	D-604	V	Gate	1.50	Flushing Oil	Other	L	N	P	208	Blank	Y
B-1739	Unit 267	Crude Unit	D-604	C	Flange	2.00	Flushing Oil	Other	L	N	P	235	Blank	NA
B-1741	Unit 267	Crude Unit	D-604	C	Flange	2.00	Flushing Oil	Other	L	N	P	155	Blank	NA
B-1743	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	99	Blank	Y
B-1745	Unit 267	Crude Unit	D-604	C	Bull Plug	0.90	Flushing Oil	Other	L	N	P	104	Blank	NA
B-1747	Unit 267	Crude Unit	D-604	V	Gate	1.00	Flushing Oil	Other	L	N	P	204	Blank	Y
B-1749	Unit 267	Crude Unit	D-604	V	Gate	1.00	Flushing Oil	Other	L	N	P	310	Blank	Y
B-1751	Unit 267	Crude Unit	D-604	V	Gate	0.75	Flushing Oil	Other	L	N	P	83	Blank	N
B-1753	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	78	Blank	NA
B-1755	Unit 267	Crude Unit	D-604	C	Flange	2.00	Flushing Oil	Other	L	N	P	135	Blank	NA
B-1757	Unit 267	Crude Unit	D-604	V	Gate	2.00	Flushing Oil	Other	L	N	P	125	Blank	Y
B-1759	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	148	Blank	Y
B-1761	Unit 267	Crude Unit	E-610	C	Reducer	0.50	Flushing Oil	Other	L	N	P	102	Blank	NA
B-1763	Unit 267	Crude Unit	E-610	C	Tube Fitting	0.25	Flushing Oil	Other	L	N	P	119	Blank	NA
B-1765	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	308	Blank	Y
B-1767	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	175	Blank	Y
B-1769	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	134	Blank	NA
B-1771	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	278	Blank	Y
B-1773	Unit 267	Crude Unit	E-610	V	Gate	1.00	Flushing Oil	Other	L	N	P	169	0	Y
B-1775	Unit 267	Crude Unit	E-610	V	Check	1.00	Flushing Oil	Other	L	N	P	79	0	Y
B-1777	Unit 267	Crude Unit	E-610	V	Check	1.00	Flushing Oil	Other	L	N	P	72	0	Y
B-1779	Unit 267	Crude Unit	E-610	C	Plug	0.50	Flushing Oil	Other	L	N	P	144	0	NA
B-1781	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	111	0	Y
B-1783	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	94	0	NA
B-1785	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	214	0	N
B-1787	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	85	0	Y
B-1789	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	73	0	NA
B-1791	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	273	0	Y
B-1793	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	176	0	Y
B-1795	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	78	0	NA
B-1797	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	295	0	N
B-1799	Unit 267	Crude Unit	E-610	V	Needle	0.50	Flushing Oil	Other	L	N	P	79	0	Y
B-1801	Unit 267	Crude Unit	E-610	V	Needle	0.50	Flushing Oil	Other	L	N	P	79	0	Y
B-1803	Unit 267	Crude Unit	E-610	V	Needle	0.50	Flushing Oil	Other	L	N	P	86	0	Y
B-1805	Unit 267	Crude Unit	E-610	C	Tube Fitting	0.50	Flushing Oil	Other	L	N	P	75	0	NA
B-1807	Unit 267	Crude Unit	E-610	C	Tube Fitting	0.50	Flushing Oil	Other	L	N	P	89	0	NA
B-1809	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	87	0	NA
B-1811	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	78	0	NA
B-1813	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	87	0	NA
B-1815	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	87	0	NA
B-1817	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	89	0	Y
B-1819	Unit 267	Crude Unit	E-610	C	Reducer	0.50	Flushing Oil	Other	L	N	P	93	0	NA
B-1821	Unit 267	Crude Unit	E-610	C	Tube Fitting	0.25	Flushing Oil	Other	L	N	P	93	0	NA
B-1823	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	117	0	Y
B-1825	Unit 267	Crude Unit	E-610	C	Tee	0.50	Flushing Oil	Other	L	N	P	54	0	NA
B-1827	Unit 267	Crude Unit	E-610	V	Gate	0.75	Flushing Oil	Other	L	N	P	81	0	Y
B-1829	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	77	0	NA
B-1831	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	94	0	Y
B-1833	Unit 267	Crude Unit	E-610	V	Gate	0.75	Flushing Oil	Other	L	N	P	93	15	N
B-1835	Unit 267	Crude Unit	E-610	V	Gate	0.75	Flushing Oil	Other	L	N	P	86	15	Y
B-1837	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	118	15	NA
B-1839	Unit 267	Crude Unit	E-610	C	Plug	0.50	Flushing Oil	Other	L	N	P	82	15	NA
B-1841	Unit 267	Crude Unit	E-610	V	Gate	0.50	Flushing Oil	Other	L	N	P	71	15	Y
B-1843	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	71	15	NA
B-1845	Unit 267	Crude Unit	E-610	V	Gate	1.00	Flushing Oil	Other	L	N	P	89	15	Y
B-1847	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	91	15	Y
B-1849	Unit 267	Crude Unit	E-610	V	Gate	0.75	Flushing Oil	Other	L	N	P	92	15	Y
B-1851	Unit 267	Crude Unit	E-610	C	Bull Plug	0.50	Flushing Oil	Other	L	N	P	91	15	NA
B-1853	Unit 267	Crude Unit	E-610	V	Gate	2.00	Flushing Oil	Other	L	N	P	171	15	Y
B-1855	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	95	0	NA
B-1857	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	95	0	NA
B-1859	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	95	0	NA
B-1861	Unit 267	Crude Unit	E-610	C	Screw Fitting	0.50	Flushing Oil	Other	L	N	P	95	0	NA
B-1863	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	N	N	T	212	0	Y
B-1865	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	N	N	T	212	0	Y
B-1867	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	N	N	T	212	0	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1869	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	220	0	NA
B-1871	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	220	0	NA
B-1873	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	220	0	NA
B-1875	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	N	N	T	215	0	Y
B-1877	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	N	N	T	215	0	Y
B-1879	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	N	N	T	215	0	Y
B-1881	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	191	0	NA
B-1883	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	191	0	NA
B-1885	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	191	0	NA
B-1887	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	191	0	NA
B-1889	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	191	0	NA
B-1891	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	N	N	T	191	0	NA
B-1893	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	Y
B-1895	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	NA
B-1897	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	Y
B-1899	Unit 267	Crude Unit	D-604	C	Bull Plug	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	NA
B-1901	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	NA
B-1903	Unit 267	Crude Unit	D-604	C	Tube Fitting	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	NA
B-1905	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	Y
B-1907	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	L	N	T	81	0	Y
B-1909	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	L	N	T	79	0	Y
B-1911	Unit 267	Crude Unit	D-604	V	Needle	0.50	Vacuum tower Overhead	Diesel	L	N	T	79	0	Y
B-1913	Unit 267	Crude Unit	D-604	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	T	77	0	NA
B-1915	Unit 267	Crude Unit	D-604	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	T	112	0	Y
B-1917	Unit 267	Crude Unit	D-604	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	T	124	0	NA
B-1919	Unit 267	Crude Unit	D-604	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	T	94	0	NA
B-1921	Unit 267	Crude Unit	D-604	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	T	80	0	NA
B-1923	Unit 267	Crude Unit	D-602	V	Gate	0.50	Resid	Resid	N	N	G	69	Blank	N
B-1925	Unit 267	Crude Unit	D-602	V	Gate	0.50	Resid	Resid	N	N	G	98.5	Blank	Y
B-1927	Unit 267	Crude Unit	D-602	C	Plug	0.50	Resid	Resid	N	N	G	98.5	Blank	NA
B-1929	Unit 267	Crude Unit	D-602	V	Gate	2.00	Resid	Resid	N	N	G	83.5	Blank	Y
B-1931	Unit 267	Crude Unit	D-602	C	Flange	2.00	Resid	Resid	N	N	G	83.5	Blank	NA
B-1933	Unit 267	Crude Unit	D-602	C	Flange	2.00	Resid	Resid	N	N	G	69.4	Blank	NA
B-1935	Unit 267	Crude Unit	D-602	C	Flange	6.00	Resid	Resid	N	N	G	132	Blank	NA
B-1937	Unit 267	Crude Unit	D-602	V	Gate	6.00	Resid	Resid	N	N	G	124.6	Blank	Y
B-1939	Unit 267	Crude Unit	D-602	V	Gate	0.50	Resid	Resid	N	N	G	75	Blank	N
B-1941	Unit 267	Crude Unit	D-602	C	Plug	0.50	Resid	Resid	N	N	G	75	Blank	NA
B-1943	Unit 267	Crude Unit	D-602	C	Flange	6.00	Resid	Resid	N	N	G	153	Blank	NA
B-1945	Unit 267	Crude Unit	D-602	V	Gate	6.00	Resid	Resid	N	N	G	123.9	Blank	Y
B-1947	Unit 267	Crude Unit	D-602	C	Flange	6.00	Resid	Resid	N	N	G	145	Blank	NA
B-1949	Unit 267	Crude Unit	D-602	V	Gate	6.00	Resid	Resid	N	N	G	125	Blank	Y
B-1951	Unit 267	Crude Unit	D-601	C	Flange	6.00	Resid	Resid	N	N	G	159.6	Blank	NA
B-1953	Unit 267	Crude Unit	D-601	V	Control Valve	6.00	Resid	Resid	N	N	G	157	Blank	Y
B-1955	Unit 267	Crude Unit	D-601	C	Flange	6.00	Resid	Resid	N	N	G	163.8	Blank	NA
B-1957	Unit 267	Crude Unit	D-601	V	Bleed	0.50	Resid	Resid	N	N	G	79	Blank	N
B-1959	Unit 267	Crude Unit	D-601	C	Plug	0.50	Resid	Resid	N	N	G	79	Blank	NA
B-1961	Unit 267	Crude Unit	D-601	V	Gate	6.00	Resid	Resid	N	N	G	101	Blank	Y
B-1963	Unit 267	Crude Unit	D-601	C	Flange	6.00	Resid	Resid	N	N	G	132	Blank	NA
B-1965	Unit 267	Crude Unit	D-601	V	Globe	4.00	Resid	Resid	N	N	G	103	Blank	Y
B-1967	Unit 267	Crude Unit	D-601	C	Flange	4.00	Resid	Resid	N	N	G	103	Blank	NA
B-1969	Unit 267	Crude Unit	E-613	V	Gate	0.75	Light Vacuum Gas Oil	Gas Oil	L	N	P	165	Blank	N
B-1971	Unit 267	Crude Unit	E-613	C	Plug	0.75	Light Vacuum Gas Oil	Gas Oil	L	N	P	165	Blank	NA
B-1973	Unit 267	Crude Unit	E-613	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	237	Blank	NA
B-1975	Unit 267	Crude Unit	E-613	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	166	Blank	NA
B-1977	Unit 267	Crude Unit	E-613	C	Flange	3.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	111	Blank	NA
B-1979	Unit 267	Crude Unit	E-613	C	Flange	3.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	83	Blank	NA
B-1981	Unit 267	Crude Unit	E-613	C	Flange	3.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	120	Blank	NA
B-1983	Unit 267	Crude Unit	E-613	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	161	Blank	NA
B-1985	Unit 267	Crude Unit	E-613	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	237	Blank	NA
B-1987	Unit 267	Crude Unit	E-613	V	Gate	0.75	Light Vacuum Gas Oil	Gas Oil	L	N	P	80	Blank	Y
B-1989	Unit 267	Crude Unit	E-613	C	Plug	0.75	Light Vacuum Gas Oil	Gas Oil	L	N	P	80	Blank	NA
B-1991	Unit 267	Crude Unit	E-613	C	Flange	4.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	277	Blank	NA
B-1993	Unit 267	Crude Unit	E-613	C	Flange	4.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	270	Blank	NA
B-1995	Unit 267	Crude Unit	E-613	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	174	Blank	NA
B-1997	Unit 267	Crude Unit	E-613	C	Flange	3.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	115	Blank	NA
B-1999	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	230	Blank	NA
B-2001	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	230	Blank	NA
B-2003	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	230	Blank	NA
B-2005	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	230	Blank	NA
B-2007	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	230	Blank	NA
B-2009	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	230	Blank	NA
B-2011	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2013	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-2015	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2017	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2019	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2021	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2023	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2025	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2027	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2029	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2031	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2033	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2035	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2037	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2039	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2041	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2043	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2045	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2047	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2049	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2051	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2053	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2055	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2057	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2059	Unit 267	Crude Unit	E-613	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	P	220	Blank	NA
B-2061	Unit 267	Crude Unit	E-613	C	Flange	2.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	158	Blank	NA
B-2063	Unit 267	Crude Unit	E-613	C	Flange	3.00	Light Vacuum Gas Oil	Gas Oil	L	N	P	217	Blank	NA
B-2065	Unit 267	Crude Unit	E-613	V	Gate	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	228	Blank	Y
B-2067	Unit 267	Crude Unit	E-613	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	252	Blank	NA
B-2069	Unit 267	Crude Unit	E-613	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	278	Blank	NA
B-2071	Unit 267	Crude Unit	E-615	V	Gate	1.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	112	Blank	N
B-2073	Unit 267	Crude Unit	E-615	C	Bull Plug	0.50	Light Vacuum Gas Oil	Gas Oil	N	N	G	112	Blank	NA
B-2075	Unit 267	Crude Unit	E-615	V	Control Valve	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	282	Blank	Y
B-2077	Unit 267	Crude Unit	E-615	V	Gate	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	232	Blank	Y
B-2079	Unit 267	Crude Unit	E-615	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	237	Blank	NA
B-2081	Unit 267	Crude Unit	E-615	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	234	Blank	NA
B-2083	Unit 267	Crude Unit	E-615	V	Gate	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	307	Blank	Y
B-2085	Unit 267	Crude Unit	E-615	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	276	Blank	NA
B-2087	Unit 267	Crude Unit	E-615	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	276	Blank	NA
B-2089	Unit 267	Crude Unit	E-615	C	Flange	6.00	Light Vacuum Gas Oil	Gas Oil	N	N	G	262	Blank	NA
B-2101	MTC	Marine Terminal	G-71	P	Seal	Unknown	Gas Oil	Gas Oil	N	N	G	82	0	NA
B-2103	MTC	Marine Terminal	G-71	C	Pump Housing	Unknown	Gas Oil	Gas Oil	N	N	G	82	0	NA
B-2105	Unit 40	Tank Farm	G-33	P	Seal	Unknown	Resid	Resid	L	N	G	102	45	NA
B-2107	Unit 40	Tank Farm	G-33	C	Pump Housing	Unknown	Resid	Resid	L	N	G	102	45	NA
B-2109	Unit 40	Tank Farm	G-503A	P	Seal	Unknown	240 feed	Gas Oil	L	N	G	138	42	NA
B-2111	Unit 40	Tank Farm	G-503A	C	Pump Housing	Unknown	240 feed	Gas Oil	L	N	G	138	42	NA
B-2113	Unit 40	Tank Farm	G-503B	P	Seal	Unknown	240 feed	Gas Oil	L	N	G	78	28	NA
B-2115	Unit 40	Tank Farm	G-503B	C	Pump Housing	Unknown	240 feed	Gas Oil	L	N	G	78	28	NA
B-2117	Unit 40	Tank Farm	G-322	P	Seal	Unknown	Gas Oil	Gas Oil	L	N	G	92	20	NA
B-2119	Unit 40	Tank Farm	G-322	C	Pump Housing	Unknown	Gas Oil	Gas Oil	L	N	G	92	20	NA
B-2121	Unit 233	Fuel Gas Treatment	G-601	P	Seal	Unknown	Rich DGA (Diethyl glycol amine)	Amine	L	N	G	118	146	NA
B-2123	Unit 233	Fuel Gas Treatment	G-601	C	Pump Housing	Unknown	Rich DGA (Diethyl glycol amine)	Amine	L	N	G	118	146	NA
B-2125	Unit 233	Fuel Gas Treatment	G-6015	P	Seal	Unknown	Rich DGA (Diethyl glycol amine)	Amine	L	N	G	106	70	NA
B-2127	Unit 233	Fuel Gas Treatment	G-6015	C	Pump Housing	Unknown	Rich DGA (Diethyl glycol amine)	Amine	L	N	G	106	70	NA
B-2129	Unit 233	Fuel Gas Treatment	G-602	P	Seal	Unknown	Sweet Gas	Other	L	N	G	99	Blank	NA
B-2131	Unit 233	Fuel Gas Treatment	G-602	C	Pump Housing	Unknown	Sweet Gas	Other	L	N	G	99	Blank	NA
B-2133	Unit 233	Fuel Gas Treatment	G-604	P	Seal	Unknown	Sour gas liquid	Other	N	N	G	81	20	NA
B-2135	Unit 233	Fuel Gas Treatment	G-604	C	Pump Housing	Unknown	Sour gas liquid	Other	N	N	G	81	20	NA
B-2137	Unit 200	Crude Unit / Coker	G-37	P	Seal	Unknown	Vacuum Tower Gas Oil	Gas Oil	L	N	G	429	180	NA
B-2139	Unit 200	Crude Unit / Coker	G-37	C	Pump Housing	Unknown	Vacuum Tower Gas Oil	Gas Oil	L	N	G	429	180	NA
B-2	246	Hydrocracker	VT Column	C	Hatch	48.00	Blank	Unknown	N	Blank	T	132	Blank	NA
B-4	246	Hydrocracker	D-804	C	Flange	6.00	Blank	Unknown	N	Blank	T	152	Blank	NA
B-6	246	Hydrocracker	D-804	C	Flange	2.00	Blank	Unknown	N	Blank	T	90	Blank	NA
B-8	246	Hydrocracker	D-804	V	GT	2.00	Blank	Unknown	N	Blank	T	90	Blank	Y
B-10	246	Hydrocracker	D-804	C	Flange	2.00	Blank	Unknown	N	Blank	T	165	Blank	NA
B-12	246	Hydrocracker	D-804	V	GT	2.00	Blank	Unknown	N	Blank	T	165	Blank	Y
B-14	246	Hydrocracker	D-804	V	GT	2.00	Blank	Unknown	N	Blank	T	200	Blank	Y
B-16	246	Hydrocracker	D-804	V	GT	1.00	Blank	Unknown	N	Blank	T	105	Blank	N
B-18	246	Hydrocracker	D-804	V	GT	2.00	Blank	Unknown	N	Blank	T	142	Blank	Y
B-20	246	Hydrocracker	D-804	C	Bull Plug	1.00	Blank	Unknown	N	Blank	T	105	Blank	NA
B-22	246	Hydrocracker	D-804	C	Flange	12.00	Blank	Unknown	N	Blank	T	251	Blank	NA
B-24	246	Hydrocracker	D-804	C	Hatch	48.00	Blank	Unknown	N	Blank	T	275	Blank	NA
B-26	246	Hydrocracker	D-804	V	GT	1.50	Blank	Unknown	N	Blank	T	190	Blank	Y
B-28	246	Hydrocracker	D-804	C	Flange	1.50	Blank	Unknown	N	Blank	T	190	Blank	NA
B-30	246	Hydrocracker	D-804	C	Flange	12.00	Blank	Unknown	N	Blank	T	250	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-32	246	Hydrocracker	VT 804 Distillation	C	Flange	2.00	Blank	Unknown	N	Blank	T	250	Blank	NA
B-34	246	Hydrocracker	Column	C	Flange	12.00	Blank	Unknown	N	Blank	T	328	Blank	NA
B-36	246	Hydrocracker	Column	V	GT	2.00	Blank	Unknown	L	Blank	T	137	Blank	Y
B-38	246	Hydrocracker	Column	C	Flange	2.00	Blank	Unknown	L	Blank	T	108	Blank	NA
B-40	246	Hydrocracker	Column	V	GT	2.00	Blank	Unknown	L	Blank	T	210	Blank	Y
B-42	246	Hydrocracker	Column	C	Flange	2.00	Blank	Unknown	L	Blank	T	250	Blank	NA
B-44	246	Hydrocracker	Column	C	Flange	2.00	Blank	Unknown	L	Blank	T	250	Blank	NA
B-46	246	Hydrocracker	Column	C	Access Hatch	48.00	Blank	Unknown	N	Blank	T	375	Blank	NA
B-48	246	Hydrocracker	Column	V	GT	1.00	Blank	Unknown	N	Blank	T	145	Blank	N
B-50	246	Hydrocracker	Column	C	BP	1.00	Blank	Unknown	N	Blank	T	125	Blank	NA
B-52	246	Hydrocracker	Column	V	GT	2.00	Blank	Unknown	N	Blank	T	145	Blank	Y
B-54	246	Hydrocracker	Column	C	Flange	2.00	Blank	Unknown	N	Blank	T	110	Blank	NA
B-56	246	Hydrocracker	Column	V	GT	2.00	Blank	Unknown	N	Blank	T	135	Blank	Y
B-58	246	Hydrocracker	Column	V	GT	2.00	Blank	Unknown	N	Blank	T	250	Blank	Y
B-60	246	Hydrocracker	Column	C	Flange	2.00	Blank	Unknown	N	Blank	T	225	Blank	NA
B-62	246	Hydrocracker	VT-804 Column	V	Needle	0.38	Blank	Unknown	N	Blank	T	110	Blank	Y
B-64	246	Hydrocracker	VT-804 Column	V	Needle	0.38	Blank	Unknown	N	Blank	T	110	Blank	Y
B-66	246	Hydrocracker	VT-804 Column	C	Flange	24.00	Blank	Unknown	N	Blank	T	400	Blank	NA
B-68	246	Hydrocracker	VT-804 Column	C	Flange	2.00	Blank	Unknown	N	Blank	T	200	Blank	NA
B-70	246	Hydrocracker	VT-804 Column	V	GT	2.00	Blank	Unknown	N	Blank	T	145	Blank	Y
B-72	246	Hydrocracker	VT-804 Column	C	Flange	2.00	Blank	Unknown	N	Blank	T	220	Blank	NA
B-74	246	Hydrocracker	VT-804 Column	C	Flange	24.00	Blank	Unknown	N	Blank	T	380	Blank	NA
B-76	246	Hydrocracker	VT-804 Column	C	Access Hatch	48.00	Blank	Unknown	N	Blank	T	395	Blank	NA
B-78	246	Hydrocracker	VT-804 Column	C	Flange	4.00	Blank	Unknown	N	Blank	T	395	Blank	NA
B-80	246	Hydrocracker	VT-804 Column	C	Access Hatch	48.00	Blank	Unknown	N	Blank	T	440	Blank	NA
B-82	246	Hydrocracker	VT-804 Column	C	Flange	48.00	Blank	Unknown	N	Blank	T	520	Blank	NA
B-84	246	Hydrocracker	VT-804 Column	V	GT	1.00	Blank	Unknown	N	Blank	T	100	Blank	N
B-86	246	Hydrocracker	VT-804 Column	V	GT	2.00	Blank	Unknown	N	Blank	T	130	Blank	Y
B-88	246	Hydrocracker	VT-804 Column	C	Flange	2	Blank	Unknown	N	Blank	T	115	Blank	NA
B-90	246	Hydrocracker	Vac Tower D-804	V	GT	1.00	Blank	Unknown	N	Blank	T	170	Blank	Y
B-92	246	Hydrocracker	Vac Tower D-804	V	GT	1.00	Blank	Unknown	N	Blank	T	170	Blank	Y
B-94	246	Hydrocracker	Vac Tower D-804	C	Flange	2.00	Blank	Unknown	N	Blank	T	240	Blank	NA
B-96	246	Hydrocracker	Vac Tower D-804	V	-	2.00	Blank	Unknown	N	Blank	T	180	Blank	Y
B-98	246	Hydrocracker	Vac Tower D-804	V	GT	1.00	Blank	Unknown	N	Blank	T	130	Blank	Y
B-100	246	Hydrocracker	Vac Tower D-804	V	GT	1.00	Blank	Unknown	N	Blank	T	100	Blank	Y
B-102	246	Hydrocracker	Vac Tower D-804	V	Needle	0.38	Blank	Unknown	N	Blank	T	145	Blank	Y
B-104	246	Hydrocracker	Vac Tower D-804	C	Flange	3.00	Blank	Unknown	N	Blank	T	220	Blank	NA
B-106	246	Hydrocracker	Vac Column D-804	V	GT	8.00	Blank	Unknown	N	N	T	235	Blank	Y
B-108	246	Hydrocracker	Vac Column D-804	C	Flange	8.00	Blank	Unknown	N	N	T	245	Blank	NA
B-110	246	Hydrocracker	Vac Column D-804	V	GT	2.00	Blank	Unknown	N	N	T	170	Blank	Y
B-112	246	Hydrocracker	Vac Column D-804	C	Flange	8.00	Blank	Unknown	N	N	T	210	Blank	NA
B-114	246	Hydrocracker	Vac Column D-804	V	GT	1.00	Blank	Unknown	N	N	T	105	Blank	N
B-116	246	Hydrocracker	Vac Column D-804	V	GT	8.00	Blank	Unknown	N	N	T	190	Blank	N
B-118	246	Hydrocracker	Vac Column D-804	C	Flange	8.00	Blank	Unknown	N	N	T	190	Blank	NA
B-120	246	Hydrocracker	Vac Column D-804	V	GT	2.00	Blank	Unknown	N	N	T	365	Blank	Y
B-122	246	Hydrocracker	Vac Column D-804	V	GT	2.00	Blank	Unknown	N	N	T	65	Blank	N
B-124	246	Hydrocracker	Vac Column D-804	C	Flange	2.00	Blank	Unknown	N	N	T	65	Blank	NA
B-126	246	Hydrocracker	Vac Column D-804	V	GT	1.00	Blank	Unknown	N	N	T	75	Blank	N
B-128	246	Hydrocracker	Vac Column D-804	V	GT	1.00	Blank	Unknown	N	N	T	80	Blank	N
B-130	246	Hydrocracker	Vac Column D-804	V	GT	1.00	Blank	Unknown	N	N	T	110	Blank	N
B-132	246	Hydrocracker	Vac Column D-804	C	Flange	1.00	Blank	Unknown	N	N	T	90	Blank	NA
B-134	246	Hydrocracker	Vac Column D-804	C	Bull Plug	0.50	Blank	Unknown	N	N	T	195	Blank	NA
B-136	246	Hydrocracker	Vac Column D-804	V	GT	1.00	Blank	Unknown	N	N	T	190	Blank	Y
B-138	246	Hydrocracker	Vac Column D-804	V	GT	2.00	Blank	Unknown	N	N	T	385	Blank	Y
B-140	246	Hydrocracker	Vac Column D-804	V	GT	0.50	Blank	Unknown	N	N	T	109	Blank	N
B-142	246	Hydrocracker	Vac Column D-804	V	GT	0.50	Blank	Unknown	N	N	T	105	Blank	Y
B-144	246	Hydrocracker	Vac Column D-804	V	GT	0.50	Blank	Unknown	N	N	T	250	Blank	Y
B-146	246	Hydrocracker	Vac Column D-804	C	BP	0.50	Blank	Unknown	N	N	T	230	Blank	NA
B-148	246	Hydrocracker	Vac Column D-804	V	GT	2.00	Blank	Unknown	N	N	T	369	Blank	Y
B-150	246	Hydrocracker	Vac Column D-804	C	Access Hatch	48.00	Blank	Unknown	N	N	T	450	Blank	NA
B-152	246	Hydrocracker	Vac Column D-804	V	GT	4.00	Blank	Unknown	N	N	T	240	Blank	Y
B-154	246	Hydrocracker	Vac Column D-804	C	Flange	14.00	Blank	Unknown	N	N	T	320	Blank	NA
B-156	246	Hydrocracker	Vac Column D-804	C	Flange	8.00	Blank	Unknown	N	N	T	460	Blank	NA
B-158	246	Hydrocracker	Vac Column D-804	C	Flange	12.00	DSL	Diesel	N	N	Blank	350	Blank	NA
B-160	246	Hydrocracker	Vac Column D-804	C	BP	1.00	DSL	Diesel	N	N	Blank	225	Blank	NA
B-162	246	Hydrocracker	Vac Column D-804	V	GT	1.00	DSL	Diesel	N	N	Blank	225	Blank	Y
B-164	246	Hydrocracker	Line after E-836	V	GT	10.00	DSL	Diesel	N	N	G	339	Blank	Y
B-166	246	Hydrocracker	Line after E-836	C	Flange	10.00	DSL	Diesel	N	N	G	399	Blank	NA
B-168	246	Hydrocracker	Line after E-836	V	GT	10.00	DSL	Diesel	N	N	G	340	Blank	Y
B-170	246	Hydrocracker	Line after E-836	V	GT	1.00	DSL	Diesel	N	N	G	185	Blank	Y
B-172	246	Hydrocracker	Line after E-836	C	Flange	10.00	DSL	Diesel	N	N	G	360	Blank	NA
B-174	246	Hydrocracker	Line after E-836	V	Control Valve	10.00	DSL	Diesel	N	N	G	360	Blank	Y
B-176	246	Hydrocracker	Line after E-836	V	GT	1.00	DSL	Diesel	N	N	G	230	Blank	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-178	246	Hydrocracker	Line after E-836	C	Flange	10.00	DSL	Diesel	N	N	G	350	Blank	NA
B-180	246	Hydrocracker	Line after E-836	V	GT	10.00	DSL	Diesel	N	N	G	350	Blank	Y
B-182	246	Hydrocracker	Line after E-836	C	Flange	1.00	DSL	Diesel	N	N	G	210	Blank	NA
B-184	246	Hydrocracker	Line after E-836	C	Union	0.50	DSL	Diesel	N	N	G	130	Blank	NA
B-186	246	Hydrocracker	Line after E-836	V	GT	1.00	DSL	Diesel	N	N	G	230	Blank	Y
B-188	246	Hydrocracker	Line after E-836	C	Union	0.25	DSL	Diesel	N	N	G	135	Blank	NA
B-190	246	Hydrocracker	Line after E-836	V	GT	10.00	DSL	Diesel	N	Blank	G	320	Blank	Y
B-192	246	Hydrocracker	Line after E-836	C	Flange	10.00	DSL	Diesel	N	Blank	G	320	Blank	NA
B-194	246	Hydrocracker	Line after E-836	V	GT	1.00	DSL	Diesel	N	Blank	G	320	Blank	Y
B-196	246	Hydrocracker	Line after E-836	C	Flange	12.00	DSL	Diesel	N	Blank	G	320	Blank	NA
B-198	246	Hydrocracker	Line after E-836	V	GT	2.00	DSL	Diesel	N	Blank	G	250	Blank	Y
B-200	246	Hydrocracker	Line after E-836	C	Bull Plug	2.00	DSL	Diesel	N	Blank	G	250	Blank	NA
B-202	246	Hydrocracker	Line after E-836	C	Flange	10.00	DSL	Diesel	N	Blank	G	290	Blank	NA
B-204	246	Hydrocracker	Line after E-836	V	GT	10.00	DSL	Diesel	N	Blank	G	260	Blank	Y
B-206	246	Hydrocracker	Line after E-836	V	GT	1.00	DSL	Diesel	N	Blank	G	185	Blank	Y
B-208	246	Hydrocracker	Heavy DSL return from E-846	V	GT	6.00	DSL	Diesel	N	Blank	G	260	Blank	Y
B-210	246	Hydrocracker	Heavy DSL return from E-846	C	Flange	6.00	DSL	Diesel	N	Blank	G	230	Blank	NA
B-212	246	Hydrocracker	Heavy DSL return from E-846	V	GT	1.00	DSL	Diesel	N	Blank	G	200	Blank	N
B-214	246	Hydrocracker	Heavy DSL return from E-846	V	GT	6.00	DSL	Diesel	N	Blank	G	200	Blank	Y
B-216	246	Hydrocracker	Heavy DSL return from E-846	V	GT	1.00	DSL	Diesel	N	Blank	G	170	Blank	Y
B-218	246	Hydrocracker	Heavy DSL return from E-846	C	Bull Plug	1.00	DSL	Diesel	N	Blank	G	170	Blank	NA
B-220	246	Hydrocracker		V	GT	4.00	Heavy DSL PA	Diesel	N	Blank	G	385	Blank	Y
B-222	246	Hydrocracker		C	Flange	4.00	Heavy DSL PA	Diesel	N	Blank	G	385	Blank	NA
B-224	246	Hydrocracker		V	Control	2.00	Heavy DSL PA	Diesel	N	Blank	G	410	Blank	Y
B-226	246	Hydrocracker		V	GT	1.00	Heavy DSL PA	Diesel	N	Blank	G	175	Blank	N
B-228	246	Hydrocracker		V	GT	1.00	Heavy DSL PA	Diesel	N	Blank	G	260	Blank	N
B-230	246	Hydrocracker		C	Bull Plug	1.00	Heavy DSL PA	Diesel	N	Blank	G	260	Blank	NA
B-232	246	Hydrocracker		V	GT	4.00	Heavy DSL PA	Diesel	N	Blank	G	360	Blank	Y
B-234	246	Hydrocracker		V	GT	1.00	Heavy DSL PA	Diesel	N	Blank	G	250	Blank	Y
B-236	246	Hydrocracker		C	Flange	4.00	Heavy DSL PA	Diesel	N	Blank	G	400	Blank	NA
B-238	246	Hydrocracker		C	Flange	6.00	Heavy DSL PA	Diesel	N	Blank	G	90	Blank	NA
B-240	246	Hydrocracker		V		1.00	Heavy DSL PA	Diesel	N	Blank	G	270	Blank	Y
B-242	246	Hydrocracker		C	Flange	6.00	Heavy DSL PA	Diesel	N	Blank	G	390	Blank	NA
B-244	246	Hydrocracker		V	GT	2.00	Heavy DSL PA	Diesel	N	Blank	G	235	Blank	N
B-246	246	Hydrocracker		C	Bull Plug	2.00	Heavy DSL PA	Diesel	N	Blank	G	300	Blank	NA
B-248	246	Hydrocracker	P-11-006	V	GT	4.00	HUK	Gas Oil	N	Blank	G	230	Blank	Y
B-250	246	Hydrocracker	P-11-006	C	Flange	4.00	HUK	Gas Oil	N	Blank	G	230	Blank	NA
B-252	246	Hydrocracker	P-11-006	V	GT	1.00	HUK	Gas Oil	N	Blank	G	130	Blank	N
B-254	246	Hydrocracker	P-11-006	V	Control	3.00	HUK	Gas Oil	N	Blank	G	255	Blank	Y
B-256	246	Hydrocracker	P-11-006	C	Flange	3.00	HUK	Gas Oil	N	Blank	G	255	Blank	NA
B-258	246	Hydrocracker	P-11-006	V	GT	1.00	HUK	Gas Oil	N	Blank	G	150	Blank	N
B-260	246	Hydrocracker	P-11-006	V	GT	4.00	HUK	Gas Oil	N	Blank	G	220	Blank	Y
B-262	246	Hydrocracker	P-11-006	V	GT	4.00	HUK	Gas Oil	N	Blank	G	130	Blank	Y
B-264	246	Hydrocracker	P-11-006	V	GT	1.00	HUk	Gas Oil	N	Blank	G	170	Blank	N
B-266	246	Hydrocracker	P-11-006	C	Union	0.25	HUK	Gas Oil	N	Blank	G	140	Blank	NA
B-268	246	Hydrocracker	P-11-006	V	GT	1.00	HUK	Gas Oil	N	Blank	G	130	Blank	Y
B-270	246	Hydrocracker	P-11-006	C	Bull Plug	1.00	HUK	Gas Oil	N	Blank	G	110	Blank	NA
B-272	246	Hydrocracker	P-11-006	C	Flange	4.00	HUK	Gas Oil	N	Blank	G	200	Blank	NA
B-274	246	Hydrocracker	P-11-006	V	Ball	4.00	HUK	Gas Oil	N	Blank	G	200	Blank	Y
B-276	246	Hydrocracker	P-11-006	C	Threaded	0.25	HUK	Gas Oil	N	Blank	G	77	Blank	NA
B-278-1	246	Hydrocracker	P-11-006	C	Bonnet	4.00	HUK	Gas Oil	N	Blank	G	180	Blank	Y
B-278-2	246	Hydrocracker	P-11-006	V	Ball	4.00	HUK	Gas Oil	N	Blank	G	180	Blank	Y
B-280	246	Hydrocracker	P-11-006	V	GT	1.00	HUK	Gas Oil	N	Blank	G	140	Blank	Y
B-282	246	Hydrocracker	P-11-006	C	Flange	6.00	HUK	Gas Oil	N	Blank	G	175	Blank	NA
B-284	246	Hydrocracker	P-11-006	V	GT	2.00	HUK	Gas Oil	N	Blank	G	118	Blank	Y
B-286	246	Hydrocracker	P-11-006	C	Bull Plug	2.00	HUK	Gas Oil	N	Blank	G	118	Blank	NA
B-288	246	Hydrocracker	From 8E-828S	C	Flange	6.00	HUK	Gas Oil	N	Blank	G	145	Blank	NA
B-290	246	Hydrocracker	From 8E-828S	V	GT	6.00	HUK	Gas Oil	N	Blank	G	110	Blank	Y
B-292	246	Hydrocracker	From 8E-828S	V	GT	1.00	HUK	Gas Oil	N	Blank	G	95	Blank	N
B-294	246	Hydrocracker	From 8E-828S	C	Bull Plug	1.00	HUK	Gas Oil	N	Blank	G	80	Blank	NA
B-296	246	Hydrocracker	From 8E-828S	V	Control	6.00	HUK	Gas Oil	N	Blank	G	145	Blank	Y
B-298	246	Hydrocracker	From 8E-828S	C	Flange	6.00	HUK	Gas Oil	N	Blank	G	145	Blank	NA
B-300	246	Hydrocracker	From 8E-828S	V	GT	1.00	HUK	Gas Oil	N	Blank	G	130	Blank	N
B-302	246	Hydrocracker	From 8E-828S	V	GT	6.00	HUK	Gas Oil	N	Blank	G	115	Blank	Y
B-304	246	Hydrocracker	From 8E-828S	V	GT	1.00	HUK	Gas Oil	N	Blank	G	110	Blank	N
B-306	246	Hydrocracker	From 8E-828S	V	GT	1.00	HUK	Gas Oil	N	Blank	G	80	Blank	Y
B-308	246	Hydrocracker	From 8E-828S	C	Flange	6.00	HUK	Gas Oil	N	Blank	G	140	Blank	NA
B-310	246	Hydrocracker	From 8E-828S	V	Ball	6.00	HUK	Gas Oil	N	Blank	G	113	Blank	Y
B-312	246	Hydrocracker	P-11-008	V	Ball	6.00	HUK	Gas Oil	N	Blank	G	115	Blank	Y
B-314	246	Hydrocracker	P-11-008	C	Flange	6.00	HUK	Gas Oil	N	Blank	G	103	Blank	NA
B-316	246	Hydrocracker	P-11-008	V	GT	1.00	HUK	Gas Oil	N	Blank	G	125	Blank	Y
B-318	246	Hydrocracker	P-11-008	C	Flange	6.00	HUK	Gas Oil	N	Blank	G	145	Blank	NA
B-320	246	Hydrocracker	P-11-008	V	GT	2.00	HUK	Gas Oil	N	Blank	G	120	Blank	Y

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B-322	246	Hydrocracker	P-11-008	C	Bull Plug	2.00	HUK	Gas Oil	N	Blank	G	120	Blank	NA
B-324	246	Hydrocracker	Hot feed	V	GT	4.00	Heavy Diesel	Diesel	N	N	P	90	Blank	Y
B-326	246	Hydrocracker	Hot feed	C	Flange	4.00	Heavy Diesel	Diesel	N	N	P	77	Blank	NA
B-328	246	Hydrocracker	Hot feed	V	GT	3.00	HUK	Gas Oil	N	N	P	80	Blank	Y
B-330	246	Hydrocracker	Hot feed	C	Flange	3.00	HUK	Gas Oil	N	N	P	85	Blank	NA
B-332	246	Hydrocracker	Hot Feed	C	BP	1.00	UGO	Gas Oil	N	N	P	150	Blank	NA
B-334	246	Hydrocracker	Hot feed	V	GT	1.00	UGO	Gas Oil	N	N	P	145	Blank	N
B-336	246	Hydrocracker	Hot Feed	V	GT	1.00	UGO	Gas Oil	N	N	P	100	Blank	N
B-338	246	Hydrocracker	Hot Feed	V	GT	4.00	UGO	Gas Oil	N	N	P	135	Blank	Y
B-340	246	Hydrocracker	Hot Feed	C	Flange	4.00	UGO	Gas Oil	N	N	P	140	Blank	NA
B-342	246	Hydrocracker	Hot Feed	V	GT	4.00	UGO	Gas Oil	N	N	P	165	Blank	Y
B-344	246	Hydrocracker	Hot Feed	V	GT	1.00	Flush oil	Other	N	N	P	80	Blank	Y
B-346	246	Hydrocracker	Hot Feed	C	Flange	3.00	FO	Fuel Oil	N	N	P	85	Blank	NA
B-348	246	Hydrocracker	Hot Feed	V	GT	4.00	Blank	Unknown	N	N	P	200	Blank	Y
B-350	246	Hydrocracker	Hot Feed	C	BP	1.00	Blank	Unknown	N	N	P	200	Blank	NA
B-352	246	Hydrocracker	Hot Feed	V	GT	1.00	Blank	Unknown	N	N	P	200	Blank	Y
B-354	246	Hydrocracker	Hot Feed	V	GT	1.00	Blank	Unknown	N	N	P	140	Blank	Y
B-356	246	Hydrocracker	Hot Feed	C	Flange	3.00	Blank	Unknown	N	N	P	240	Blank	NA
B-358	246	Hydrocracker	Hot Feed	V	GT	3.00	Blank	Unknown	N	N	P	240	Blank	Y
B-360	246	Hydrocracker	Hot Feed	V	GT	1.00	Blank	Unknown	N	N	P	120	Blank	Y
B-362	246	Hydrocracker	Hot Feed	V	GT	4.00	Steam condensate	Condensate	N	N	P	435	Blank	Y
B-364	246	Hydrocracker	Hot Feed	C	BP	4.00	Steam condensate	Condensate	N	N	P	225	Blank	NA
B-366	246	Hydrocracker	Hot Feed	V	GT	1.00	Steam condensate	Condensate	N	N	P	305	Blank	N
B-368	246	Hydrocracker	Hot Feed	C	Flange	4.00	Steam condensate	Condensate	N	N	P	430	Blank	NA
B-370	246	Hydrocracker	Hot Feed	V	GT	4.00	Steam condensate	Condensate	N	N	P	405	Blank	N
B-372	246	Hydrocracker	Hot Feed	V	GT	1.00	Steam condensate	Condensate	N	N	P	305	Blank	N
B-374	246	Hydrocracker	Hot Feed	V	GT	4.00	FO	Fuel Oil	N	N	P	180	Blank	Y
B-376	246	Hydrocracker	Hot Feed	V	GT	4.00	Blank	Unknown	N	N	P	150	Blank	Y
B-378	246	Hydrocracker	Hot Feed	V	GT	1.00	VTHGO	Gas Oil	N	N	P	115	Blank	Y
B-380	246	Hydrocracker	Hot Feed	V	GT	1.00	FO	Fuel Oil	N	N	P	150	Blank	Y
B-382	246	Hydrocracker	Hot Feed	V	GT	1.00	HCGO	Gas Oil	N	N	P	140	Blank	Y
B-384	246	Hydrocracker	Hot Feed	V	GT	1.00	FO	Fuel Oil	N	N	P	185	Blank	Y
B-386	246	Hydrocracker	Hot Feed	V	GT	3.00	HCGO	Gas Oil	N	N	P	310	Blank	Y
B-388	246	Hydrocracker	Hot Feed	C	Flange	3.00	HCGO	Gas Oil	N	N	P	320	Blank	NA
B-390	246	Hydrocracker	Hot Feed	C	BP	1.00	HCGO	Gas Oil	N	N	P	245	Blank	NA
B-392	246	Hydrocracker	Hot Feed	V	GT	1.00	HCGO	Gas Oil	N	N	P	250	Blank	Y
B-394	246	Hydrocracker	Hot Feed	V	GT	3.00	HCGO	Gas Oil	N	N	P	305	Blank	Y
B-396	246	Hydrocracker	Hot Feed	V	GT	1.00	HCGO	Gas Oil	N	N	P	320	Blank	Y
B-398	246	Hydrocracker	Hot Feed	V	GT	1.00	Warm up oil	Diesel	N	N	P	100	Blank	Y
B-400	246	Hydrocracker	Hot Feed	V	GT	2.00	Warm up oil	Diesel	N	N	P	90	Blank	Y
B-402	246	Hydrocracker	Hot Feed	V	GT	8.00	VTHGO	Gas Oil	N	N	P	350	Blank	Y
B-404	246	Hydrocracker	Hot Feed	V	GT	1.00	VTHGO	Gas Oil	N	N	P	345	Blank	Y
B-406	246	Hydrocracker	Hot Feed	C	Flange	8.00	HCGO	Gas Oil	N	N	P	365	Blank	NA
B-408	246	Hydrocracker	Hot Feed	V	GT	8.00	VTHGO	Gas Oil	N	N	P	355	Blank	Y
B-410	246	Hydrocracker	Hot Feed	V	GT	1.00	VTHGO	Gas Oil	N	N	P	380	Blank	Y
B-412	246	Hydrocracker	Hot Feed	C	Flange	8.00	VTHGO	Gas Oil	N	N	P	365	Blank	NA
B-414	246	Hydrocracker	Hot Feed	V	GT	1.00	VTHGO	Gas Oil	N	N	P	205	Blank	Y
B-416	246	Hydrocracker	Hot Feed	V	GT	6.00	UGO	Gas Oil	N	N	P	205	Blank	Y
B-418	246	Hydrocracker	Hot Feed	C	BP	1.00	UGO	Gas Oil	N	N	P	220	Blank	NA
B-420	246	Hydrocracker	Hot Feed	V	GT	1.00	UGO	Gas Oil	N	N	P	220	Blank	Y
B-422	246	Hydrocracker	Hot Feed	C	Flange	6.00	UGO	Gas Oil	N	N	P	170	Blank	NA
B-424	246	Hydrocracker	Hot Feed	V	GT	6.00	UGO	Gas Oil	N	N	P	115	Blank	Y
B-426	246	Hydrocracker	Hot Feed	V	GT	6.00	UGO	Gas Oil	N	N	P	115	Blank	Y
B-428	246	Hydrocracker	Hot Feed	V	GT	6.00	UGO	Gas Oil	N	N	P	110	Blank	Y
B-430	246	Hydrocracker	Hot Feed	V	GT	1.00	UGO	Gas Oil	N	N	P	100	Blank	Y
B-432	246	Hydrocracker	Hot Feed	V	GT	1.00	UGO	Gas Oil	N	N	P	110	Blank	Y
B-434	246	Hydrocracker	Hot Feed	C	Flange	6.00	UGO	Gas Oil	N	N	P	115	Blank	NA
B-436	246	Hydrocracker	Hot Feed	V	GT	1.00	HUK	Gas Oil	N	Blank	P	87	Blank	Y
B-438	246	Hydrocracker	Hot Feed	C	Flange	4.00	HUK	Gas Oil	N	Blank	P	87	Blank	NA
B-440	246	Hydrocracker	Hot Feed	V	GT	4.00	HUK	Gas Oil	N	Blank	P	87	Blank	Y
B-442	246	Hydrocracker	Hot Feed	V	GT	1.00	HUK	Gas Oil	N	Blank	P	76	Blank	Y
B-444	246	Hydrocracker	Hot Feed	V	GT	4.00	HUK	Gas Oil	N	Blank	P	88	Blank	Y
B-446	246	Hydrocracker	Hot Feed	C	Flange	4.00	HUK	Gas Oil	N	Blank	P	88	Blank	NA
B-448	246	Hydrocracker	Hot Feed	V	GT	1.00	HUK	Gas Oil	N	Blank	P	88	Blank	N
B-450	246	Hydrocracker	Hot Feed	V	GT	1.00	DSL	Diesel	N	Blank	P	92	Blank	Y
B-452	246	Hydrocracker	Hot Feed	V	GT	6.00	Dsl	Diesel	N	Blank	P	96	Blank	Y
B-454	246	Hydrocracker	Hot Feed	C	Flange	6.00	DSL	Diesel	N	Blank	P	100	Blank	NA
B-456	246	Hydrocracker	Hot Feed	V	GT	1.00	DSL	Diesel	N	Blank	P	100	Blank	Y
B-458	246	Hydrocracker	Hot Feed	V	GT	6.00	DSL	Diesel	N	Blank	P	96	Blank	Y
B-460	246	Hydrocracker	Hot Feed	C	Flange	6.00	DSL	Diesel	N	Blank	P	96	Blank	NA
B-462	246	Hydrocracker	Hot Feed	V	GT	1.00	DSL	Diesel	N	Blank	P	73	Blank	Y
B-464	246	Hydrocracker	Hot Feed	C	Bull Plug	1.00	DSL	Diesel	N	Blank	P	73	Blank	NA
B-466	246	Hydrocracker	Main Deck	C	Flange	2.00	Blank	Unknown	N	Blank	P	350	Blank	NA

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B-468	246	Hydrocracker	Main Deck	V	GT	2.00	Blank	Unknown	N	Blank	P	350	Blank	Y
B-470	246	Hydrocracker	Main Deck	V	GT	6.00	Blank	Unknown	N	Blank	P	410	Blank	Y
B-472	246	Hydrocracker	Main Deck	C	Flange	6.00	Blank	Unknown	N	Blank	P	440	Blank	NA
B-474	246	Hydrocracker	Main Deck	C	Flange	1.00	Blank	Unknown	N	Blank	P	120	Blank	NA
B-476	246	Hydrocracker	Main Deck	V	GT	1.50	Blank	Unknown	N	Blank	P	245	Blank	Y
B-478	246	Hydrocracker	Main Deck	C	Flange	6.00	Blank	Unknown	N	Blank	P	425	Blank	NA
B-480	246	Hydrocracker	Main Deck	V	GT	6.00	Blank	Unknown	N	Blank	P	400	Blank	Y
B-482	246	Hydrocracker	Main Deck	C	Flange	6.00	Blank	Unknown	N	Blank	P	180	Blank	NA
B-484	246	Hydrocracker	Main Deck	V	Control	6.00	Blank	Unknown	N	Blank	P	400	Blank	Y
B-486	246	Hydrocracker	Feed Inlet	C	Flange	4.00	BTHGO	Gas Oil	N	Blank	G	330	Blank	NA
B-488	246	Hydrocracker	Feed Inlet	V	GT	4.00	BTHGO	Gas Oil	N	Blank	G	330	Blank	Y
B-490	246	Hydrocracker	Feed Inlet	V	GT	1.00	BTHGO	Gas Oil	N	Blank	G	92	Blank	N
B-492	246	Hydrocracker	Feed Inlet	V	GT	2.00	BTHGO	Gas Oil	N	Blank	G	250	Blank	Y
B-494	246	Hydrocracker	Feed Inlet	V	Control	4.00	HCGO	Gas Oil	N	Blank	G	350	Blank	Y
B-496	246	Hydrocracker	Feed Inlet	C	Flange	2.00	HCGO	Gas Oil	N	Blank	G	330	Blank	NA
B-498	246	Hydrocracker	Feed Inlet	C	Bull Plug	1.00	HCGO	Gas Oil	N	Blank	G	90	Blank	NA
B-500	246	Hydrocracker	Feed Inlet	V	GT	1.00	HVGO	Gas Oil	N	Blank	G	90	Blank	Y
B-502	246	Hydrocracker	Feed Inlet	V	GT	4.00	HCGO	Gas Oil	N	Blank	G	325	Blank	Y
B-504	246	Hydrocracker	Feed Inlet	C	Flange	4.00	HCGO	Gas Oil	N	Blank	G	325	Blank	NA
B-506	246	Hydrocracker	Feed Inlet	C	Flange	4.00	HCGO	Gas Oil	N	Blank	G	320	Blank	NA
B-508	246	Hydrocracker	Feed Inlet	V	GT	1.00	HCGO	Gas Oil	N	Blank	G	165	Blank	Y
B-510	246	Hydrocracker	Feed Inlet	V	GT	1.00	HCGO	Gas Oil	N	Blank	G	165	Blank	Y
B-512	246	Hydrocracker	Feed Inlet	V	GT	1.50	Side Cut 2	Gas Oil	N	Blank	G	280	Blank	Y
B-514	246	Hydrocracker	Feed Inlet	C	Flange	4.00	Side Cut 2	Gas Oil	N	Blank	G	415	Blank	NA
B-516	246	Hydrocracker	Feed Inlet	V	GT	4.00	Side Cut 2	Gas Oil	N	Blank	G	360	Blank	Y
B-518	246	Hydrocracker	Feed Inlet	V	GT	1.00	Side Cut 2	Gas Oil	N	Blank	G	100	Blank	Y
B-520	246	Hydrocracker	Feed Inlet	C	Bull Plug	1.00	Side Cut 2	Gas Oil	N	Blank	G	100	Blank	NA
B-522	246	Hydrocracker	Feed Inlet	V	Control	2.00	Side Cut 2	Gas Oil	N	Blank	G	340	Blank	Y
B-524	246	Hydrocracker	Feed Inlet	C	Flange	2.00	Side Cut 2	Gas Oil	N	Blank	G	430	Blank	NA
B-526	246	Hydrocracker	Feed Inlet	V	GT	1.00	Side Cut 2	Gas Oil	N	Blank	G	100	Blank	N
B-528	246	Hydrocracker	Feed Inlet	V	GT	4.00	Side Cut 2	Gas Oil	N	Blank	G	400	Blank	Y
B-530	246	Hydrocracker	Feed inlet	C	Flange	4.00	Side Cut 2	Gas Oil	N	Blank	G	410	Blank	NA
B-532	246	Hydrocracker	Feed Inlet	C	Bull Plug	1.00	Side Cut 2	Gas Oil	N	Blank	G	170	Blank	NA
B-534	246	Hydrocracker	Feed Inlet	C	Flange	1.00	Side Cut 2	Gas Oil	N	Blank	G	170	Blank	NA
B-536	246	Hydrocracker	Feed Inlet	V	GT	2.00	Side Cut 2	Gas Oil	N	Blank	G	390	Blank	Y
B-538	246	Hydrocracker	Feed Inlet	C	Flange	8.00	VTHGO	Gas Oil	N	Blank	G	335	Blank	NA
B-540	246	Hydrocracker	Feed Inlet	V	GT	8.00	VTHGO	Gas Oil	N	Blank	G	335	Blank	Y
B-542	246	Hydrocracker	Feed Inlet	V	GT	6.00	VTHGO	Gas Oil	N	Blank	G	250	Blank	Y
B-544	246	Hydrocracker	Feed Inlet	V	GT	1.00	VTHGO	Gas Oil	N	Blank	G	100	Blank	Y
B-546	246	Hydrocracker	Feed Inlet	V	Control	6.00	VTHGO	Gas Oil	N	Blank	G	350	Blank	Y
B-548	246	Hydrocracker	Feed Inlet	C	Flange	6.00	VTHGO	Gas Oil	N	Blank	G	375	Blank	NA
B-550	246	Hydrocracker	Feed Inlet	V	GT	1.00	VTHGO	Gas Oil	N	Blank	G	125	Blank	Y
B-552	246	Hydrocracker	Feed Inlet	V	GT	8.00	VTHGO	Gas Oil	N	Blank	G	350	Blank	Y
B-554	246	Hydrocracker	Feed Inlet	C	Flange	8.00	VTHGO	Gas Oil	N	Blank	G	325	Blank	NA
B-556	246	Hydrocracker	Feed Inlet	V	GT	1.50	VTHGO	Gas Oil	N	Blank	G	150	Blank	Y
B-558	246	Hydrocracker	Feed Inlet	C	Bull Plug	1.50	VTHGO	Gas Oil	N	Blank	G	150	Blank	NA
B-560	246	Hydrocracker	Feed Inlet	V	GT	6.00	UGO	Gas Oil	N	Blank	G	130	Blank	Y
B-562	246	Hydrocracker	Feed Inlet	V	Control	4.00	UGO	Gas Oil	N	N	G	165	Blank	Y
B-564	246	Hydrocracker	Feed Inlet	V	GT	1.00	UGO	Gas Oil	N	N	G	100	Blank	Y
B-566	246	Hydrocracker	Feed Inlet	V	GT	1.00	UGO	Gas Oil	N	N	G	110	Blank	Y
B-568	246	Hydrocracker	Feed Inlet	V	GT	6.00	UGO	Gas Oil	N	N	G	215	Blank	Y
B-570	246	Hydrocracker	Feed Inlet	V	GT	4.00	UGO	Gas Oil	N	N	G	110	Blank	Y
B-572	246	Hydrocracker	Feed Inlet	C	BP	1.00	UGO	Gas Oil	N	N	G	140	Blank	NA
B-574	246	Hydrocracker		V	GT	4.00	Blank	Unknown	N	N	G	205	Blank	Y
B-576	246	Hydrocracker		V	Control	4.00	Blank	Unknown	N	N	G	185	Blank	Y
B-578	246	Hydrocracker		V	GT	1.00	Blank	Unknown	N	N	G	120	Blank	Y
B-580	246	Hydrocracker		V	GT	1.00	Blank	Unknown	N	N	G	125	Blank	Y
B-582	246	Hydrocracker		V	GT	4.00	Blank	Unknown	N	N	G	235	Blank	Y
B-584	246	Hydrocracker		V	GT	2.00	Blank	Unknown	N	N	G	200	Blank	Y
B-586	246	Hydrocracker	Vac. Feed Exchanger	C	Flange	18.00	Blank	Unknown	N	N	P	425	Blank	NA
B-588	246	Hydrocracker	Vac. Feed Exchanger	C	Flange	18.00	Blank	Unknown	N	N	P	545	Blank	NA
B-590	246	Hydrocracker	Pump 8G 816B	C	Flange	10.00	HD/HUK	Gas Oil	N	N	G	415	Blank	NA
B-592	200 / Coker	Coker	Bubble Tower	C	Flange	10.00	Blank	Unknown	N	Blank	T	440	Blank	NA
B-594	200 / Coker	Coker	Bubble Tower	C	Flange	0.50	Blank	Unknown	N	Blank	T	140	Blank	NA
B-596	200 / Coker	Coker	Bubble Tower	C	Union	0.50	Blank	Unknown	N	Blank	T	195	Blank	NA
B-598	200 / Coker	Coker	Bubble Tower	V	GT	8.00	Blank	Unknown	N	Blank	T	470	Blank	Y
B-600	200 / Coker	Coker	Bubble Tower	V	GT	8.00	Blank	Unknown	N	Blank	T	380	Blank	Y
B-602	200 / Coker	Coker	Bubble Tower	V	GT	4.00	Blank	Unknown	N	Blank	T	255	Blank	Y
B-604	200 / Coker	Coker	Bubble Tower	C	Flange	4.00	Blank	Unknown	N	Blank	T	180	Blank	NA
B-606	200 / Coker	Coker	Bubble Tower	C	Flange	6.00	Blank	Unknown	N	Blank	T	540	Blank	NA
B-608	200 / Coker	Coker	Bubble Tower	V	Control	6.00	Blank	Unknown	N	Blank	T	576	Blank	Y
B-610	200 / Coker	Coker	Bubble Tower	C	Flange	4.00	LCGO	Gas Oil	N	Blank	T	210	Blank	NA
B-612	200 / Coker	Coker	Bubble Tower	C	Flange	6.00	Feed	Asphalt/Resid	N	Blank	T	540	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-614	200 / Coker	Coker	Bubble Tower	V	GT	6.00	Feed	Asphalt/Resid	N	Blank	T	400	Blank	Y
B-616	200 / Coker	Coker	Bubble Tower	C	Flange	0.50	Feed	Asphalt/Resid	N	Blank	T	300	Blank	NA
B-618	200 / Coker	Coker	Bubble Tower	V	GT	4.00	Slop	Slop Oil	N	Blank	T	280	Blank	Y
B-620	200 / Coker	Coker	Bubble Tower	C	Flange	1.00	Slop	Slop Oil	N	Blank	T	105	Blank	NA
B-622	Coker	Coker	Bubble Tower	V	GT	2.00	Slop	Slop Oil	N	Blank	T	142	Blank	Y
B-624	Coker	Coker	Bubble Tower	C	Flange	2.00	Slop	Slop Oil	N	Blank	T	150	Blank	NA
B-626	Coker	Coker	Bubble Tower	V	GT	2.00	Slop	Slop Oil	N	Blank	T	205	Blank	Y
B-628	Coker	Coker	Bubble Tower	V	GT	6.00	Slop	Slop Oil	N	Blank	T	200	Blank	Y
B-630	Coker	Coker	Bubble Tower	C	Flange	6.00	Slop	Slop Oil	N	Blank	T	200	Blank	NA
B-632	76	Blending / Tank Farm	Blank	C	Pump Housing	8	Light Diesel	Diesel	N	N	G	90	73	NA
B-634	76	Blending / Tank Farm	Blank	P	Blank	Blank	Diesel Blend	Diesel	L	N	G	110	195	NA
B-636	76	Blending / Tank Farm	Blank	P	Blank	10	DSL	Diesel	N	Y	G	90	15	NA
B-638	76	Blending / Tank Farm	Blank	P	Blank	Blank	Tank 173 Blend	Other	N	N	G	80	10	NA
B-640	76	Blending / Tank Farm	Blank	P	Blank	Blank	DSL	Diesel	L	N	G	110	70	NA
B-642	76	Blending / Tank Farm	Blank	P	Blank	Blank	DSL	Diesel	L	N	G	105	48	NA
B-644	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	G	330	Blank	NA
B-646	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	G	260	Blank	NA
B-648	200	Crude Unit / Coker	Blank	P	Blank	Blank	D-101 Bottoms	Gas Oil	L	Blank	G	385	Blank	NA
B-650	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	G	340	Blank	NA
B-652	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	G	300	Blank	NA
B-654	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	G	440	Blank	NA
B-656	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	T	310	Blank	NA
B-658	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	T	378	Blank	NA
B-660	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	T	496	Blank	NA
B-662	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	T	584	Blank	NA
B-664	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	T	550	Blank	NA
B-666	200	Crude Unit / Coker	Blank	P	Blank	Blank	Blank	Unknown	L	Blank	G	139	Blank	NA
B-668	200	Crude Unit / Coker	Blank	P	Blank	6	Blank	Unknown	L	Blank	G	112	Blank	NA
B-670	200	Crude Unit / Coker	Blank	P	Blank	6	Tank 201 resid	Resid	L	Blank	G	140	210	NA
B-672	200	Crude Unit / Coker	Blank	P	Blank	Blank	Tank 201 resid	Resid	N	N	G	100	Blank	NA
B-674	200	Crude Unit / Coker	Blank	P	Blank	Blank	VTHGO prod	Gas Oil	N	N	G	70	Blank	NA
B-676	200	Crude Unit / Coker	Blank	P	Blank	Blank	Feed from SWVRE(?)	Asphalt/Resid	N	N	G	78	Blank	NA
B-678	200	Crude Unit / Coker	Bubble Tower	V	GT	3.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	380	Blank	Y
B-680	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	400	Blank	Y
B-682	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	150	Blank	Y
B-684	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	150	Blank	Y
B-686	200	Crude Unit / Coker	Bubble Tower	C	Bull Plug	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	150	Blank	NA
B-688	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	150	Blank	Y
B-690	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	145	Blank	Y
B-692	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	140	Blank	Y
B-694	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	115	Blank	Y
B-696	200	Crude Unit / Coker	Bubble Tower	V	GT	3.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	130	Blank	Y
B-698	200	Crude Unit / Coker	Bubble Tower	C	Flange	2.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	130	Blank	NA
B-700	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	100	Blank	Y
B-702	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	210	Blank	Y
B-704	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	140	Blank	Y
B-706	200	Crude Unit / Coker	Bubble Tower	V	GT	3.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	435	Blank	Y
B-708	200	Crude Unit / Coker	Bubble Tower	V	GT	2.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	260	Blank	Y
B-710	200	Crude Unit / Coker	Bubble Tower	C	Flange	2.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	260	Blank	NA
B-712	200	Crude Unit / Coker	Bubble Tower	V	GT	1.00	Pre-frac Bottoms	Asphalt/Resid	N	N	P	105	Blank	Y
B-714	200	Crude Unit / Coker	Bubble Tower	C	Access hatch	36.00	Blank	Unknown	N	N	P	525	Blank	NA
B-716	200	Crude Unit / Coker	Base of Bubble Tower	C	Flange	8.00	Blank	Unknown	L	N	G	485	Blank	NA
B-718	200	Crude Unit / Coker	Base of Bubble Tower	V	GT	3.00	Blank	Unknown	L	N	G	370	Blank	Y
B-720	Coker	Coker	D-207	V	Control	2.00	LCGO	Gas Oil	N	Blank	T	440	Blank	Y
B-722	Coker	Coker	D-207	V	GT	4.00	LCGO	Gas Oil	N	Blank	T	375	Blank	Y
B-724	Coker	Coker	D-207	C	Flange	4.00	LCGO	Gas Oil	N	Blank	T	325	Blank	NA
B-726	Coker	Coker	D-207	V	GT	1.00	LCGO	Gas Oil	N	Blank	T	180	Blank	Y
B-728	Coker	Coker	D-207	C	Flange	4.00	LCGO	Gas Oil	N	Blank	T	430	Blank	NA
B-730	Coker	Coker	D-207	V	GT	4.00	LCGO	Gas Oil	N	Blank	T	430	Blank	Y
B-732	Coker	Coker	D-207	V	GT	4.00	LCGO	Gas Oil	N	Blank	T	270	Blank	Y
B-734	Coker	Coker	D-207	C	Bull Plug	1.00	LCGO	Gas Oil	N	Blank	T	180	Blank	NA
B-736	Coker	Coker	D-207	C	Flange	2.00	LCGO	Gas Oil	N	Blank	T	590	Blank	NA
B-740	Coker	Coker	D-207	V	GT	2.00	LCGO	Gas Oil	N	Blank	T	590	Blank	Y
B-742	Coker	Coker	D-207	V	Control	2.00	LCGO	Gas Oil	N	Blank	T	540	Blank	Y
B-744	Coker	Coker	D-207	V	GT	1.00	LCGO	Gas Oil	N	Blank	T	170	Blank	Y
B-746	Coker	Coker	D-207	V	GT	1.00	LCGO	Gas Oil	N	Blank	T	200	Blank	Y
B-748	Coker	Coker	D-207	C	Flange	2.00	LCGO	Gas Oil	N	Blank	T	560	Blank	NA
B-750	Coker	Coker	D-207	V	GT	2.00	LCGO	Gas Oil	N	Blank	T	560	Blank	Y
B-752	Coker	Coker	D-207	C	Bull Plug	1.00	LCGO	Gas Oil	N	Blank	T	235	Blank	NA
B-754	Coker	Coker	D-207	V	GT	2.00	LCGO	Gas Oil	N	Blank	T	260	Blank	Y
B-756	Coker	Coker	D-207	V	GT	2.00	HCGO	Gas Oil	N	Blank	T	380	Blank	Y
B-758	Coker	Coker	D-207	V	GT	2.00	HCGO	Gas Oil	N	Blank	T	280	Blank	Y
B-760	Coker	Coker	D-207	C	Flange	2.00	HCGO	Gas Oil	N	Blank	T	280	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-762	Coker	Coker	D-207	C	Flange	4.00	HCGO	Gas Oil	N	Blank	T	590	Blank	NA
B-764	Coker	Coker	D-207	C	Bull Plug	1.00	HCGO	Gas Oil	N	Blank	T	115	Blank	NA
B-766	Coker	Coker	D-207	V	GT	1.00	HCGO	Gas Oil	N	Blank	T	115	Blank	Y
B-768	Coker	Coker	D-207	C	Flange	1.00	HCGO	Gas Oil	N	Blank	T	155	Blank	NA
B-770	Coker	Coker	D-207	V	GT	1.00	HCGO	Gas Oil	N	Blank	T	170	Blank	Y
B-772	Coker	Coker	D-207	V	GT	1.00	HCGO	Gas Oil	N	Blank	T	260	Blank	Y
B-774	Coker	Coker	D-207	V	GT	1.00	HCGO	Gas Oil	N	Blank	T	180	Blank	Y
B-776	Coker	Coker	D-207	V	GT	2.00	HCGO	Gas Oil	N	Blank	T	180	Blank	Y
B-778	Coker	Coker	D-207	C	Flange	2.00	HCGO	Gas Oil	N	Blank	T	180	Blank	NA
B-780	Coker	Coker	D-207	C	Flange	2.00	HCGO	Gas Oil	N	Blank	T	270	Blank	NA
B-782	Coker	Coker	D-207	V	GT	4.00	HCGO	Gas Oil	N	Blank	T	285	Blank	Y
B-784	Coker	Coker	D-207	C	Flange	4.00	HCGO	Gas Oil	N	Blank	T	285	Blank	NA
B-786	Coker	Coker	D-207	V	GT	1.00	HCGO	Gas Oil	N	Blank	T	130	Blank	Y
B-788	Coker	Coker	E-214A	C	Flange	8.00	LCGO	Gas Oil	N	N	G	190	Blank	NA
B-790	Coker	Coker	E-214A	V	GT	1.00	LCGO	Gas Oil	N	N	G	95	Blank	Y
B-792	Coker	Coker	E-214A	C	BP	1.00	LCGO	Gas Oil	N	N	G	95	Blank	NA
B-794	Coker	Coker	E-214A	C	Flange	8.00	LCGO	Gas Oil	N	N	G	170	Blank	NA
B-796	Coker	Coker	E-214A	C	Flange	2.00	LCGO	Gas Oil	N	N	G	170	Blank	NA
B-798	Coker	Coker	E-214A	C	Flange	2.00	LCGO	Gas Oil	N	N	G	155	Blank	NA
B-800	Coker	Coker	E-214A	C	Flange	8.00	LCGO	Gas Oil	N	N	G	210	Blank	NA
B-802	Coker	Coker	E-214A	C	Flange	2.00	LCGO	Gas Oil	N	N	G	190	Blank	NA
B-804	Coker	Coker	E-207D	V	GT	6.00	LCGO	Gas Oil	N	N	G	280	Blank	Y
B-806	Coker	Coker	E-207D	C	Flange	2.00	LCGO	Gas Oil	N	N	G	220	Blank	NA
B-808	Coker	Coker	E-207D	C	Flange	6.00	LCGO	Gas Oil	N	N	G	270	Blank	NA
B-810	Coker	Coker	E-207D	C	Flange	3.00	LCGO	Gas Oil	N	N	G	255	Blank	NA
B-812	Coker	Coker	E-207B	V	GT	6.00	LCGO	Gas Oil	N	N	G	260	Blank	Y
B-814	Coker	Coker	E-207B	C	Flange	6.00	LCGO	Gas Oil	N	N	G	260	Blank	NA
B-816	Coker	Coker	E-207B	C	Flange	1.00	LCGO	Gas Oil	N	N	G	250	Blank	NA
B-818	Coker	Coker	E-207B	C	BP	1.00	LCGO	Gas Oil	N	N	G	85	Blank	NA
B-820	Coker	Coker	E-207B	C	GT	1.00	LCGO	Gas Oil	N	N	G	85	Blank	NA
B-822	Coker	Coker	LCGO P/A From G-216	V	GT	6.00	LCGO	Gas Oil	N	N	G	365	Blank	Y
B-824	Coker	Coker	LCGO P/A From G-216	C	Flange	6.00	LCGO	Gas Oil	N	N	G	365	Blank	NA
B-826	Coker	Coker	VTLGO from E-108AB	V	GT	3.00	VTLGO	Gas Oil	L	N	G	235	Blank	Y
B-828	Coker	Coker	VTLGO from E-108AB	V	GT	1.00	VTLGO	Gas Oil	L	N	G	230	Blank	Y
B-830	Coker	Coker	E-207D	C	BP	1.00	LCGO	Gas Oil	N	N	G	265	Blank	NA
B-832	Coker	Coker	E-207D	V	GT	1.00	LCGO	Gas Oil	N	N	G	250	Blank	Y
B-834	Coker	Coker	E-207B	C	BP	1.00	LCGO	Gas Oil	N	N	G	190	Blank	NA
B-836	Coker	Coker	E-207B	V	GT	1.00	LCGO	Gas Oil	N	N	G	205	Blank	Y
B-838	Coker	Coker	VTHGO from G38	V	GT	4.00	VTHGO	Gas Oil	N	N	G	165	Blank	Y
B-840	Coker	Coker	VTHGO from G38	V	GT	4.00	VTHGO	Gas Oil	N	N	G	160	Blank	Y
B-842	Coker	Coker	VTHGO from G38	V	Control	4.00	VTHGO	Gas Oil	N	N	G	115	Blank	Y
B-844	Coker	Coker	VTHGO from G38	C	Flange	4.00	VTHGO	Gas Oil	N	N	G	105	Blank	NA
B-846	Coker	Coker	VTHGO from G38	V	GT	4.00	VTHGO	Gas Oil	N	N	G	105	Blank	Y
B-848	Coker	Coker	HCGO from TV-878	V	GT	6.00	HCGO	Gas Oil	N	N	G	630	Blank	Y
B-850	Coker	Coker	HCGO from TV-878	V	Control	6.00	HCGO	Gas Oil	N	N	G	600	Blank	Y
B-852	Coker	Coker	From G-217 TV 878	V	GT	6.00	HCGO	Gas Oil	N	Blank	G	550	Blank	Y
B-854	Coker	Coker	From G-217 TV 878	C	Flange	6.00	HCGO	Gas Oil	N	Blank	G	550	Blank	NA
B-856	Coker	Coker	From G-217 TV 878	C	Flange	6.00	SCTGO	Gas Oil	N	Blank	G	335	Blank	NA
B-858	Coker	Coker	From G-217 TV 878	V	GT	6.00	SCTGO	Gas Oil	N	Blank	G	335	Blank	Y
B-860	Coker	Coker	From G-217 TV 878	V	GT	1.00	SCTGO	Gas Oil	N	Blank	G	210	Blank	Y
B-862	Coker	Coker	TV-762	V	Control	2.00	SCTGO	Gas Oil	N	Blank	G	280	Blank	Y
B-864	Coker	Coker	From TV-762 to FV-102	V	GT	6.00	SCTGO	Gas Oil	N	Blank	G	470	Blank	Y
B-866	Coker	Coker	From TV-762 to FV-102	C	Flange	6.00	SCTGO	Gas Oil	N	Blank	G	400	Blank	NA
B-868	Coker	Coker	From TV-762 to FV-102	V	GT	6.00	SCTGO	Gas Oil	N	Blank	G	400	Blank	Y
B-870	Coker	Coker	E-102A	V	GT	6.00	SCTGO	Gas Oil	N	Blank	G	480	Blank	Y
B-872	Coker	Coker	E-102A	V	GT	6.00	SCTGO	Gas Oil	N	Blank	G	460	Blank	Y
B-874	Coker	Coker	E-102A	C	Flange	6.00	SCTGO	Gas Oil	N	Blank	G	460	Blank	NA
B-876	Coker	Coker	E-102A	C	Bull Plug	1.00	SCTGO	Gas Oil	N	Blank	G	230	Blank	NA
B-878	Coker	Coker	E-102A	V	GT	1.00	SCTGO	Gas Oil	N	Blank	G	230	Blank	Y
B-880	Coker	Coker	E102-A	V	GT	6.00	SCTGO	Gas Oil	N	N	G	460	Blank	Y
B-882	Coker	Coker	E-102A	C	Flange	6.00	SCTGO	Gas Oil	N	N	G	460	Blank	NA
B-884	Coker	Coker	E-102A	V	GT	6.00	SCTGO	Gas Oil	N	N	G	440	Blank	Y
B-886	Coker	Coker	E-102A	V	GT	1.00	SCTGO	Gas Oil	N	N	G	100	Blank	Y
B-888	Coker	Coker	E-102A	C	Bull Plug	1.00	SCTGO	Gas Oil	N	N	G	100	Blank	NA
B-890	Coker	Coker	E-102A	V	GT	4.00	VTHGO	Gas Oil	N	N	G	140	Blank	Y
B-892	Coker	Coker	E-102A	V	GT	4.00	Slops	Slop Oil	N	N	G	90	Blank	Y
B-894	Coker	Coker	E-102A	V	GT	0.50	Comb- Go	Gas Oil	N	N	G	110	Blank	Y
B-896	Coker	Coker	E-102A	V	GT	4.00	Comb- Go	Gas Oil	N	N	G	90	Blank	Y
B-898	Coker	Coker	E-102A	V	GT	4.00	LCGO	Gas Oil	N	N	G	80	Blank	Y
B-900	Coker	Coker	E-210	V	GT	6.00	HCGO	Gas Oil	N	N	G	270	Blank	Y
B-902	Coker	Coker	E-210	V	GT	1.00	HCGO	Gas Oil	N	N	G	130	Blank	Y
B-904	Coker	Coker	E-210	V	Control	6.00	HCGO	Gas Oil	N	N	G	255	Blank	Y
B-906	Coker	Coker	E-210	V	GT	6.00	HCGO	Gas Oil	N	N	G	270	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-908	Coker	Coker	E-210	V	GT	1.00	HCGO	Gas Oil	N	N	G	167	Blank	Y
B-910	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-912	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-914	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-916	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-918	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-920	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-922	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-924	Coker	Coker	E-210	C	Union	0.50	HCGO	Gas Oil	N	N	G	140	Blank	NA
B-926	Coker	Coker	HPGLO to FV-910 from G-105	V	GT	1.00	HPGLO	Gas Oil	N	N	G	125	Blank	Y
B-928	Coker	Coker	HPGLO to FV-910 from G-105	C	BP	1.00	HPGLO	Gas Oil	N	N	G	105	Blank	NA
B-930	Coker	Coker	HPGLO to FV-910 from G-105	V	Control	3.00	HPGLO	Gas Oil	N	N	G	155	Blank	Y
B-932	Coker	Coker	HPGLO to FV-910 from G-105	C	Flange	3.00	HPGLO	Gas Oil	N	N	G	155	Blank	NA
B-934	Coker	Coker	SCTGO from LV-103 to E-103	V	GT	4.00	SCTGO	Gas Oil	N	N	G	410	Blank	Y
B-936	Coker	Coker	HPGLO	V	Needle	1.00	HPGLO	Gas Oil	L	N	G	150	Blank	Y
B-938	Coker	Coker	HCGO from E213 to LV-755	V	GT	6.00	HCGO	Gas Oil	N	N	G	90	Blank	Y
B-940	Coker	Coker	HCGO from E213 to LV-755	C	Flange	4.00	HCGO	Gas Oil	N	N	G	90	Blank	NA
B-942	Coker	Coker	HCGO Prod to H-5 or u-246	V	GT	3.00	HCGO	Gas Oil	N	N	G	400	Blank	Y
B-944	Coker	Coker	HCGO Prod to H-5 or u-246	C	BP	1.00	HCGO	Gas Oil	N	N	G	215	Blank	NA
B-946	Coker	Coker	HCGO Prod to H-5 or u-246	V	GT	1.00	HCGO	Gas Oil	N	N	G	295	Blank	Y
B-948	Coker	Coker	HCGO Prod to H-5 or u-246	V	Control	2.00	HCGO	Gas Oil	N	N	G	400	Blank	Y
B-950	Coker	Coker	HCGO Prod to H-5 or u-246	C	Flange	2.00	HCGO	Gas Oil	N	N	G	345	Blank	NA
B-952	Coker	Coker	HCGO Prod to H-5 or u-246	V	GT	1.00	HCGO	Gas Oil	N	N	G	180	Blank	Y
B-954	Coker	Coker	HCGO Prod to H-5 or u-246	C	Flange	3.00	HCGO	Gas Oil	N	N	G	380	Blank	NA
B-956	Coker	Coker	HCGO Prod to H-5 or u-246	V	GT	3.00	HCGO	Gas Oil	N	N	G	380	Blank	Y
B-958	Coker	Coker	HCGO Prod to H-5 or u-246	V	GT	2.00	HCGO	Gas Oil	N	N	G	255	Blank	Y
B-960	Coker	Coker	Around Pump GM-212	C	Flange	2.00	Resid	Resid	N	N	G	125	Blank	NA
B-962	Coker	Coker	Around Pump GM-212	V	GT	2.00	Resid	Resid	N	N	G	115	Blank	Y
B-964	Coker	Coker	Around Pump GM-212	V	GT	6.00	Resid	Resid	L	N	G	135	Blank	Y
B-966	Coker	Coker	Around Pump GM-212	V	GT	1.00	Resid	Resid	L	N	G	115	Blank	Y
B-968	Coker	Coker	Near Pump GM-212	C	Flange	1.00	Resid	Resid	L	N	G	215	Blank	NA
B-970	Coker	Coker	Near Pump GM-212	V	GT	1.00	Resid	Resid	L	N	G	215	Blank	Y
B-972	Coker	Coker	Near Pump GM-212	C	threaded	0.75	Resid	Resid	L	N	G	115	Blank	NA
B-974	Coker	Coker	Near Pump GM-212	C	Flange	2.00	Resid	Resid	L	N	G	100	Blank	NA
B-976	Coker	Coker	Near Pump GM-212	V	GT	1.00	Resid	Resid	L	N	G	95	Blank	Y
B-978	Coker	Coker	Near Pump GM-212	V	GT	2.00	Resid	Resid	L	N	G	105	Blank	Y
B-980	Coker	Coker	Near Pump GM-212	V	GT	6.00	Resid	Resid	L	N	G	150	Blank	Y
B-982	Coker	Coker	Near Pump GM-212	C	Flange	6.00	Resid	Resid	L	N	G	175	Blank	NA
B-984	Coker	Coker	HCGO to Prod manifold	V	GT	6.00	HCGO	Gas Oil	N	N	G	145	Blank	Y
B-986	Coker	Coker	HCGO to Prod manifold	C	Flange	6.00	HCGO	Gas Oil	N	N	G	145	Blank	NA
B-988	Coker	Coker	HCGO to Prod manifold	V	Control	2.00	HCGO	Gas Oil	N	N	G	185	Blank	Y
B-990	Coker	Coker	HCGO to Prod manifold	V	GT	1.00	HCGO	Gas Oil	N	N	G	105	Blank	Y
B-992	Coker	Coker	HCGO to Prod manifold	V	GT	6.00	HCGO	Gas Oil	N	N	G	180	Blank	Y
B-994	Coker	Coker	HCGO to Prod manifold	C	Flange	6.00	HCGO	Gas Oil	N	N	G	180	Blank	NA
B-996	Coker	Coker	HCGO from H-5 to prod	V	GT	6.00	HCGO	Gas Oil	N	N	G	180	Blank	Y
B-998	Coker	Coker	HCGO from H-5 to prod	V	GT	6.00	HCGO	Gas Oil	N	N	G	120	Blank	Y
B-1000	Coker	Coker	HPGLO from G-105	V	GT	1.00	HPGLO	Gas Oil	N	N	G	155	Blank	Y
B-1002	Coker	Coker	HPGLO from G-105	C	Threaded	1.00	HPGLO	Gas Oil	N	N	G	105	Blank	NA
B-1004	Coker	Coker	HPGLO from G-105	V	GT	1.00	HPGLO	Gas Oil	N	N	G	140	Blank	Y
B-1006	Coker	Coker	HPGLO from G-105	V	GT	3.00	HPGLO	Gas Oil	N	N	G	150	Blank	Y
B-1008	Coker	Coker	HPGLO from G-105	V	GT	4.00	HPGLO	Gas Oil	N	N	G	150	Blank	Y
B-1010	Coker	Coker	HPGLO from G-105	C	Flange	3.00	HPGLO	Gas Oil	N	N	G	155	Blank	NA
B-1012	Coker	Coker	HPGLO from G-105	V	GT	3.00	HPGLO	Gas Oil	N	N	G	150	Blank	Y
B-1014	Coker	Coker	HPGLO from G-105	V	GT	3.00	HPGLO	Gas Oil	N	N	G	155	Blank	Y
B-1016	Coker	Coker	HPGLO from G-105	V	GT	3.00	HPGLO	Gas Oil	N	N	G	155	Blank	Y
B-1018	Coker	Coker		C	Flange	3.00	HPGLO	Gas Oil	N	Blank	G	165	Blank	NA
B-1020	Coker	Coker		V	GT	1.00	HPGLO	Gas Oil	N	Blank	G	110	Blank	Y
B-1022	Coker	Coker		C	Flange	3.00	HPGLO	Gas Oil	N	Blank	G	165	Blank	NA
B-1024	Coker	Coker		V	GT	3.00	HPGLO	Gas Oil	N	Blank	G	170	Blank	Y
B-1026	Coker	Coker		V	GT	1.00	HPGLO	Gas Oil	N	Blank	G	120	Blank	Y
B-1028	Coker	Coker		C	Bull Plug	1.00	HPGLO	Gas Oil	N	Blank	G	120	Blank	NA
B-1030	Coker	Coker		V	GT	8.00	VTHGO	Gas Oil	N	Blank	G	355	Blank	Y
B-1032	Coker	Coker		C	Flange	4.00	VT Bottoms	Gas Oil	N	Blank	G	560	68	NA
B-1034	Coker	Coker		V	GT	1.00	VT Bottoms	Gas Oil	N	Blank	G	320	68	Y
B-1036	Coker	Coker		V	GT	1.00	VT Bottoms	Gas Oil	N	Blank	G	170	68	Y
B-1038	Coker	Coker		C	Flange	6.00	VT Bottoms	Gas Oil	N	Blank	G	480	Blank	NA
B-1040	Coker	Coker		V	GT	10.00	VT Bottoms	Gas Oil	N	Blank	G	410	Blank	Y
B-1042	Coker	Coker		V	GT	4.00	VT Bottoms	Gas Oil	N	Blank	G	165	Blank	Y
B-1044	GM-234	Sulfur Recovery		C	Flange	6.00	VT Bottoms	Gas Oil	N	Blank	G	400	Blank	NA
B-1046	GM-234	Sulfur Recovery		V	GT	10.00	VT Bottoms	Gas Oil	N	Blank	G	485	Blank	Y
B-1048	Coker	Coker		C	Flange	4.00	Slops	Slop Oil	N	Blank	G	260	Blank	NA
B-1050	Coker	Coker		C	Flange	4.00	Slops	Slop Oil	N	Blank	G	290	Blank	NA
B-1052	Coker	Coker		V	GT	4.00	Slops	Slop Oil	N	Blank	G	185	Blank	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1054	Coker	Coker		C	Flange	2.00	Slops	Slop Oil	N	Blank	G	115	Blank	NA
B-1056	Coker	Coker		V	GT	2.00	Slops	Slop Oil	N	Blank	G	110	Blank	Y
B-1058	Coker	Coker	E-114	C	Flange	8.00	DSL	Diesel	N	Blank	G	250	Blank	NA
B-1060	Coker	Coker	From E-240	V	GT	6.00	VTHGO	Gas Oil	N	Blank	G	325	Blank	Y
B-1062	Coker	Coker	From E-240	V	GT	6.00	VTHGO	Gas Oil	N	Blank	G	210	Blank	Y
B-1064	Coker	Coker	From E-240	V	GT	1.00	VTHGO	Gas Oil	N	Blank	G	130	Blank	Y
B-1066	Coker	Coker	From E-240	C	BP	1.00	VTHGO	Gas Oil	N	Blank	G	120	Blank	NA
B-1068	Coker	Coker	From E-240	V	Control	2.00	VTHGO	Gas Oil	N	Blank	G	285	Blank	Y
B-1070	Coker	Coker	From E-240	V	GT	1.00	VTHGO	Gas Oil	N	Blank	G	122	Blank	Y
B-1072	Coker	Coker	From FV-539A	V	GT	4.00	VTHGO	Gas Oil	N	Blank	G	255	Blank	Y
B-1074	Coker	Coker		V	Control	4.00	VTHGO	Gas Oil	N	Blank	G	370	Blank	Y
B-1076	Coker	Coker		V	GT	8.00	VTHGO	Gas Oil	N	Blank	G	350	Blank	Y
B-1078	Coker	Coker	E-237	C	Flange	8.00	VTHGO	Gas Oil	N	N	G	475	Blank	NA
B-1080	Coker	Coker	E-239	V	GT	1.00	VTHGO	Gas Oil	N	N	G	185	Blank	Y
B-1082	Coker	Coker	E-239	C	BP	1.00	VTHGO	Gas Oil	N	N	G	185	Blank	NA
B-1084	Coker	Coker	E-239	V	GT	3.00	VTHGO	Gas Oil	N	N	G	240	Blank	Y
B-1086	Coker	Coker	E-239	V	GT	8.00	VTHGO	Gas Oil	N	N	G	290	Blank	Y
B-1088	Coker	Coker	E-239	C	Flange	8.00	VTHGO	Gas Oil	N	N	G	290	Blank	NA
B-1090	Coker	Coker	E-239	V	Control	8.00	VTHGO	Gas Oil	N	N	G	295	Blank	Y
B-1092	Coker	Coker	E-239	V	GT	1.00	VTHGO	Gas Oil	N	N	G	125	Blank	Y
B-1094	Coker	Coker	E-239	C	Flange	8.00	VTHGO	Gas Oil	N	N	G	335	Blank	NA
B-1096	Coker	Coker	E-239	V	GT	8.00	VTHGO	Gas Oil	N	N	G	370	Blank	Y
B-1098	Coker	Coker	E-239	C	Flange	2.00	VTHGO	Gas Oil	N	N	G	210	Blank	NA
B-1100	Coker	Coker	E-239	V	GT	1.00	VTHGO	Gas Oil	N	N	G	110	Blank	Y
B-1102	Coker	Coker		V	GT	6.00	SCT Bottoms	Gas Oil	N	N	G	625	124	Y
B-1104	Coker	Coker		V	GT	1.00	SCT Bottoms	Gas Oil	N	N	G	315	124	Y
B-1106	Coker	Coker		V	Needle	0.38	SCT Bottoms	Gas Oil	N	N	G	125	124	Y
B-1108	Coker	Coker		V	Needle	0.38	SCT Bottoms	Gas Oil	L	N	G	120	125	Y
B-1110	Coker	Coker		V	GT	1.00	SCT Bottoms	Gas Oil	L	N	G	410	Blank	Y
B-1112	Coker	Coker		C	Flange	3.00	SCT Bottoms	Gas Oil	L	N	G	530	Blank	NA
B-1114	Coker	Coker		V	Control	3.00	SCT Bottoms	Gas Oil	L	N	G	645	Blank	Y
B-1116	Coker	Coker		V	GT	1.00	SCT Bottoms	Gas Oil	L	N	G	160	Blank	Y
B-1118	Coker	Coker		V	GT	6.00	SCT Bottoms	Gas Oil	L	N	G	640	Blank	Y
B-1120	Coker	Coker		V	GT	6.00	SCT Bottoms	Gas Oil	L	N	G	620	Blank	Y
B-1122	Coker	Coker		V	GT	1.00	SCTGO	Gas Oil	N	N	G	220	Blank	Y
B-1124	Coker	Coker		V	GT	6.00	SCTGO	Gas Oil	N	N	G	480	Blank	Y
B-1126	Coker	Coker		C	Flange	6.00	SCTGO	Gas Oil	N	N	G	510	Blank	NA
B-1128	Coker	Coker		V	GT	1.00	SCTGO	Gas Oil	N	N	G	735	Blank	Y
B-1130	Coker	Coker		V	Control	4.00	SCTGO	Gas Oil	N	N	G	510	Blank	Y
B-1132	Coker	Coker		C	Flange	4.00	SCTGO	Gas Oil	N	N	G	525	Blank	NA
B-1134	Coker	Coker		V	GT	4.00	SCTGO	Gas Oil	N	N	G	475	Blank	Y
B-1136	Coker	Coker		V	GT	6.00	SCTGO	Gas Oil	N	N	G	445	Blank	Y
B-1138	200 / Coker	Coker	Pumps G-104	V	GT	10.00	SCTGO Pump around	Gas Oil	L	N	G	100.5	Blank	Y
B-1140	200 / Coker	Coker	pumps G-104	C	Flange	10.00	SCTGO Pump around	Gas Oil	L	N	G	322.5	Blank	NA
B-1142	200 / Coker	Coker	Pumps G-104	C	Flange	6.00	SCTGO Pump around	Gas Oil	L	N	g	524.5	Blank	NA
B-1144	200 / Coker	Coker	pumps G-104 A	V	GT	3.00	SCTGO Pump around	Gas Oil	L	N	G	191.5	60	Y
B-1146	200 / Coker	Coker	Pumps G-104A	C	Flange	3.00	SCTGO Pump around	Gas Oil	L	N	G	351	60	NA
B-1148	200 / Coker	Coker	Pumps G-104A	V	GT	3.00	SCTGO Pump around	Gas Oil	L	N	G	170	60	Y
B-1150	200 / Coker	Coker	Pumps G-104 A	V	GT	1.00	SCTGO Pump around	Gas Oil	L	N	G	306	60	Y
B-1152	200 / Coker	Coker	pumps g-104 A	V	GT	10.00	SCTGO Pump around	Gas Oil	L	N	G	304.5	Blank	Y
B-1154	200 / Coker	Coker	Pumps G-104 A	V	GT	1.00	SCTGO Pump around	Gas Oil	L	N	G	230	Blank	Y
B-1156	200 / Coker	Coker	Pumps G-103	C	Plug	1.00	SCTGO Pump around	Gas Oil	L	N	G	144	Blank	NA
B-1158	200 / Coker	Coker	pumps GM-103	V	GT	1.00	SCTGO Pump around	Gas Oil	L	N	G	144	Blank	Y
B-1160	200 / Coker	Coker	Pumps GM-103	V	GT	1.00	SCTGO Pump around	Gas Oil	L	N	G	276	Blank	Y
B-1162	200 / Coker	Coker	Pumps GM-103	V	GT	1.00	SCTGO Pump around	Gas Oil	L	N	G	228.5	Blank	Y
B-1164	200 / Coker	Coker	pumps Gm- 103	V	N	0.50	SCTGO Pump around	Gas Oil	L	N	G	191	22	Y
B-1166	200 / Coker	Coker	pumps GM-103	V	N	0.50	SCTGO Pump around	Gas Oil	L	N	G	204	22	Y
B-1168	200 / Coker	Coker	Pumps GM-103	V	GT	1.00	SCTGO	Gas Oil	L	N	G	310.5	15	Y
B-1170	200 / Coker	Coker	Pumps GM-103	C	Flange	3.00	SCTGO	Gas Oil	L	N	G	314.5	145	NA
B-1172	200 / Coker	Coker	pumps Gm-103	V	GT	3.00	SCTGO	Gas Oil	L	N	G	170.5	145	Y
B-1174	200 / Coker	Coker	pumps GM-103	C	Plug	1.00	SCTGO	Gas Oil	L	N	G	293	15	NA
B-1176	200 / Coker	Coker	pumps GM-103	V	GT	1.00	SCTGO	Gas Oil	L	N	G	293	15	Y
B-1178	200 / Coker	Coker	Pumps GM-103	C	Flange	3.00	SCTGO	Gas Oil	L	N	G	330.5	145	NA
B-1180	200 / Coker	Coker	Pump Gm-103	V	GT	4.00	SCTGO	Gas Oil	L	N	G	190.5	145	Y
B-1182	200 / Coker	Coker	Pump Gm-103	V	GT	6.00	SCTGO	Gas Oil	L	N	G	232	Blank	Y
B-1184	200 / Coker	Coker	pumps GM-103	C	Flange	2.00	SCTGO	Gas Oil	L	N	G	134.5	Blank	NA
B-1186	200 / Coker	Coker	pumps GM- 103	V	GT	2.00	SCTGO	Gas Oil	L	N	G	228	Blank	Y
B-1188	200 / Coker	Coker	pumps G-204	V	GT	2.00	SCT Quench	Gas Oil	L	N	G	194	Blank	Y
B-1190	200 / Coker	Coker	pumps G-204	V	GT	1.00	SCT Quench	Gas Oil	L	N	G	231	Blank	Y
B-1192	200 / Coker	Coker	pumps G-204	C	plug	1.00	SCT Quench	Gas Oil	L	N	G	102	Blank	NA
B-1194	200 / Coker	Coker	pumps G-204	V	GT	1.00	SCT Quench	Gas Oil	L	N	G	102	Blank	Y
B-1196	200 / Coker	Coker	pump G-204	V	GT	1.00	SCT Quench	Gas Oil	L	N	G	136	Blank	Y
B-1198	200 / Coker	Coker	pumps G-204	C	Flange	4.00	SCT Quench	Gas Oil	L	N	G	275	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1200	200 / Coker	Coker	pumps G-204	V	GT	4.00	SCT Quench	Gas Oil	L	N	G	271	Blank	Y
B-1202	200 / Coker	Coker	pumps G-204	C	Flange	3.00	SCT Quench	Gas Oil	L	N	G	139	Blank	NA
B-1204	200 / Coker	Coker	pumps G-204	V	GT	3.00	SCT Quench	Gas Oil	L	N	G	123.5	Blank	Y
B-1206	200 / Coker	Coker	pumps G-204	V	GT	6.00	SCT Quench	Gas Oil	L	N	G	331.5	Blank	Y
B-1208	200 / Coker	Coker	pumps G-204	V	GT	2.00	HPGCO	Gas Oil	L	N	G	115	Blank	Y
B-1210	200 / Coker	Coker	pumps G-204	C	Flange	2.00	HPGCO	Gas Oil	L	N	G	107	Blank	NA
B-1212	200 / Coker	Coker	To B-102 Heaters	V	GT	6.00	SCT Bottoms	Gas Oil	L	N	G	494	Blank	Y
B-1214	200 / Coker	Coker	To B-102 Heaters	C	Flange	6.00	SCT Bottoms	Gas Oil	L	N	G	529	Blank	NA
B-1216	200 / Coker	Coker	To B-102 Heaters	V	Control valves	4.00	SCT Bottoms	Gas Oil	L	N	G	526	Blank	Y
B-1218	200 / Coker	Coker	To B-102 Heaters	C	Flange	8.00	SCT Bottoms	Gas Oil	L	N	G	489	Blank	NA
B-1220	200 / Coker	Coker	To B-102 Heaters	V	GT	8.00	SCT Bottoms	Gas Oil	L	N	G	444	Blank	Y
B-1222	200 / Coker	Coker	To B-102 Heaters	V	GT	1.00	SCT Bottoms	Gas Oil	L	N	G	154	Blank	Y
B-1224	200 / Coker	Coker	To B-102 Heaters	V	GT	1.00	SCT Bottoms	Gas Oil	L	N	G	220	Blank	Y
B-1226	200 / Coker	Coker	To B-102 Heaters	V	Control Valve	6.00	SCT Bottoms	Gas Oil	L	N	G	227	Blank	Y
B-1228	200 / Coker	Coker	To B-102 Heaters	C	Flange	6.00	SCT Bottoms	Gas Oil	L	N	G	410	Blank	NA
B-1230	200 / Coker	Coker	To B-102 Heaters	V	GT	1.00	SCT Bottoms	Gas Oil	L	N	G	173	Blank	Y
B-1232	200 / Coker	Coker	To B-102 Heaters	V	GT	9.00	SCT Bottoms	Gas Oil	L	N	G	109.5	Blank	Y
B-1234	200 / Coker	Coker	To B-102 Heaters	V	GT	9.00	SCT Bottoms	Gas Oil	L	N	G	444	Blank	Y
B-1236	200 / Coker	Coker	To B-102 Heaters	C	Flange	9.00	SCT Bottoms	Gas Oil	L	N	G	480	Blank	NA
B-1238	200 / Coker	Coker	To B-102 Heaters	V	Control Valve	4.00	SCT Bottoms	Gas Oil	L	N	G	239	Blank	Y
B-1240	200 / Coker	Coker	To B-102 Heaters	V	GT	8.00	SCT Bottoms	Gas Oil	N	Blank	G	240	Blank	Y
B-1242	200 / Coker	Coker	To B-102 Heaters	C	Flange	4.00	SCT Bottoms	Gas Oil	N	Blank	G	218	Blank	NA
B-1244	200 / Coker	Coker	pump 208	V	GT	2.00	SCT Bottoms	Gas Oil	N	Blank	G	184	Blank	Y
B-1246	200 / Coker	Coker	pump 208	V	GT	1.50	SCT Bottoms	Gas Oil	N	Blank	G	131	Blank	Y
B-1248	200 / Coker	Coker	pump 208	C	Flange	0.50	SCT Bottoms	Gas Oil	N	Blank	G	131	Blank	NA
B-1250	200 / Coker	Coker	pump 208	V	GT	1.00	SCT Bottoms	Gas Oil	N	Blank	G	127	Blank	Y
B-1252	200 / Coker	Coker	pump 208	V	GT	1.00	SCT Bottoms	Gas Oil	N	Blank	G	127	Blank	Y
B-1254	200 / Coker	Coker	P-208 A	V	GT	1.50	SCT Bottoms	Gas Oil	N	Blank	G	150	Blank	Y
B-1256	200 / Coker	Coker	P-208 A	V	GT	1.50	SCT Bottoms	Gas Oil	N	Blank	G	105	Blank	Y
B-1258	Coker	Coker		V	GT	1.00	VT Heavy	Gas Oil	N	Blank	G	100	Blank	Y
B-1260	Coker	Coker		C	BP	1.00	VT Heavy	Gas Oil	N	Blank	G	100	Blank	NA
B-1262	Coker	Coker		V	GT	2.00	VT Heavy	Gas Oil	N	Blank	G	175	Blank	Y
B-1264	Coker	Coker		V	GT	6.00	SCT Bottoms	Gas Oil	N	Blank	G	490	Blank	Y
B-1266	Coker	Coker		V	Control	4.00	SCT Bottoms	Gas Oil	N	Blank	G	570	Blank	Y
B-1268	Coker	Coker		V	GT	6.00	SCT Bottoms	Gas Oil	N	Blank	G	384	Blank	Y
B-1270	Coker	Coker	GM-209	V	GT	6.00	VTCGO	Gas Oil	N	Blank	G	277	Blank	Y
B-1272	Coker	Coker	GM-209	C	Flange	6.00	VTCGO	Gas Oil	N	Blank	G	277	Blank	NA
B-1274	Coker	Coker	GM-209	V	GT	1.00	VTCGO	Gas Oil	N	Blank	G	205	Blank	Y
B-1276	Coker	Coker	GM-209	V	GT	4.00	VTCGO	Gas Oil	N	Blank	G	310	Blank	Y
B-1278	Coker	Coker	GM-209	V	GT	6.00	VTCGO	Gas Oil	N	Blank	G	230	Blank	Y
B-1280	Coker	Coker	GM-209	V	Control	2.00	VTCGO	Gas Oil	N	Blank	G	318	Blank	Y
B-1282	Coker	Coker	GM-209	V	GT	4.00	VTCGO	Gas Oil	N	Blank	G	318	Blank	Y
B-1284	Coker	Coker	GM-209	C	Flange	4.00	VTCGO	Gas Oil	N	Blank	G	318	Blank	NA
B-1286	Coker	Coker	GM-209	V	GT	1.00	VTCGO	Gas Oil	N	Blank	G	160	Blank	Y
B-1288	250	Hydrotreater	E701	C	Flange	8.00	Diesel	Diesel	L	N	G	175	Blank	NA
B-1290	250	Hydrotreater	E701	V	Gate	2.00	Diesel	Diesel	L	N	G	104	Blank	Y
B-1292	250	Hydrotreater	E701	C	Bull plug	1.50	Diesel	Diesel	L	N	G	96	Blank	NA
B-1294	250	Hydrotreater	E701	C	Flange	2.00	Diesel	Diesel	L	N	G	121	Blank	NA
B-1296	250	Hydrotreater	E701	V	Globe	8.00	Diesel	Diesel	L	N	G	249	Blank	Y
B-1298	250	Hydrotreater	E701	C	Flange	8.00	Diesel	Diesel	N	N	G	249	Blank	NA
B-1300	250	Hydrotreater	E701	V	Control Valve	8.00	Diesel	Diesel	N	Blank	G	251	Blank	Y
B-1302	250	Hydrotreater	E701	C	Flange	8.00	Diesel	Diesel	N	Blank	G	219	Blank	NA
B-1306	250	Hydrotreater	E701	V	Globe	8.00	Diesel	Diesel	L	N	G	215	Blank	Y
B-1308	250	Hydrotreater	E701	V	Globe	6.00	Diesel	Diesel	L	N	O	194	Blank	Y
B-1310	250	Hydrotreater	E701	C	Flange	6.00	Diesel	Diesel	N	Blank	O	178	Blank	NA
B-1312	250	Hydrotreater	E701	V	Gate	2.00	Diesel	Diesel	L	N	G	138	Blank	Y
B-1314	250	Hydrotreater	E701	C	Flange	8.00	Diesel	Diesel	L	N	G	229	Blank	NA
B-1316	250	Hydrotreater	E701	V	Globe	8.00	Diesel	Diesel	L	N	G	244	Blank	Y
B-1318	250	Hydrotreater	E701	C	Bull plug	1.50	diesel	Diesel	N	Blank	G	119	Blank	NA
B-1320	250	Hydrotreater	E701	V	Control Valve	8.00	Diesel	Diesel	N	Blank	G	254	Blank	Y
B-1322	250	Hydrotreater	E701	C	Flange	8.00	Diesel	Diesel	N	Blank	G	254	Blank	NA
B-1324	250	Hydrotreater	E701	V	Globe	8.00	Diesel	Diesel	L	N	G	229	Blank	Y
B-1326	250	Hydrotreater	E701	V	Globe	6.00	Diesel	Diesel	L	N	O	190	Blank	Y
B-1328	250	Hydrotreater	E701	C	Flange	6.00	Diesel	Diesel	N	Blank	O	237	Blank	NA
B-1330	250	Hydrotreater	E709	V	Gate	1.00	Diesel	Diesel	L	N	G	102	170	Y
B-1332	250	Hydrotreater	E709	V	Hex Valve	0.75	Diesel	Diesel	L	N	G	119	170	Y
B-1334	250	Hydrotreater	E709	V	Gate	1.00	Diesel	Diesel	L	N	G	86	170	Y
B-1336	250	Hydrotreater	E709	PRD	?	1.00	Diesel	Diesel	N	Blank	G	108	55	NA
B-1338	250	Hydrotreater	E709	C	Flange	8.00	Diesel	Diesel	N	Blank	G	110	55	NA
B-1340	250	Hydrotreater	E709	V	?	8.00	Diesel	Diesel	N	Blank	G	113	55	Y
B-1342	250	Hydrotreater	E709	V	Gate	1.00	Diesel	Diesel	N	Blank	G	101	Blank	Y
B-1344	250	Hydrotreater	E709	C	Bull Plug	1.00	Diesel	Diesel	N	Blank	G	101	Blank	NA
B-1346	250	Hydrotreater	E709	C	Flange	2.00	Diesel	Diesel	N	Blank	G	97	Blank	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1348	250	Hydrotreater	pump 722	C	Flange	4.00	Jet A	Jet	L	N	G	82	Blank	NA
B-1350	250	Hydrotreater	pump 722	V	Gate	1.00	Jet A	Jet	L	N	G	78	Blank	Y
B-1352	250	Hydrotreater	pump 722	C	Flange	4.00	Jet A	Jet	L	N	G	80	Blank	NA
B-1354	250	Hydrotreater	pump 722	V	Globe	4.00	Jet A	Jet	L	N	G	76	Blank	Y
B-1356	250	Hydrotreater	pump 722	V	Globe	6.00	Jet A	Jet	L	N	G	84	38	Y
B-1358	250	Hydrotreater	pump 722	C	Flange	6.00	Jet A	Jet	N	Blank	G	77	38	NA
B-1360	250	Hydrotreater	pump 722	V	Gate	1.00	Jet A	Jet	L	N	G	77	38	Y
B-1362	250	Hydrotreater	pump 722	C	Threaded	1.00	Jet A	Jet	L	N	G	76	38	NA
B-1364	250	Hydrotreater	pump 722	V	Gate	1.00	Jet A	Jet	L	N	G	76	38	Y
B-1366	250	Hydrotreater	pump 722	C	Flange	3.00	Jet A	Jet	L	N	G	88	27	NA
B-1368	250	Hydrotreater	Pump 722	C	Bull plug	1.00	Jet A	Jet	L	N	G	74	Blank	NA
B-1370	250	Hydrotreater	South Side	V	Gate	8.00	DSL	Diesel	N	N	G	69	130	Y
B-1372	250	Hydrotreater	South Side	V	Gate	0.75	DSL	Diesel	N	N	G	59	130	Y
B-1374	250	Hydrotreater	South Side	C	Plug	0.75	DSL	Diesel	N	N	G	50	130	NA
B-1376	250	Hydrotreater	South Side	V	Control	6.00	DSL	Diesel	N	N	G	70	130	Y
B-1378	250	Hydrotreater	South Side	V	Gate	8.00	DSL	Diesel	N	N	G	71	130	Y
B-1380	250	Hydrotreater	South Side	C	Flange	8.00	DSL	Diesel	N	N	G	87	130	NA
B-1382	250	Hydrotreater	South Side	V	Gate	0.75	DSL	Diesel	N	N	G	63	130	Y
B-1384	250	Hydrotreater	South Side	V	Gate	0.75	DSL	Diesel	N	N	G	66	130	Y
B-1386	250	Hydrotreater	South Side	V	Globe	6.00	DSL	Diesel	N	N	G	59	130	Y
B-1388	250	Hydrotreater	South Side	V	Gate	0.75	DSL	Diesel	N	N	G	68	200	Y
B-1390	250	Hydrotreater	South Side	C	Plug	0.75	DSL	Diesel	N	N	G	62	200	NA
B-1392	250	Hydrotreater	South Side	V	Gate	0.50	DSL	Diesel	N	N	G	71	200	Y
B-1394	250	Hydrotreater	South Side	V	Ball	0.50	DSL	Diesel	N	N	G	77	200	Y
B-1396	250	Hydrotreater	South Side	C	Tube Fitting	0.25	DSL	Diesel	N	N	G	86	200	NA
B-1398	250	Hydrotreater	E-709	C	Tube Fitting	0.75	Non-blended DSL	Diesel	N	N	G	74	200	NA
B-1400	250	Hydrotreater	E-709	V	Gate	0.75	Non-blended DSL	Diesel	N	N	G	79	200	Y
B-1402	250	Hydrotreater	E-709	C	Plug	0.75	Non-blended DSL	Diesel	N	N	G	71	Unknown	NA
B-1404	250	Hydrotreater	Tank 721	V	Gate	1.50	Cetane Improver	Cetane Improver	N	N	G	47.2	Unknown	Y
B-1406	250	Hydrotreater	Tank 721	C	Bonnet	1.50	Cetane Improver	Cetane Improver	N	N	G	48.5	Unknown	NA
B-1408	250	Hydrotreater	Tank 721	C	Man way	24.00	Cetane Improver	Cetane Improver	N	N	G	48.6	Unknown	NA
B-1410	250	Hydrotreater	Tank 721	V	Gate	1.50	Cetane Improver	Cetane Improver	N	N	G	49.2	Unknown	Y
B-1412	250	Hydrotreater	Tank 721	V	Gate	1.50	Cetane Improver	Cetane Improver	N	N	G	51	Unknown	Y
B-1414	250	Hydrotreater	Tank 721	C	Flange	1.50	Cetane Improver	Cetane Improver	N	N	G	50.3	Unknown	NA
B-1416	250	Hydrotreater	Tank 721	V	Gate	4.00	Cetane Improver	Cetane Improver	N	N	G	49	Unknown	Y
B-1418	250	Hydrotreater	Tank 721	V	Ball	0.50	Cetane Improver	Cetane Improver	N	N	G	54.8	Unknown	Y
B-1420	250	Hydrotreater	Tank 721	V	Gate	2.00	Cetane Improver	Cetane Improver	N	N	G	54.1	Unknown	Y
B-1422	250	Hydrotreater	Tank 721	C	Flange	2.00	Cetane Improver	Cetane Improver	N	N	G	52.2	Unknown	NA
B-1424	250	Hydrotreater	Tank 721	C	Flange	2.00	Cetane Improver	Cetane Improver	N	N	G	71.4	Unknown	NA
B-1426	250	Hydrotreater	Road 7 Platform	V	Gate	2.00	Cetane Improver	Cetane Improver	N	N	G	72.6	Unknown	Y
B-1428	250	Hydrotreater	Road 7 Platform	C	Flange	2.00	Cetane Improver	Cetane Improver	N	N	G	76.4	Unknown	NA
B-1430	250	Hydrotreater	Road 7 Platform	V	Gate	0.75	Cetane Improver	Cetane Improver	N	N	G	75	Unknown	Y
B-1432	250	Hydrotreater	Road 7 Platform	C	Plug	0.75	Cetane Improver	Cetane Improver	N	N	G	70.8	Unknown	NA
B-1434	250	Hydrotreater	Road 7 Platform	C	Plug	0.75	Cetane Improver	Cetane Improver	N	N	G	80	Unknown	NA
B-1436	250	Hydrotreater	Road 7 Platform	V	Gate	2.00	Cetane Improver	Cetane Improver	N	N	G	79.7	Unknown	Y
B-1438	250	Hydrotreater	Road 7 Platform	C	Flange	2.00	Cetane Improver	Cetane Improver	N	N	G	80.4	Unknown	NA
B-1440	250	Hydrotreater	Tank 721	V	Gate	2.00	Cetane Improver	Cetane Improver	N	N	G	89.2	80	Y
B-1442	250	Hydrotreater	Tank 721	C	Flange	2.00	Cetane Improver	Cetane Improver	N	N	G	90.8	80	NA
B-1444	250	Hydrotreater	Tank 721	V	Bleed	0.75	Cetane Improver	Cetane Improver	N	N	G	87	80	Y
B-1446	250	Hydrotreater	Tank 721	C	Flange	1.00	Cetane Improver	Cetane Improver	N	N	G	87.3	80	NA
B-1448	250	Hydrotreater	Tank 721	V	Gate	1.50	Cetane Improver	Cetane Improver	N	N	G	66	80	Y
B-1450	250	Hydrotreater	Tank 721	V	Ball	1.50	Cetane Improver	Cetane Improver	N	N	G	81.5	80	Y
B-1452	250	Hydrotreater	Tank 721	V	Ball	0.75	Cetane Improver	Cetane Improver	N	N	G	81	80	Y
B-1454	250	Hydrotreater	Tank 721	C	Plug	0.75	Cetane Improver	Cetane Improver	N	N	G	77	80	NA
B-1456	250	Hydrotreater	Tank 721	V	Ball	0.75	Cetane Improver	Cetane Improver	N	N	G	71	80	Y
B-1458	250	Hydrotreater	Tank 721	V	Ball	0.75	Cetane Improver	Cetane Improver	N	N	G	88	260	Y
B-1460	250	Hydrotreater	Tank 721	V	Check	1.00	Cetane Improver	Cetane Improver	N	N	G	72	260	Y
B-1462	250	Hydrotreater	Tank 721	V	Ball	0.75	Cetane Improver	Cetane Improver	N	N	G	87	260	Y
B-1464	250	Hydrotreater	Tank 721	V	Ball	0.75	Cetane Improver	Cetane Improver	N	N	G	83	260	Y
B-1466	250	Hydrotreater	Tank 721	C	Plug	0.75	Cetane Improver	Cetane Improver	N	N	G	83	260	NA
B-1468	MP-30	Hydrotreater	B-103	V	Gate	0.75	Reboil Oil	Diesel	N	N	G	82.4	203	Y
B-1470	MP-30	Hydrotreater	B-103	V	Gate	1.00	Reboil Oil	Diesel	N	N	G	265	203	Y
B-1472	MP-30	Hydrotreater	B-103	V	Gate	1.50	Reboil Oil	Diesel	N	N	G	335	203	Y
B-1474	MP-30	Hydrotreater	B-103	C	Plug	1.50	Reboil Oil	Diesel	N	N	G	350	203	NA
B-1476	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	53.4	Blank	Y
B-1478	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	61	Blank	Y
B-1480	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	60.1	Blank	Y
B-1482	MP-30	Hydrotreater	D-104	C	Tee	0.25	Reboil Oil	Diesel	L	N	P	60	Blank	NA
B-1484	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	61.5	Blank	Y
B-1486	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	63.1	Blank	Y
B-1488	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	61.4	Blank	Y
B-1490	MP-30	Hydrotreater	D-104	C	Tee	0.25	Reboil Oil	Diesel	L	N	P	63.1	Blank	NA
B-1492	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	60	Blank	Y

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B-1494	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	61.6	Blank	Y
B-1496	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	63	Blank	Y
B-1498	MP-30	Hydrotreater	D-104	C	Tee	0.25	Reboil Oil	Diesel	L	N	P	61.7	Blank	NA
B-1500	MP-30	Hydrotreater	D-104	V	Needle	0.25	Reboil Oil	Diesel	L	N	P	74	98	Y
B-1502	MP-30	Hydrotreater	E-314	V	Gate	2.00	Reboil Oil	Diesel	L	N	P	85	98	Y
B-1504	MP-30	Hydrotreater	E-314	V	Gate	1.50	Reboil Oil	Diesel	L	N	P	104	98	Y
B-1506	MP-30	Hydrotreater	E-314	C	Plug	2.00	Reboil Oil	Diesel	L	N	P	109	98	NA
B-1508	MP-30	Hydrotreater	E-314	V	Needle	1.50	Reboil Oil	Diesel	L	N	P	77	98	Y
B-1510	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	P	96	98	Y
B-1512	MP-30	Hydrotreater	E-314	V	Gate	0.75	Reboil Oil	Diesel	L	N	P	81	98	Y
B-1514	MP-30	Hydrotreater	E-314	C	Cap	0.50	Reboil Oil	Diesel	L	N	P	101	98	NA
B-1516	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	P	83	98	Y
B-1518	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	P	72	98	Y
B-1520	MP-30	Hydrotreater	E-314	V	Gate	1.50	Reboil Oil	Diesel	L	N	P	80.4	98	Y
B-1522	MP-30	Hydrotreater	E-314	C	Union	1.00	Reboil Oil	Diesel	L	N	P	78	98	NA
B-1524	MP-30	Hydrotreater	E-314	V	Gate	2.00	Reboil Oil	Diesel	L	N	P	106	98	Y
B-1526	MP-30	Hydrotreater	E-314	V	Gate	2.00	Reboil Oil	Diesel	L	N	P	74	98	Y
B-1528	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	G	82	2	Y
B-1530	MP-30	Hydrotreater	E-314	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	80	2	NA
B-1532	MP-30	Hydrotreater	E-314	V	Needle	0.50	Reboil Oil	Diesel	L	N	G	72.5	2	Y
B-1534	MP-30	Hydrotreater	E-309	V	Gate	4.00	Reboil Oil	Diesel	L	N	G	190	Blank	Y
B-1536	MP-30	Hydrotreater	E-309	V	Gate	4.00	Reboil Oil	Diesel	L	N	G	254	Blank	Y
B-1538	MP-30	Hydrotreater	E-309	V	Gate	4.00	Reboil Oil	Diesel	L	N	G	306	Blank	Y
B-1540	MP-30	Hydrotreater	E-309	C	Cap	0.50	Reboil Oil	Diesel	L	N	G	206	Blank	NA
B-1542	MP-30	Hydrotreater	E-309	V	Gate	0.50	Reboil Oil	Diesel	L	N	G	206	Blank	N
B-1544	MP-30	Hydrotreater	G-306	V	Gate	10.00	Reboil Oil	Diesel	L	N	G	71	10	Y
B-1546	MP-30	Hydrotreater	G-306	V	Needle	0.50	Reboil Oil	Diesel	L	N	G	65	10	Y
B-1548	MP-30	Hydrotreater	G-306	C	Tube Fitting	0.50	Reboil Oil	Diesel	L	N	G	65	10	NA
B-1550	MP-30	Hydrotreater	G-306	V	Gate	0.50	Reboil Oil	Diesel	L	N	G	95	22	Y
B-1552	MP-30	Hydrotreater	G-306	V	Gate	0.50	Reboil Oil	Diesel	L	N	G	202	22	Y
B-1554	MP-30	Hydrotreater	G-306	V	Gate	0.50	Reboil Oil	Diesel	L	N	G	120	22	Y
B-1556	MP-30	Hydrotreater	G-306	C	Union	0.50	Reboil Oil	Diesel	L	N	G	125	22	NA
B-1558	MP-30	Hydrotreater	G-306	V	Gate	0.50	Reboil Oil	Diesel	L	N	G	80	22	Y
B-1560	MP-30	Hydrotreater	G-308	V	Gate	4.00	Reboil Oil	Diesel	L	N	P	75	25	Y
B-1562	MP-30	Hydrotreater	G-308	V	Gate	4.00	Reboil Oil	Diesel	L	N	P	105	25	Y
B-1564	MP-30	Hydrotreater	E-308	C	Flange	4.00	Reboil Oil	Diesel	L	N	P	77	25	NA
B-1566	MP-30	Hydrotreater	E-308	V	Control Valve	4.00	Reboil Oil	Diesel	L	N	P	106	25	Y
B-1568	MP-30	Hydrotreater	D-207	V	Gate	10.00	Reboil Oil	Diesel	H	N	G	420	25	Y
B-1570	MP-30	Hydrotreater	D-207	V	Control Valve	10.00	Reboil Oil	Diesel	H	N	G	423	25	Y
B-1572	MP-30	Hydrotreater	D-207	C	Flange	10.00	Reboil Oil	Diesel	H	N	G	425	25	NA
B-1574	MP-30	Hydrotreater	D-207	V	Gate	10.00	Reboil Oil	Diesel	H	N	G	350	25	Y
B-1576	MP-30	Hydrotreater	D-207	V	Globe	10.00	Reboil Oil	Diesel	H	N	G	310	25	Y
B-1578	MP-30	Hydrotreater	E-106B	V	Needle	0.25	Reboil Oil	Diesel	L	N	G	61	Blank	Y
B-1580	MP-30	Hydrotreater	E-106B	V	Needle	0.25	Reboil Oil	Diesel	L	N	G	58	Blank	Y
B-1582	MP-30	Hydrotreater	E-106B	C	Tube Fitting	0.25	Reboil Oil	Diesel	L	N	G	47	Blank	NA
B-1584	MP-30	Hydrotreater	E-106B	V	Ball	0.50	Reboil Oil	Diesel	L	N	G	75	Blank	Y
B-1586	MP-30	Hydrotreater	E-106B	V	Ball	0.50	Reboil Oil	Diesel	L	N	G	74	Blank	Y
B-1588	MP-30	Hydrotreater	E-106B	V	Ball	0.50	Reboil Oil	Diesel	L	N	G	86	Blank	Y
B-1590	MP-30	Hydrotreater	E-106B	C	Tube Fitting	0.25	Reboil Oil	Diesel	L	N	G	56	Blank	NA
B-1592	MP-30	Hydrotreater	B-101	V	Gate	8.00	Reboil Oil	Diesel	L	N	G	410	24	Y
B-1594	MP-30	Hydrotreater	B-101	V	Control Valve	8.00	Reboil Oil	Diesel	L	N	G	330	24	Y
B-1596	MP-30	Hydrotreater	B-101	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	104	24	Y
B-1598	MP-30	Hydrotreater	B-101	C	Plug	0.75	Reboil Oil	Diesel	L	N	G	104	24	NA
B-1600	MP-30	Hydrotreater	B-101	V	Gate	10.00	Reboil Oil	Diesel	L	N	G	250	24	Y
B-1602	MP-30	Hydrotreater	B-101	V	Gate	10.00	Reboil Oil	Diesel	L	N	G	365	24	Y
B-1604	MP-30	Hydrotreater	GM-400	V	Gate	2.00	Reboil Oil	Diesel	L	N	G	55.3	55	Y
B-1606	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	57	55	Y
B-1608	MP-30	Hydrotreater	GM-400	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	60	55	NA
B-1610	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	55	55	Y
B-1612	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	56	55	Y
B-1614	MP-30	Hydrotreater	GM-400	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	55	55	NA
B-1616	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	54	55	Y
B-1618	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	55	55	Y
B-1620	MP-30	Hydrotreater	GM-400	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	56	55	NA
B-1622	MP-30	Hydrotreater	GM-400	V	Gate	3.00	Reboil Oil	Diesel	L	N	G	53	55	Y
B-1624	MP-30	Hydrotreater	GM-400	V	Gate	3.00	Reboil Oil	Diesel	L	N	G	88	55	Y
B-1626	MP-30	Hydrotreater	GM-400	V	Gate	3.00	DSL	Diesel	L	N	G	57	55	Y
B-1628	MP-30	Hydrotreater	GM-400	C	Flange	3.00	DSL	Diesel	L	N	G	54	55	NA
B-1630	MP-30	Hydrotreater	GM-400	V	Gate	0.75	DSL	Diesel	L	N	G	60	55	N
B-1632	MP-30	Hydrotreater	GM-400	V	Gate	0.75	DSL	Diesel	L	N	G	58	55	N
B-1634	MP-30	Hydrotreater	GM-400	C	Plug	0.50	DSL	Diesel	L	N	G	65	55	NA
B-1636	MP-30	Hydrotreater	GM-400	V	Ball	0.50	DSL	Diesel	L	N	G	65	55	N
B-1638	MP-30	Hydrotreater	GM-400	V	Gate	0.75	DSL	Diesel	L	N	G	59	55	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1640	MP-30	Hydrotreater	GM-400	C	Plug	0.50	DSL	Diesel	L	N	G	59	55	NA
B-1642	MP-30	Hydrotreater	GM-400	V	Gate	3.00	Reboil Oil	Diesel	L	N	G	99	Blank	Y
B-1644	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	92	Blank	N
B-1646	MP-30	Hydrotreater	GM-400	C	Plug	0.50	Reboil Oil	Diesel	L	N	G	72	Blank	NA
B-1648	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	L	N	G	86	Blank	Y
B-1650	MP-30	Hydrotreater	GM-400	V	Gate	4.00	Reboil Oil	Diesel	L	N	G	98	Blank	Y
B-1652	MP-30	Hydrotreater	GM-400	V	Check	3.00	Reboil Oil	Diesel	N	N	G	118	Blank	Y
B-1654	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	N	N	G	77	Blank	N
B-1656	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	N	N	G	82	Blank	N
B-1658	MP-30	Hydrotreater	GM-400	C	Plug	0.50	Reboil Oil	Diesel	N	N	G	68	Blank	NA
B-1660	MP-30	Hydrotreater	GM-400	V	Gate	0.75	Reboil Oil	Diesel	N	N	G	74	Blank	Y
B-1662	MP-30	Hydrotreater	GM-400	C	Plug	0.50	Reboil Oil	Diesel	N	N	G	65	Blank	NA
B-1664	Unit 267	Crude Unit	E-612	V	Gate	0.75	DSL	Diesel	L	N	G	68.9	Blank	Y
B-1666	Unit 267	Crude Unit	E-612	C	Plug	0.50	DSL	Diesel	L	N	G	62.4	Blank	NA
B-1668	Unit 267	Crude Unit	E-612	C	Flange	1.00	DSL	Diesel	L	N	G	186.4	Blank	NA
B-1670	Unit 267	Crude Unit	E-619A	V	Gate	0.75	DSL	Diesel	L	N	G	196.5	Blank	Y
B-1672	Unit 267	Crude Unit	E-619A	C	Plug	0.50	DSL	Diesel	L	N	G	191.2	Blank	NA
B-1674	Unit 267	Crude Unit	E-619A	C	Flange	4.00	DSL	Diesel	L	N	G	267.5	Blank	NA
B-1676	Unit 267	Crude Unit	G-612A	V	Gate	6.00	Atmospheric Bottoms	Gas Oil	L	N	G	76.2	58	Y
B-1678	Unit 267	Crude Unit	G-612A	C	Flange	6.00	Atmospheric Bottoms	Gas Oil	L	N	G	58	58	NA
B-1680	Unit 267	Crude Unit	G-612A	V	Gate	2.00	Atmospheric Bottoms	Gas Oil	L	N	G	53.6	58	Y
B-1682	Unit 267	Crude Unit	G-612A	V	Check	4.00	Atmospheric Bottoms	Gas Oil	L	N	G	57.8	58	Y
B-1684	Unit 267	Crude Unit	G-612A	V	Gate	4.00	Atmospheric Bottoms	Gas Oil	L	N	G	58.1	58	Y
B-1686	Unit 267	Crude Unit	G-612A	V	Gate	0.75	Atmospheric Bottoms	Gas Oil	L	N	G	61.4	58	N
B-1688	Unit 267	Crude Unit	G-612A	C	Plug	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	58.2	58	NA
B-1690	Unit 267	Crude Unit	G-612A	V	Gate	3.00	Atmospheric Bottoms	Gas Oil	L	N	G	54.4	58	Y
B-1692	Unit 267	Crude Unit	G-612A	C	Flange	3.00	Atmospheric Bottoms	Gas Oil	L	N	G	55	58	NA
B-1694	Unit 267	Crude Unit	G-615	V	Gate	8.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	336.9	218	Y
B-1696	Unit 267	Crude Unit	G-615	C	Flange	8.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	342.6	218	NA
B-1698	Unit 267	Crude Unit	G-615	V	Gate	0.75	Light Vacuum Gas Oil	Gas Oil	L	N	G	156.4	218	N
B-1700	Unit 267	Crude Unit	G-615	C	Plug	0.50	Light Vacuum Gas Oil	Gas Oil	L	N	G	174.6	218	NA
B-1702	Unit 267	Crude Unit	G-615	V	Gate	8.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	333.3	218	Y
B-1704	Unit 267	Crude Unit	G-615	C	Flange	8.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	273.4	218	NA
B-1706	Unit 267	Crude Unit	G-615	V	Gate	2.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	155.7	218	Y
B-1708	Unit 267	Crude Unit	G-615	V	Gate	1.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	69.6	218	N
B-1710	Unit 267	Crude Unit	G-615	C	Flange	3.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	74.6	218	NA
B-1712	Unit 267	Crude Unit	G-615	V	Gate	2.00	Light Vacuum Gas Oil	Gas Oil	L	N	G	72.9	218	Y
B-1714	Unit 267	Crude Unit	G-615	V	Check	3.00	Gas Oil	Gas Oil	L	N	G	64.2	218	Y
B-1716	Unit 267	Crude Unit	G-615	V	Gate	0.75	Gas Oil	Gas Oil	L	N	G	72.2	218	N
B-1718	Unit 267	Crude Unit	G-615	C	Plug	0.50	Gas Oil	Gas Oil	L	N	G	72	218	NA
B-1720	Unit 267	Crude Unit	G-615	V	Needle	0.38	Gas Oil	Gas Oil	L	N	G	68.1	218	Y
B-1722	Unit 267	Crude Unit	G-615	V	Control Valve	6.00	Gas Oil	Gas Oil	L	N	G	66.7	218	Y
B-1724	Unit 267	Crude Unit	G-615	V	Gate	0.75	Gas Oil	Gas Oil	L	N	G	80.2	218	N
B-1726	Unit 267	Crude Unit	G-615	C	Plug	0.50	Gas Oil	Gas Oil	L	N	G	78.6	218	NA
B-1728	Unit 267	Crude Unit	G-615	V	Gate	2.00	Gas Oil	Gas Oil	L	N	G	76.1	218	Y
B-1730	Unit 267	Crude Unit	G-615	C	Flange	2.00	Gas Oil	Gas Oil	L	N	G	80.2	218	NA
B-1732	Unit 267	Crude Unit	G-617	V	Gate	12.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	506.7	Blank	Y
B-1734	Unit 267	Crude Unit	G-617	V	Gate	2.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	298	Blank	Y
B-1736	Unit 267	Crude Unit	G-617	C	Flange	2.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	156.7	Blank	NA
B-1738	Unit 267	Crude Unit	G-617	V	Gate	4.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	467.3	Blank	Y
B-1740	Unit 267	Crude Unit	G-617	V	Check	4.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	512.7	Blank	Y
B-1742	Unit 267	Crude Unit	B-601	V	Globe	4.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	412.8	Blank	Y
B-1744	Unit 267	Crude Unit	B-601	V	Gate	4.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	467.9	Blank	Y
B-1746	Unit 267	Crude Unit	B-601	C	Flange	4.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	336.5	Blank	NA
B-1748	Unit 267	Crude Unit	B-601	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	166.2	Blank	Y
B-1750	Unit 267	Crude Unit	B-601	V	Control Valve	4.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	476.4	Blank	Y
B-1752	Unit 267	Crude Unit	B-601	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	174.5	Blank	Y
B-1754	Unit 267	Crude Unit	B-601	C	Plug	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	114.2	Blank	NA
B-1756	Unit 267	Crude Unit	B-601	V	Gate	6.00	Atmospheric Bottoms	Gas Oil	L	N	G	508.4	Blank	Y
B-1758	Unit 267	Crude Unit	B-601	C	Flange	6.00	Atmospheric Bottoms	Gas Oil	L	N	G	495.1	Blank	NA
B-1760	Unit 267	Crude Unit	B-601	V	Gate	2.00	Atmospheric Bottoms	Gas Oil	L	N	G	418.5	Blank	Y
B-1762	Unit 267	Crude Unit	B-601	V	Gate	0.75	Atmospheric Bottoms	Gas Oil	L	N	G	176	Blank	Y
B-1764	Unit 267	Crude Unit	B-601	C	Plug	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	146.1	Blank	NA
B-1766	Unit 267	Crude Unit	B-601	V	Check	2.00	Atmospheric Bottoms	Gas Oil	L	N	G	88.1	Blank	Y
B-1768	Unit 267	Crude Unit	B-601	V	Gate	0.75	Atmospheric Bottoms	Gas Oil	L	N	G	251	Blank	Y
B-1770	Unit 267	Crude Unit	B-601	C	Fitting	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	251	Blank	NA
B-1772	Unit 267	Crude Unit	B-601	V	Needle	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	113.5	Blank	Y
B-1774	Unit 267	Crude Unit	B-601	C	Plug	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	113.5	Blank	NA
B-1776	Unit 267	Crude Unit	B-601	V	Needle	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	105.5	Blank	Y
B-1778	Unit 267	Crude Unit	B-601	C	Plug	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	77.2	Blank	NA
B-1780	Unit 267	Crude Unit	B-601	C	3-way	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	91.5	Blank	NA
B-1782	Unit 267	Crude Unit	B-601	C	Pressure gauge	0.50	Atmospheric Bottoms	Gas Oil	L	N	G	89.9	Blank	NA
B-1784	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	N	N	P	62.3	Blank	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1786	Unit 267	Crude Unit	F-607	C	Plug	0.50	Vacuum tower Overhead	Diesel	N	N	P	56.9	Blank	NA
B-1788	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	N	N	P	57.3	Blank	N
B-1790	Unit 267	Crude Unit	F-607	C	Plug	0.50	Vacuum tower Overhead	Diesel	N	N	P	55.7	Blank	NA
B-1792	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	49.5	Blank	Y
B-1794	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	41.2	Blank	Y
B-1796	Unit 267	Crude Unit	F-607	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	P	48.4	Blank	NA
B-1798	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	57.9	Blank	Y
B-1800	Unit 267	Crude Unit	F-607	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	P	63.1	Blank	NA
B-1802	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	60.7	Blank	N
B-1804	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	45.4	Blank	N
B-1806	Unit 267	Crude Unit	F-607	C	Flange	1.00	Vacuum tower Overhead	Diesel	L	N	P	49.1	Blank	NA
B-1808	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	53.2	Blank	N
B-1810	Unit 267	Crude Unit	F-607	C	Plug	0.50	Vacuum tower Overhead	Diesel	L	N	P	51	Blank	NA
B-1812	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	51.4	Blank	N
B-1814	Unit 267	Crude Unit	F-607	C	Plug	0.50	Vacuum tower Overhead	Diesel	L	N	P	50.2	Blank	NA
B-1816	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	N	N	P	80.7	Blank	Y
B-1818	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	64.5	Blank	Y
B-1820	Unit 267	Crude Unit	F-607	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	P	62.5	Blank	NA
B-1822	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	60.8	Blank	Y
B-1824	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	62.1	Blank	Y
B-1826	Unit 267	Crude Unit	F-607	C	Plug	0.50	Vacuum tower Overhead	Diesel	L	N	P	69	Blank	NA
B-1828	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	148.6	Blank	Y
B-1830	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	83.4	Blank	Y
B-1832	Unit 267	Crude Unit	F-607	C	Plug	0.50	Vacuum tower Overhead	Diesel	L	N	P	80.3	Blank	NA
B-1834	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	91.1	Blank	Y
B-1836	Unit 267	Crude Unit	F-607	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	P	96.2	Blank	NA
B-1838	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	61.7	Blank	Y
B-1840	Unit 267	Crude Unit	F-607	V	Gate	0.75	Vacuum tower Overhead	Diesel	L	N	P	65	Blank	Y
B-1842	Unit 267	Crude Unit	F-607	C	Cap	0.50	Vacuum tower Overhead	Diesel	L	N	P	61.7	Blank	NA
B-1844	Unit 267	Crude Unit	F-607	C	Plug	0.50	Vacuum tower Overhead	Diesel	L	N	P	67.1	Blank	NA
B-1846	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	60.6	Blank	Y
B-1848	Unit 267	Crude Unit	F-607	V	Gate	2.00	Vacuum tower Overhead	Diesel	L	N	P	70.3	Blank	Y
B-1850	Unit 267	Crude Unit	F-607	C	Flange	2.00	Vacuum tower Overhead	Diesel	L	N	P	67.6	Blank	NA
B-1852	Unit 267	Crude Unit	E-603B	V	Needle	0.50	LVGO Reflux	Gas Oil	L	N	P	71.4	Blank	Y
B-1854	Unit 267	Crude Unit	E-603B	V	Needle	0.50	LVGO Reflux	Gas Oil	L	N	P	67.5	Blank	Y
B-1856	Unit 267	Crude Unit	E-603B	C	Elbow	0.50	LVGO Reflux	Gas Oil	L	N	P	80.5	Blank	NA
B-1858	Unit 267	Crude Unit	E-603B	V	Needle	0.50	LVGO Reflux	Gas Oil	L	N	P	67	Blank	Y
B-1860	Unit 267	Crude Unit	E-603B	V	Gate	0.75	LVGO Reflux	Gas Oil	L	N	P	248.5	Blank	Y
B-1862	Unit 267	Crude Unit	E-603B	V	Gate	0.75	LVGO Reflux	Gas Oil	L	N	P	235.9	Blank	Y
B-1864	Unit 267	Crude Unit	E-603B	V	Gate	1.50	LVGO Reflux	Gas Oil	L	N	P	213.6	Blank	Y
B-1866	Unit 267	Crude Unit	E-603B	C	Flange	1.50	LVGO Reflux	Gas Oil	L	N	P	212.7	Blank	NA
B-1868	Unit 267	Crude Unit	E-603B	C	Flange	1.50	LVGO Reflux	Gas Oil	L	N	P	213	Blank	NA
B-1870	Unit 267	Crude Unit	E-603B	V	Gate	2.00	LVGO Reflux	Gas Oil	L	N	P	345.2	Blank	Y
B-1872	Unit 267	Crude Unit	E-603B	C	Flange	2.00	LVGO Reflux	Gas Oil	L	N	P	339.8	Blank	NA
B-1874	Unit 267	Crude Unit	E-603B	V	Control Valve	1.00	LVGO Reflux	Gas Oil	L	N	P	270	Blank	Y
B-1876	Unit 267	Crude Unit	E-603B	V	Gate	0.75	LVGO Reflux	Gas Oil	L	N	P	123.7	Blank	Y
B-1878	Unit 267	Crude Unit	E-603B	C	Plug	0.50	LVGO Reflux	Gas Oil	L	N	P	114.8	Blank	NA
B-1880	Unit 267	Crude Unit	E-603B	C	Flange	2.00	LVGO Reflux	Gas Oil	L	N	P	282.5	Blank	NA
B-1882	Unit 267	Crude Unit	E-603B	V	Gate	2.00	LVGO Reflux	Gas Oil	L	N	P	320.7	Blank	Y
B-1884	Unit 267	Crude Unit	E-603B	C	Flange	2.00	LVGO Reflux	Gas Oil	L	N	P	304.5	Blank	NA
B-1886	Unit 267	Crude Unit	FV-394	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	67	0	Y
B-1888	Unit 267	Crude Unit	FV-394	V	Control Valve	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	54	0	Y
B-1890	Unit 267	Crude Unit	FV-394	C	Flange	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	59	0	NA
B-1892	Unit 267	Crude Unit	FV-394	V	Needle	0.50	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	54	0	Y
B-1894	Unit 267	Crude Unit	FV-394	C	Plug	0.50	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	59	0	NA
B-1896	Unit 267	Crude Unit	FV-394	V	Gate	0.50	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	55	0	N
B-1898	Unit 267	Crude Unit	FV-394	V	Gate	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	68	150	Y
B-1900	Unit 267	Crude Unit	FV-394	C	Flange	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	98.4	150	NA
B-1902	Unit 267	Crude Unit	FV-394	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	69.9	150	N
B-1904	Unit 267	Crude Unit	FV-394	C	Plug	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	113.4	150	NA
B-1906	Unit 267	Crude Unit	HV-1501	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	84.6	Blank	N
B-1908	Unit 267	Crude Unit	HV-1501	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	147	Blank	Y
B-1910	Unit 267	Crude Unit	HV-1501	C	Plug	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	81	Blank	NA
B-1912	Unit 267	Crude Unit	HV-1501	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	88.8	Blank	Y
B-1914	Unit 267	Crude Unit	PV-1694	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	111	Blank	Y
B-1916	Unit 267	Crude Unit	PV-1694	C	Plug	0.38	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	75.3	Blank	NA
B-1918	Unit 267	Crude Unit	PV-1694	V	Needle	0.38	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	91.4	Blank	Y
B-1920	Unit 267	Crude Unit	PV-1694	V	Control Valve	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	149.6	Blank	Y
B-1922	Unit 267	Crude Unit	PV-1694	V	Bleed	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	68.4	Blank	Y
B-1924	Unit 267	Crude Unit	PV-1694	C	Plug	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	75.2	Blank	NA
B-1926	Unit 267	Crude Unit	PV-1694	V	Gate	6.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	106	Blank	Y
B-1928	Unit 267	Crude Unit	PV-1684	V	Globe	4.00	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	105	Blank	Y
B-1930	Unit 267	Crude Unit	PV-1684	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	216	Blank	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
B-1932a	Unit 267	Crude Unit	PV-1684	V	Gate	0.75	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	135	Blank	N
B-1932b	Unit 267	Crude Unit	D-602	V	Gate	2.00	Resid	Resid	N	N	G	69.4	Blank	Y
B-1934	Unit 267	Crude Unit	PV-1694	C	Plug	0.50	Vacuum Tower Bottoms	Asphalt/Resid	N	N	G	70	Blank	NA
B-1936	Unit 267	Crude Unit	PV-1694	V	Needle	0.50	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	71	Blank	Y
B-1938	Unit 267	Crude Unit	PV-1694	V	Needle	0.75	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	83	Blank	Y
B-1940	Unit 267	Crude Unit	FV-1888	V	Control Valve	3.00	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	80	Blank	Y
B-1942	Unit 267	Crude Unit	FV-1888	C	Plug	0.50	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	83	Blank	NA
B-1944	Unit 267	Crude Unit	FV-1888	V	Gate	0.50	Vacuum Tower Bottoms	Asphalt/Resid	L	N	G	75	Blank	N
B-1946	Unit 267	Crude Unit	D-604	V	Gate	3.00	Heavy Diesel	Diesel	L	N	P	150	82	Y
B-1948	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	261	82	Y
B-1950	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	58	80	N
B-1952	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	L	N	P	55	82	NA
B-1954	Unit 267	Crude Unit	D-604	V	Gate	0.50	Heavy Diesel	Diesel	L	N	P	102	82	N
B-1956	Unit 267	Crude Unit	D-604	V	Gate	0.50	Heavy Diesel	Diesel	L	N	P	80	82	N
B-1958	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	L	N	P	64	82	NA
B-1960	Unit 267	Crude Unit	D-604	V	Gate	0.50	Heavy Diesel	Diesel	L	N	P	83	83	Y
B-1962	Unit 267	Crude Unit	D-604	V	Gate	0.50	Heavy Diesel	Diesel	L	N	P	76	83	Y
B-1964	Unit 267	Crude Unit	D-604	V	Gate	0.50	Heavy Diesel	Diesel	L	N	P	84	83	Y
B-1966	Unit 267	Crude Unit	D-604	C	Plug	0.25	Heavy Diesel	Diesel	L	N	P	74	83	NA
B-1968	Unit 267	Crude Unit	D-604	V	Needle	0.25	Heavy Diesel	Diesel	L	N	P	75	83	Y
B-1970	Unit 267	Crude Unit	D-604	V	Needle	0.25	Heavy Diesel	Diesel	L	N	P	89	83	Y
B-1972	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	L	N	P	78	83	NA
B-1974	Unit 267	Crude Unit	D-604	V	Regulator	1.00	Heavy Diesel	Diesel	L	N	P	108	83	Y
B-1976	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	80	83	Y
B-1978	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	L	N	P	79	83	NA
B-1980	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	63	83	Y
B-1982	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	68	83	Y
B-1984	Unit 267	Crude Unit	D-604	V	Regulator	1.00	Heavy Diesel	Diesel	L	N	P	69	83	Y
B-1986	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	76	83	Y
B-1988	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	L	N	P	80	83	NA
B-1990	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	90	83	Y
B-1992	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	68	83	Y
B-1994	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	L	N	P	83	83	NA
B-1996	Unit 267	Crude Unit	D-604	V	Regulator	1.00	Heavy Diesel	Diesel	L	N	P	105	83	Y
B-1998	Unit 267	Crude Unit	D-604	V	Needle	0.50	Heavy Diesel	Diesel	L	N	P	75	83	Y
B-2000	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	L	N	P	70	83	NA
B-2002	Unit 267	Crude Unit	D-604	V	Gate	0.50	Heavy Diesel	Diesel	L	N	P	89	83	Y
B-2004	Unit 267	Crude Unit	D-604	C	Plug	0.50	Heavy Diesel	Diesel	N	N	P	81	83	NA
B-2006	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	65	58	Y
B-2008	Unit 267	Crude Unit	D-604	C	Plug	0.75	Heavy Diesel	Diesel	L	N	P	56	58	NA
B-2010	Unit 267	Crude Unit	D-604	V	Gate	0.50	Heavy Diesel	Diesel	L	N	P	83	20	Y
B-2012	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	68	20	Y
B-2014	Unit 267	Crude Unit	D-604	V	Needle	0.25	Heavy Diesel	Diesel	L	N	P	60	20	Y
B-2016	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	74	20	Y
B-2018	Unit 267	Crude Unit	D-604	C	Plug	0.75	Heavy Diesel	Diesel	L	N	P	72	20	NA
B-2020	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	104	20	Y
B-2022	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	110	20	N
B-2024	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	263	20	Y
B-2026	Unit 267	Crude Unit	D-604	C	Flange	1.00	Heavy Diesel	Diesel	L	N	P	125	20	NA
B-2028	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	98	20	Y
B-2030	Unit 267	Crude Unit	D-604	C	Plug	0.75	Heavy Diesel	Diesel	L	N	P	85	20	NA
B-2032	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	94	20	Y
B-2034	Unit 267	Crude Unit	D-604	V	Gate	0.75	Heavy Diesel	Diesel	L	N	P	76	20	N
B-2036	Unit 40	Tank Farm	G-407	P	Centrifugal	10	Mid Barrel (Diesel range material)	Diesel	N	N	G	63	100	NA
B-2038	Unit 40	Tank Farm	G-407	C	Pump Housing	Blank	Mid Barrel (Diesel range material)	Diesel	N	N	G	64	100	NA
B-2040	Unit 40	Tank Farm	G-407	P	Centrifugal	Blank	Mid Barrel (Diesel range material)	Diesel	N	N	G	72	100	NA
B-2042	Unit 40	Tank Farm	G-591	P	Centrifugal	6	DSL Blend	Diesel	N	N	G	77	OOS	NA
B-2044	Unit 40	Tank Farm	G-591	C	Pump Housing	Blank	DSL Blend	Diesel	N	N	G	77	OOS	NA
B-2200	Unit 240	Hydrocracker	G-201	P	Centrifugal	Unknown	Gas Oil	Gas Oil	L	N	G	145.8	20	NA
B-2202	Unit 240	Hydrocracker	G-201	C	Pump Housing	Unknown	Gas Oil	Gas Oil	L	N	G	166.4	20	NA
B-2204	Unit 240	Hydrocracker	G-107	P	Centrifugal	Unknown	Bottoms	Diesel	L	N	G	93.3	200	NA
B-2206	Unit 240	Hydrocracker	G-107	C	Pump Housing	Unknown	Bottoms	Diesel	L	N	G	204.1	200	NA
B-2208	Unit 240	Hydrocracker	G-111	P	Centrifugal	Unknown	Heavy Oil	Heavy Oil	H	N	G	204.6	225	NA
B-2210	Unit 240	Hydrocracker	G-111	C	Pump Housing	Unknown	Heavy Oil	Heavy Oil	H	N	G	443.2	225	NA
B-2212	Unit 248	Aromatic Saturation	G-603	P	Centrifugal	Unknown	Heavy Oil	Heavy Oil	H	N	G	106.2	40	NA
B-2214	Unit 248	Aromatic Saturation	G-603	C	Pump Housing	Unknown	Heavy Oil	Heavy Oil	H	N	G	115.2	40	NA
B-2216	MTC	Marine Terminal	G-71	V	Gate	0.75	Gas Oil	Gas Oil	N	N	G	74.2	120	Y
B-2218	MTC	Marine Terminal	G-71	V	Needle	0.50	Gas Oil	Gas Oil	N	N	G	72.2	120	Y
B-2220	MTC	Marine Terminal	G-71	V	Needle	0.50	Gas Oil	Gas Oil	N	N	G	72.9	120	Y
B-2222	MTC	Marine Terminal	G-71	V	Needle	0.50	Gas Oil	Gas Oil	N	N	G	67.7	120	Y
B-2224	MTC	Marine Terminal	G-71	C	Plug	0.50	Gas Oil	Gas Oil	N	N	G	69.2	120	NA
B-2226	MTC	Marine Terminal	G-71	V	Gate	0.75	Gas Oil	Gas Oil	N	N	G	72.5	120	Y
C-101-20157-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	FCC Feed	Heavy Gas Oil	N	N	G	64	50	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-101-20157-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	FCC Feed	Heavy Gas Oil	N	N	G	64	50	NA
C-101-20172-P	0101-FCC	Catalytic Cracking	P-20	P	Seal	Blank	FCC Feed	Heavy Gas Oil	L	N	G	179	220	NA
C-101-20172-P	0101-FCC	Catalytic Cracking	P-20	C	Pump Housing	Blank	FCC Feed	Heavy Gas Oil	L	N	G	179	220	NA
C-101-20195-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	FCC Feed	Heavy Gas Oil	N	N	G	130	210	NA
C-101-20195-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	FCC Feed	Heavy Gas Oil	N	N	G	130	210	NA
C-101-20210-P	0101-FCC	Catalytic Cracking	P-21A	P	Seal	Blank	FCC Feed	Heavy Gas Oil	L	N	G	152	50	NA
C-101-20210-P	0101-FCC	Catalytic Cracking	P-21A	C	Pump Housing	Blank	FCC Feed	Heavy Gas Oil	L	N	G	152	50	NA
C-101-20219-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	FCC Feed	Heavy Gas Oil	N	N	G	76	30	NA
C-101-20219-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	FCC Feed	Heavy Gas Oil	N	N	G	76	30	NA
C-101-20230-P	0101-FCC	Catalytic Cracking	P-113B	P	Seal	Blank	MCO	Medium Cycle Oil	L	N	G	400	175	NA
C-101-20230-P	0101-FCC	Catalytic Cracking	P-113B	C	Pump Housing	Blank	MCO	Medium Cycle Oil	L	N	G	400	175	NA
C-101-20254-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	MCO	Medium Cycle Oil	N	N	G	453	130	NA
C-101-20254-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	MCO	Medium Cycle Oil	N	N	G	453	130	NA
C-101-20267-P	0101-FCC	Catalytic Cracking	P-113A	P	Seal	Blank	MCO	Medium Cycle Oil	L	N	G	201	100	NA
C-101-20267-P	0101-FCC	Catalytic Cracking	P-113A	C	Pump Housing	Blank	MCO	Medium Cycle Oil	L	N	G	201	100	NA
C-101-20282-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	Recovered Oil (LCO - MCO - HCO)	Recovered Oil	N	N	G	56	0	NA
C-101-20282-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	Recovered Oil (LCO - MCO - HCO)	Recovered Oil	N	N	G	56	0	NA
C-101-20329-P	0101-FCC	Catalytic Cracking	P-114	P	Seal	Blank	HCO	Heavy Cycle Oil	L	N	G	361	79	NA
C-101-20329-P	0101-FCC	Catalytic Cracking	P-114	C	Pump Housing	Blank	HCO	Heavy Cycle Oil	L	N	G	361	79	NA
C-101-20345-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	HCO	Heavy Cycle Oil	N	N	G	114	11	NA
C-101-20345-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	HCO	Heavy Cycle Oil	N	N	G	114	11	NA
C-101-20369-P	0101-FCC	Catalytic Cracking	P-110	P	Seal	Blank	LCO	Light Cycle Oil	L	N	G	264	184	NA
C-101-20369-P	0101-FCC	Catalytic Cracking	P-110	C	Pump Housing	Blank	LCO	Light Cycle Oil	L	N	G	264	184	NA
C-101-20379-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	MCO	Medium Cycle Oil	N	N	G	249	4	NA
C-101-20379-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	MCO	Medium Cycle Oil	N	N	G	249	4	NA
C-101-20397-P	0101-FCC	Catalytic Cracking	P-111A	P	Seal	Blank	MCO	Medium Cycle Oil	L	N	G	119	300	NA
C-101-20397-P	0101-FCC	Catalytic Cracking	P-111A	C	Pump Housing	Blank	MCO	Medium Cycle Oil	L	N	G	119	300	NA
C-101-21152-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	FCC Frac Bottoms	Gas Oil (Cracked)	N	N	G	454	140	NA
C-101-21152-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	FCC Frac Bottoms	Gas Oil (Cracked)	N	N	G	454	140	NA
C-101-21199-P	0101-FCC	Catalytic Cracking	P-105	P	Seal	Blank	FCC Frac Bottoms	Gas Oil (Cracked)	L	N	G	364	450	NA
C-101-21199-P	0101-FCC	Catalytic Cracking	P-105	C	Pump Housing	Blank	FCC Frac Bottoms	Gas Oil (Cracked)	L	N	G	364	450	NA
C-101-21226-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	FCC Frac Bottoms	Gas Oil (Cracked)	N	N	G	240	140	NA
C-101-21226-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	FCC Frac Bottoms	Gas Oil (Cracked)	N	N	G	240	140	NA
C-101-21508-P	0101-FCC	Catalytic Cracking	P-118A	P	Seal	Blank	LCO	Light Cycle Oil	L	N	G	121	158	NA
C-101-21508-P	0101-FCC	Catalytic Cracking	P-118A	C	Pump Housing	Blank	LCO	Light Cycle Oil	L	N	G	121	158	NA
C-101-21519-P	0101-FCC	Catalytic Cracking		P	Seal	Blank	LCO	Light Cycle Oil	N	N	G	259	1	NA
C-101-21519-P	0101-FCC	Catalytic Cracking		C	Pump Housing	Blank	LCO	Light Cycle Oil	N	N	G	259	1	NA
C-105-20005-P	0105-VOC-FCC H2S	Hydrotreater		P	Seal	Blank	DEA	Amine	N	N	G	59	0	NA
C-105-20005-P	0105-VOC-FCC H2S	Hydrotreater		C	Pump Housing	Blank	DEA	Amine	N	N	G	59	0	NA
C-105-20041-P	0105-VOC-FCC H2S	Hydrotreater	P-220A	P	Seal	Blank	Amine Solution	Amine	L	N	G	149	350	NA
C-105-20041-P	0105-VOC-FCC H2S	Hydrotreater	P-220A	C	Pump Housing	Blank	Amine Solution	Amine	L	N	G	149	350	NA
C-105-20052-P	0105 VOC FCC H2S	Hydrotreater		P	Seal	Unknown	Amine Solution	Amine	Blank	Blank	G	54	0	NA
C-105-20052-P	0105 VOC FCC H2S	Hydrotreater		C	Pump Housing	Blank	Amine Solution	Amine	N	N	G	54	0	NA
C-110-20017-P	0110-Propylene	Polymerization		P	Seal	Blank	Flushing Oil	Diesel - Light Gas Oil	N	N	G	68	0	NA
C-110-20017-P	0110-Propylene	Polymerization		C	Pump Housing	Blank	Flushing Oil	Diesel - Light Gas Oil	N	N	G	68	0	NA
C-110-20045-P	0110-Propylene	Polymerization		P	Seal	Unknown	Tetramer	Tetramer	Blank	Blank	G	79	-25	NA
C-110-20045-P	0110-Propylene	Polymerization		C	Pump Housing	Blank	Tetramer	Tetramer	N	N	G	79	-25	NA
C-110-20059-P	0110-Propylene	Polymerization	P-670	P	Seal	4	Tetramer	Tetramer	L	N	G	87	175	NA
C-110-20059-P	0110-Propylene	Polymerization	P-670	C	Pump Housing	Blank	Tetramer	Tetramer	L	N	G	87	175	NA
C-110-20073-P	0110-Propylene	Polymerization		P	Seal	Unknown	Pentamer	Pentamer	Blank	Blank	G	291	0	NA
C-110-20073-P	0110-Propylene	Polymerization		C	Pump Housing	Blank	Pentamer	Pentamer	N	N	G	291	0	NA
C-110-20085-P	0110-Propylene	Polymerization	P-673	P	Seal	4	Pentamer	Pentamer	L	N	G	301	88	NA
C-120-20001-P	0120-POLE YA	Tank Farm	P-3922	P	Seal	Blank	VGO	Vacuum Gas Oil	N	N	G	45	0	NA
C-120-20001-P	0120-POLE YA	Tank Farm	P-3922	C	Pump Housing	Blank	VGO	Vacuum Gas Oil	N	N	G	45	0	NA
C-120-20066-P	0120-POLE YA	Tank Farm	P-3132	P	Seal	Blank	VGO	Vacuum Gas Oil	L	N	G	68	0	NA
C-120-20066-P	0120-POLE YA	Tank Farm	P-3132	C	Pump Housing	Blank	VGO	Vacuum Gas Oil	L	N	G	68	0	NA
C-120-20109-P	0120-POLE YA	Tank Farm	P-3182	P	Seal	Blank	SDA Feed	Resid	N	N	G	36	0	NA
C-120-20197-P	0120-POLE YA	Tank Farm	P-3159	P	Seal	Blank	Lube Oil Product	Lube Oil	L	N	G	88	11	NA
C-120-20214-P	0120-POLE YA	Tank Farm	P-3138	P	Seal	Blank	Gas Oil	Gas Oil	L	N	G	53.4	19	NA
C-120-20214-P	0120-POLE YA	Tank Farm	P-3138	C	Pump Housing	Blank	Gas Oil	Gas Oil	L	N	G	53.4	19	NA
C-120-20277-P	0120-POLE YA	Tank Farm	P-3194B	P	Seal	Blank	FCC Feed	Heavy Gas Oil	N	N	G	100	20	NA
C-120-20301-P	0120-POLE YA	Tank Farm	P-3194A	P	Seal	Blank	VGO	Vacuum Gas Oil	N	N	G	55	0	NA
C-120-20339-P	0120-POLE YA	Tank Farm	P-397	P	Seal	Blank	LCO	Light Cycle Oil	L	N	G	53	0	NA
C-120-20339-P	0120-POLE YA	Tank Farm	P-397	C	Pump Housing	Blank	LCO	Light Cycle Oil	L	N	G	53	0	NA
C-120-20402-P	0120-POLE YA	Tank Farm	P-3222	P	Seal	Blank	Gas Oil	Gas Oil	L	N	G	76	0	NA
C-120-20437-P	1627-CPH-24	Tank Farm	P-213A	P	Seal	Blank	HCO	Heavy Cycle Oil	N	N	G	120	92	NA
C-120-20437-P	1627-CPH-24	Tank Farm	P-213A	C	Pump Housing	Blank	HCO	Heavy Cycle Oil	N	N	G	120	92	NA
C-120-20491-P	0120-POLE YA	Tank Farm	P-3158	P	Seal	Blank	RLOP Feed	Lube Oil	N	N	G	64	0	NA
C-120-20498-P	0120-POLE YA	Tank Farm	P-3157	P	Seal	Blank	Lube Oil Product	Lube Oil	L	N	G	158	31	NA
C-120-20534-P	0120-POLE YA	Tank Farm	P-1357	P	Seal	Blank	Lube Oil Product	Lube Oil	N	N	G	75	0	NA
C-120-20534-P	0120-POLE YA	Tank Farm	P-1357	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	N	N	G	75	0	NA
C-120-20582-P	0120-POLE YA	Tank Farm	P-3160	P	Seal	Blank	Neutral Oil	Lube Oil	N	N	G	60	0	NA
C-120-20630-P	0120-POLE YA	Tank Farm	P-3160	P	Seal	Blank	Neutral Oil	Lube Oil	N	N	G	118	145	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-120-20668-P	0120-POLE YA	Tank Farm	P-3162	P	Seal	Blank	Neutral Oil	Lube Oil	N	N	G	105	0	NA
C-120-20715-P	0120-POLE YA	Tank Farm	P-3161	P	Seal	Blank	Neutral Oil	Lube Oil	N	N	G	171	55	NA
C-120-20736-P	0120-POLE YA	Tank Farm	P-3161	P	Seal	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	153	0	NA
C-1604-20007-P	1604-OFF & Main	Tank Farm	MK-1506	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	119	0	NA
C-1604-20016-P	1604-OFF & Main	Tank Farm	P-1506	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	78	0	NA
C-1604-20048-P	1604-OFF & Main	Tank Farm	Mixer	C	Pump Housing	Blank	VGO Feed	Gas Oil	N	N	G	103	0	NA
C-1604-20089-P	1604-OFF & Main	Tank Farm	P-1899	P	Seal	Blank	VGO Feed	Gas Oil	N	N	G	64	0	NA
C-1620-20067-P	1620-RPH-SP Hill	Tank Farm	P-3217	P	Seal	1	Diesel	Diesel	N	N	G	49	0	NA
C-1620-20067-P	1620-RPH-SP Hill	Tank Farm	P-3217	C	Pump Housing	Blank	Diesel	Diesel	N	N	G	49	0	NA
C-1620-20086-P	1620-RPH-SP Hill	Tank Farm	P-3195	P	Seal	Blank	Diesel	Diesel	N	N	G	61	0	NA
C-1620-20086-P	1620-RPH-SP Hill	Tank Farm	P-3195	C	Pump Housing	Blank	Diesel	Diesel	N	N	G	61	0	NA
C-1620-20197-P	1620-RPH-SP Hill	Tank Farm	P-3215	P	Seal	Blank	Diesel	Diesel	N	N	G	50	0	NA
C-1620-20197-P	1620-RPH-SP Hill	Tank Farm	P-3215	C	Pump Housing	Blank	Diesel	Diesel	N	N	G	50	0	NA
C-1620-20236-P	1620-RPH-SP Hill	Tank Farm	P-3227	P	Seal	Blank	Diesel	Diesel	N	N	G	51	0	NA
C-1620-20236-P	1620-RPH-SP Hill	Tank Farm	P-3227	C	Pump Housing	Blank	Diesel	Diesel	N	N	G	51	0	NA
C-1620-20293-P	1620-RPH-SP Hill	Tank Farm	P-955	P	Seal	Blank	Tetramer	Tetramer	N	N	G	60	0	NA
C-1620-20293-P	1620-RPH-SP Hill	Tank Farm	P-955	C	Pump Housing	Blank	Tetramer	Tetramer	N	N	G	60	0	NA
C-1620-20370-P	1620-RPH-SP Hill	Tank Farm	P-3232	P	Seal	Blank	Tetramer	Tetramer	N	N	G	52	0	NA
C-1620-20370-P	1620-RPH-SP Hill	Tank Farm	P-3232	C	Pump Housing	Blank	Tetramer	Tetramer	N	N	G	52	0	NA
C-1621-20105-P	1621-RPH-E	Tank Farm	Sample Pump	P	Seal	Blank	MCO	Medium Cycle Oil	N	N	G	79	0	NA
C-1621-20158-P	1621-RPH-E	Tank Farm	P-3216	P	Seal	Blank	HCO	Heavy Cycle Oil	Blank	Blank	G	84	0	NA
C-1626-20005-P	1620-RPH-SP	Tank Farm	P-3164	P	Seal	Blank	Lube Oil Product	Lube Oil	Blank	Blank	G	50	0	NA
C-1626-20005-P	1620-RPH-SP	Tank Farm	P-3164	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	Blank	Blank	G	50	0	NA
C-1626-20005-P	1620-RPH-SP Hill	Tank Farm	P-3164	P	Seal	Blank	Lube Oil Product	Lube Oil	N	N	G	62	0	NA
C-1626-20005-P	1620-RPH-SP Hill	Tank Farm	P-3164	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	N	N	G	62	0	NA
C-1626-20075-P	1620-RPH-SP	Tank Farm	P-3171	P	Seal	Blank	Lube Oil Product	Lube Oil	L	N	G	48.5	0	NA
C-1626-20075-P	1620-RPH-SP	Tank Farm	P-3171	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	L	N	G	48.5	0	NA
C-1626-20110-P	1626-CPH-Quarry	Tank Farm	P-3172	P	Seal	Blank	Lube Oil Product	Lube Oil	L	N	G	51	0	NA
C-1626-20110-P	1626-CPH-Quarry	Tank Farm	P-3172	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	L	N	G	51	0	NA
C-1626-20216-P	1620-RPH-SP	Tank Farm	P-3167	P	Seal	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	51	0	NA
C-1626-20216-P	1620-RPH-SP	Tank Farm	P-3167	C	Pump Housing	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	51	0	NA
C-1626-20259-P	1620-RPH-SP	Tank Farm	P-3168	P	Seal	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	50	0	NA
C-1626-20259-P	1620-RPH-SP	Tank Farm	P-3168	C	Pump Housing	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	50	0	NA
C-1626-20299-P	1626-CPH-Quarry	Tank Farm	P-3166	P	Seal	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	52	0	NA
C-1626-20299-P	1626-CPH-Quarry	Tank Farm	P-3166	C	Pump Housing	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	52	0	NA
C-1626-20379-P	1626-CPH-Quarry	Tank Farm	P-3165	P	Seal	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	51	0	NA
C-1626-20379-P	1626-CPH-Quarry	Tank Farm	P-3165	C	Pump Housing	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	51	0	NA
C-1626-20442-P	1626-CPH-Quarry	Tank Farm	P-3163	P	Seal	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	50	0	NA
C-1626-20442-P	1626-CPH-Quarry	Tank Farm	P-3163	C	Pump Housing	Blank	Neutral Oil	Lube Oil	Blank	Blank	G	50	0	NA
C-1626-20455-P	1626-CPH-Quarry	Tank Farm	P-3169	P	Seal	Blank	Neutral Oil	Lube Oil	N	N	G	49.5	0	NA
C-1626-20455-P	1626-CPH-Quarry	Tank Farm	P-3169	C	Pump Housing	Blank	Neutral Oil	Lube Oil	N	N	G	49.5	0	NA
C-1626-20517-P	1626-CPH-Quarry	Tank Farm	P-3170	P	Seal	Blank	Neutral Oil	Lube Oil	N	N	G	51.5	0	NA
C-1626-20517-P	1626-CPH-Quarry	Tank Farm	P-3170	C	Pump Housing	Blank	Neutral Oil	Lube Oil	N	N	G	51.5	0	NA
C-1626-20547-P	1626-CPH-Quarry	Tank Farm	P-4504	P	Seal	Blank	Lube Oil Product	Lube Oil	L	N	G	61.5	13	NA
C-1626-20547-P	1626-CPH-Quarry	Tank Farm	P-4504	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	L	N	G	61.5	13	NA
C-1626-20556-P	1626-CPH-Quarry	Tank Farm	P-4501	P	Seal	Blank	Lube Oil Product	Lube Oil	L	N	G	69	160	NA
C-1626-20556-P	1626-CPH-Quarry	Tank Farm	P-4501	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	L	N	G	69	160	NA
C-1626-20569-P	1626-CPH-Quarry	Tank Farm	P-4500	P	Seal	Blank	Lube Oil Product	Lube Oil	Blank	Blank	G	83	50	NA
C-1626-20569-P	1626-CPH-Quarry	Tank Farm	P-4500	C	Pump Housing	Blank	Lube Oil Product	Lube Oil	Blank	Blank	G	83	50	NA
C-1626-20604	B & S	Tank Farm	8PS	PRD		1	Lube Oil	Lube Oil	N	N	G	76	28	NA
C-1626-20607	B & S	Tank Farm	8PS	PRD		1	Lube Oil	Lube Oil	N	N	G	84	28	NA
C-1627-20033-P	1627-CPH-24	Tank Farm	P-22	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	81	260	NA
C-1627-20033-P	1627-CPH-24	Tank Farm	P-22	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	81	260	NA
C-1627-20033-P	1627-CPH-24	Tank Farm	P-22	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	65.5	100	NA
C-1627-20033-P	1627-CPH-24	Tank Farm	P-22	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	65.5	100	NA
C-1627-20055-P	1627-CPH-24	Tank Farm	P-5	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	L	N	G	69	85	NA
C-1627-20070-P	1627-CPH-24	Tank Farm	P-4	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	89	8	NA
C-1627-20087-P	1627-CPH-24	Tank Farm		P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	93	20	NA
C-1627-20087-P	1627-CPH-24	Tank Farm		C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	93	20	NA
C-1627-20095-P	1627-CPH-24	Tank Farm	P-3	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	71	110	NA
C-1627-20095-P	1627-CPH-24	Tank Farm	P-3	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	71	110	NA
C-1627-20113-P	1627-CPH-24	Tank Farm	P-2	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	81	95	NA
C-1627-20113-P	1627-CPH-24	Tank Farm	P-2	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	81	95	NA
C-1627-20129-P	1627-CPH-24	Tank Farm	P-1	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	188	300	NA
C-1627-20129-P	1627-CPH-24	Tank Farm	P-1	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	188	300	NA
C-1627-20156-P	1627-CPH-24	Tank Farm	P-1A	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	95	50	NA
C-1627-20156-P	1627-CPH-24	Tank Farm	P-1A	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	95	50	NA
C-1627-20241-P	1627-CPH-24	Tank Farm	P-343	P	Seal	Blank	Fuel Oil	Fuel Oil	N	N	G	79	20	NA
C-1627-20241-P	1627-CPH-24	Tank Farm	P-343	C	Pump Housing	Blank	Fuel Oil	Fuel Oil	N	N	G	79	20	NA
C-1627-20252-P	1627-CPH-24	Tank Farm	P-943A	P	Seal	Blank	Tempered Oil	Diesel	N	N	G	159	120	NA
C-1627-20252-P	1627-CPH-24	Tank Farm	P-943A	C	Pump Housing	Blank	Tempered Oil	Diesel	N	N	G	159	120	NA
C-1627-20319-P	1627-CPH-24	Tank Farm	P-7	C	Pump Housing	Blank	VGO	Vacuum Gas Oil	N	N	G	89.5	59	NA
C-401-20010	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	LCO	Light Cycle Oil	N	N	G	96	270	UK

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C-401-20010.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	LCO	Light Cycle Oil	N	N	G	96	270	NA
C-401-20011	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	G	96	270	UK
C-401-20011.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	96	270	NA
C-401-20014-P	0401-SDA	Solvent Deasphalting	P-155A	C	Pump Housing	Blank	LCO	Light Cycle Oil	L	N	G	69	300	NA
C-401-20014-P	0401-SDA	Solvent Deasphalting	P-155A	P	Seal	Blank	LCO	Light Cycle Oil	L	N	G	69	300	NA
C-401-20015	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	91	270	UK
C-401-20015.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	LCO	Light Cycle Oil	N	N	G	91	270	NA
C-401-20016	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	6	LCO	Light Cycle Oil	N	N	G	82	270	UK
C-401-20016.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	82	270	NA
C-401-20017	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	81	270	UK
C-401-20017.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	81	270	NA
C-401-20018	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	G	95	270	UK
C-401-20018.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	95	270	NA
C-401-20019	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	G	82	270	UK
C-401-20019.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	82	270	NA
C-401-20020	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	85	270	UK
C-401-20020.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	85	270	NA
C-401-20021	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	86	270	UK
C-401-20021.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	LCO	Light Cycle Oil	N	N	G	86	270	NA
C-401-20023	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	LCO	Light Cycle Oil	N	N	G	93	270	UK
C-401-20023.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	LCO	Light Cycle Oil	N	N	G	93	270	NA
C-401-20024	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	93	270	UK
C-401-20024.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	93	270	NA
C-401-20025	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Control	2	LCO	Light Cycle Oil	N	N	G	93	270	UK
C-401-20025.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	LCO	Light Cycle Oil	N	N	G	93	270	NA
C-401-20026	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	93	270	UK
C-401-20026.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	93	270	NA
C-401-20027	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	LCO	Light Cycle Oil	N	N	G	96	270	UK
C-401-20027.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	LCO	Light Cycle Oil	N	N	G	96	270	NA
C-401-20028	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	G	96	270	UK
C-401-20028.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	96	270	NA
C-401-20029	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	96	270	UK
C-401-20029.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	96	270	NA
C-401-20032	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	G	95	270	UK
C-401-20032.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	95	270	NA
C-401-20033	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	G	85	270	UK
C-401-20033.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	85	270	NA
C-401-20034	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	85	270	UK
C-401-20034.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	85	270	NA
C-401-20035	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	121	270	UK
C-401-20036	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	G	121	270	UK
C-401-20036.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	121	270	NA
C-401-20037	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	102	270	UK
C-401-20037.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	102	270	NA
C-401-20038	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Control	4	LCO	Light Cycle Oil	N	N	G	125	120	UK
C-401-20038.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	LCO	Light Cycle Oil	N	N	G	125	120	NA
C-401-20039	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	125	120	UK
C-401-20039.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	125	120	NA
C-401-20040	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	LCO	Light Cycle Oil	N	N	G	120	120	UK
C-401-20040.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	LCO	Light Cycle Oil	N	N	G	120	120	NA
C-401-20041	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	4	LCO	Light Cycle Oil	N	N	G	120	120	UK
C-401-20041.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	LCO	Light Cycle Oil	N	N	G	120	120	NA
C-401-20042	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	LCO	Light Cycle Oil	N	N	G	120	120	UK
C-401-20042.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	LCO	Light Cycle Oil	N	N	G	120	120	NA
C-401-20043	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	120	120	UK
C-401-20043.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	120	120	NA
C-401-20044	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20044.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20045	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	4	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20045.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20046	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	4	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20046.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20047	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20047.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20048	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20048.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20049	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20049.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20050	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20050.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20053	South Isomax	Hydrotreater and Hydrocracker	SDA	V	1/4 Turn	0.5	LCO	Light Cycle Oil	N	N	G	80	270	UK
C-401-20053.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.5	LCO	Light Cycle Oil	N	N	G	80	270	NA
C-401-20054	South Isomax	Hydrotreater and Hydrocracker	SDA	V	1/4 Turn	0.5	LCO	Light Cycle Oil	N	N	G	80	270	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-20054.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.5	LCO	Light Cycle Oil	N	N	G	80	270	NA
C-401-20055	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20055.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20059	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Control	6	LCO	Light Cycle Oil	N	N	G	110	150	UK
C-401-20059.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	G	110	150	NA
C-401-20060	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20060.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20061	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	LCO	Light Cycle Oil	N	N	G	112	150	UK
C-401-20061.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	LCO	Light Cycle Oil	N	N	G	112	150	NA
C-401-20063	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	LCO	Light Cycle Oil	N	N	G	110	150	UK
C-401-20063.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	LCO	Light Cycle Oil	N	N	G	110	150	NA
C-401-20064	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	77	150	UK
C-401-20064.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	77	150	NA
C-401-20069	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	2	LCO	Light Cycle Oil	N	N	G	106	150	UK
C-401-20069.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	LCO	Light Cycle Oil	N	N	G	106	150	NA
C-401-20070	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	LCO	Light Cycle Oil	N	N	G	106	150	UK
C-401-20070.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	LCO	Light Cycle Oil	N	N	G	106	150	NA
C-401-20132	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	90	80	UK
C-401-20132.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	N	N	G	90	80	NA
C-401-20133	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	98	80	UK
C-401-20133.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	98	80	NA
C-401-20134	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	138	80	UK
C-401-20134.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	138	80	NA
C-401-20135	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	413	80	UK
C-401-20135.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	413	80	NA
C-401-20136	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	472	80	UK
C-401-20136.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	472	80	NA
C-401-20137	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	421	80	UK
C-401-20137.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	421	80	NA
C-401-20138	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	426	80	UK
C-401-20138.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	426	80	NA
C-401-20139	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	440	80	UK
C-401-20139.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	440	80	NA
C-401-20140	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	440	80	UK
C-401-20143	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Asphalt	Asphalt	N	N	G	330	70	UK
C-401-20143	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	250	70	UK
C-401-20143.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	250	70	NA
C-401-20144	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	117	75	UK
C-401-20144.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	Asphalt	Asphalt	N	N	G	117	75	NA
C-401-20145	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	250	70	UK
C-401-20146	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	248	70	UK
C-401-20146.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Asphalt	Asphalt	N	N	G	248	70	NA
C-401-20151	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	Asphalt	Asphalt	N	N	G	239	70	UK
C-401-20151	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	Asphalt	Asphalt	N	N	G	343	75	UK
C-401-20151.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	Asphalt	Asphalt	N	N	G	239	70	NA
C-401-20151.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	Asphalt	Asphalt	N	N	G	343	75	NA
C-401-20152	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	82	75	UK
C-401-20153	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	93	70	UK
C-401-20153	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	92	75	UK
C-401-20153.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Asphalt	Asphalt	N	N	G	93	70	NA
C-401-20153.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Coupling	0.75	Asphalt	Asphalt	N	N	G	92	75	NA
C-401-20154	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Plug	0.75	Asphalt	Asphalt	N	N	G	93	70	UK
C-401-20154	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	82	75	UK
C-401-20154.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Asphalt	Asphalt	N	N	G	82	75	NA
C-401-20154.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	93	70	NA
C-401-20155	South Isomax	Hydrotreater and Hydrocracker	SDA	V	1/4 Turn	0.75	Asphalt	Asphalt	N	N	G	83	70	UK
C-401-20155	South Isomax	Hydrotreater and Hydrocracker	SDA	V	1/4 Turn	0.75	Asphalt	Asphalt	N	N	G	77	75	UK
C-401-20155.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Asphalt	Asphalt	N	N	G	83	70	NA
C-401-20155.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Asphalt	Asphalt	N	N	G	77	75	NA
C-401-20156	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Asphalt	Asphalt	N	N	G	107	75	UK
C-401-20157	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	145	70	UK
C-401-20157	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	140	75	UK
C-401-20157.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	140	75	NA
C-401-20157.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	145	70	NA
C-401-20158	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	Asphalt	Asphalt	N	N	G	205	70	UK
C-401-20158	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Asphalt	Asphalt	N	N	G	200	75	UK
C-401-20158.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	Asphalt	Asphalt	N	N	G	140	75	NA
C-401-20159	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	147	70	UK
C-401-20159	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	226	75	UK
C-401-20159.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	147	70	NA
C-401-20159.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	226	75	NA
C-401-20160	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	199	70	UK
C-401-20160	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	278	75	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-20160.1	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Coupling	0.75	Asphalt	Asphalt	N	N	G	199	70	NA
C-401-20160.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Coupling	0.75	Asphalt	Asphalt	N	N	G	278	75	NA
C-401-20161	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	134	70	UK
C-401-20161	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	278	75	UK
C-401-20161.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	134	70	NA
C-401-20161.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	278	75	NA
C-401-20163	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Asphalt	Asphalt	N	N	G	333	70	UK
C-401-20163	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Asphalt	Asphalt	N	N	G	305	75	UK
C-401-20164	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	6	Asphalt	Asphalt	N	N	G	375	70	UK
C-401-20164	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	6	Asphalt	Asphalt	N	N	G	407	75	UK
C-401-20164.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Asphalt	Asphalt	N	N	G	375	70	NA
C-401-20164.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Asphalt	Asphalt	N	N	G	407	75	NA
C-401-20165	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	276	70	UK
C-401-20165	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	235	75	UK
C-401-20166	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	Asphalt	Asphalt	N	N	G	300	70	UK
C-401-20166	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	Asphalt	Asphalt	N	N	G	300	75	UK
C-401-20166.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Asphalt	Asphalt	N	N	G	300	70	NA
C-401-20166.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Asphalt	Asphalt	N	N	G	300	75	NA
C-401-20171-V	South Isomax	Hydrotreater and Hydrocracker	SDA	PRD		1	MEA	Amine	L	N	G	84	120	NA
C-401-20172	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Asphalt	Asphalt	N	N	G	141	70	UK
C-401-20222	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	HCO	Heavy Cycle Oil	N	N	G	106	151	UK
C-401-20222.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	HCO	Heavy Cycle Oil	N	N	G	106	151	NA
C-401-20223	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	HCO	Heavy Cycle Oil	N	N	G	100	151	UK
C-401-20223.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	HCO	Heavy Cycle Oil	N	N	G	100	151	NA
C-401-20224	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	HCO	Heavy Cycle Oil	N	N	G	100	151	UK
C-401-20224.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	HCO	Heavy Cycle Oil	N	N	G	100	151	NA
C-401-20226	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	HCO	Heavy Cycle Oil	N	N	G	100	151	UK
C-401-20226	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	HCO	Heavy Cycle Oil	N	N	G	80	151	NA
C-401-20227	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	HCO	Heavy Cycle Oil	N	N	G	80	151	UK
C-401-20228	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	HCO	Heavy Cycle Oil	N	N	G	80	151	UK
C-401-20228.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	HCO	Heavy Cycle Oil	N	N	G	80	151	NA
C-401-20241-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20242-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20243-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20244.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	410	140	NA
C-401-20244-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20245-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20246-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20247.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	410	140	NA
C-401-20247-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20248-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20249-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20250.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	410	140	NA
C-401-20250-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20251-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20288-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	390	140	UK
C-401-20289-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	390	140	UK
C-401-20290.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	390	140	NA
C-401-20290-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	390	140	UK
C-401-20291-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	390	140	UK
C-401-20292-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	390	140	UK
C-401-20293-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	390	140	UK
C-401-20294.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	439	140	NA
C-401-20294-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	439	140	UK
C-401-20295-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	439	140	UK
C-401-20296-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	439	140	UK
C-401-20297-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Hot Oil	Lube Oil	L	N	G	439	140	UK
C-401-20316.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	140	140	NA
C-401-20316-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20317-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20318-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20319.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	140	140	NA
C-401-20319-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20320-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20321-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20322.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	140	140	NA
C-401-20322-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20323-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20324-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20325-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Hot Oil	Lube Oil	L	N	G	410	140	UK
C-401-20412-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20413-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20414.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	248	140	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-20414-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20415-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20416-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20417.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	248	140	NA
C-401-20417-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20418-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20419-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20420.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	248	140	NA
C-401-20420-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	248	140	UK
C-401-20423-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20424	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	93	60	UK
C-401-20424.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	290	140	NA
C-401-20424.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	93	60	NA
C-401-20424-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20425	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	124	60	UK
C-401-20425-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20426	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	246	60	UK
C-401-20426.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	246	60	NA
C-401-20426-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20427	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	399	60	UK
C-401-20427.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	290	140	NA
C-401-20427.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	399	60	NA
C-401-20427-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20428	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	305	60	UK
C-401-20428.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	305	60	NA
C-401-20428-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20429	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	305	60	UK
C-401-20429.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	305	60	NA
C-401-20429-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20430	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	365	60	UK
C-401-20430.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	L	N	G	290	140	NA
C-401-20430.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	365	60	NA
C-401-20430-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	290	140	UK
C-401-20431	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	365	60	UK
C-401-20431-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	370	140	UK
C-401-20438-P	0401-SDA	Solvent Deasphalting	P-124	C	Pump Housing	Blank	Asphalt	Asphalt	L	N	G	305	88	NA
C-401-20438-P	0401-SDA	Solvent Deasphalting	P-124	P	Seal	Blank	Asphalt	Asphalt	L	N	G	305	88	NA
C-401-20448	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	Asphalt	Asphalt	N	N	G	232	70	UK
C-401-20448.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	Asphalt	Asphalt	N	N	G	232	70	NA
C-401-20455	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	141	70	UK
C-401-20455.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	141	70	NA
C-401-20456	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	134	70	UK
C-401-20456.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.375	Asphalt	Asphalt	N	N	G	134	70	NA
C-401-20457	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	141	70	UK
C-401-20457.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	141	70	NA
C-401-20461	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Asphalt	Asphalt	N	N	G	254	70	UK
C-401-20462	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	254	70	UK
C-401-20463	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	Asphalt	Asphalt	N	N	G	263	70	UK
C-401-20463.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Asphalt	Asphalt	N	N	G	263	70	NA
C-401-20464	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	N	N	G	148	70	UK
C-401-20464.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Asphalt	Asphalt	N	N	G	148	70	NA
C-401-20474	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	Asphalt	Asphalt	N	N	G	162	70	UK
C-401-20474.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	Asphalt	Asphalt	N	N	G	162	70	NA
C-401-20484	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	392	60	UK
C-401-20484.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	392	60	NA
C-401-20485	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	392	60	UK
C-401-20485.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	392	60	NA
C-401-20486	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	404	60	UK
C-401-20486.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	404	60	NA
C-401-20487	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	405	60	UK
C-401-20487.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	405	60	NA
C-401-20488	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	173	60	UK
C-401-20488.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	173	60	NA
C-401-20489	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	163	60	UK
C-401-20489.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	163	60	NA
C-401-20490	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	310	60	UK
C-401-20490.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	310	60	NA
C-401-20491	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	170	60	UK
C-401-20491.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	170	60	NA
C-401-20492	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Hot Oil	Lube Oil	N	N	G	464	60	UK
C-401-20514	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	97	80	UK
C-401-20514.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	N	N	G	97	80	NA
C-401-20515	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	106	80	UK

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C-401-20515.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	106	80	NA
C-401-20516	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	106	80	UK
C-401-20516.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	106	80	NA
C-401-20517	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	336	80	UK
C-401-20517.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	336	80	NA
C-401-20518	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	357	80	UK
C-401-20518.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	357	80	NA
C-401-20519	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	357	80	UK
C-401-20519.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	357	80	NA
C-401-20520	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	415	80	UK
C-401-20520.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	415	80	NA
C-401-20521	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	400	80	UK
C-401-20521.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	400	80	NA
C-401-20522	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	400	80	UK
C-401-20522.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	400	80	NA
C-401-20523	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	Hot Oil	Lube Oil	N	N	G	400	80	UK
C-401-20530	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	Hot Oil	Lube Oil	N	N	G	160	70	UK
C-401-20530.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Hot Oil	Lube Oil	N	N	G	160	70	NA
C-401-20531	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	Hot Oil	Lube Oil	N	N	G	100	70	UK
C-401-20531.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	Hot Oil	Lube Oil	N	N	G	100	70	NA
C-401-20532	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	Hot Oil	Lube Oil	N	N	G	125	70	UK
C-401-20532.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	Hot Oil	Lube Oil	N	N	G	125	70	NA
C-401-20534	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	Hot Oil	Lube Oil	N	N	G	125	70	UK
C-401-20534.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	Hot Oil	Lube Oil	N	N	G	125	70	NA
C-401-20535	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	Hot Oil	Lube Oil	N	N	G	140	70	UK
C-401-20535.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Hot Oil	Lube Oil	N	N	G	140	70	NA
C-401-20540-P	0401-SDA	Solvent Deasphalting	P-1248	P	Seal	Blank	Asphalt	Asphalt	N	N	G	73	0	NA
C-401-20540-P	0401-SDA	Solvent Deasphalting	P-1248	C	Pump Housing	Blank	Asphalt	Asphalt	N	N	G	73	0	NA
C-401-20559-P	0401-SDA	Solvent Deasphalting	P-134	P	Seal	Blank	Wash Oil	Light Cycle Oil	N	N	G	435	65	NA
C-401-20559-P	0401-SDA	Solvent Deasphalting	P-134	C	Pump Housing	Blank	Wash Oil	Light Cycle Oil	N	N	G	435	65	NA
C-401-20612-P	0401-SDA	Solvent Deasphalting	P-150	P	Seal	Blank	Wash Oil	Light Cycle Oil	N	N	G	69	80	NA
C-401-20612-P	0401-SDA	Solvent Deasphalting	P-150	C	Pump Housing	Blank	Wash Oil	Light Cycle Oil	N	N	G	69	80	NA
C-401-20630-P	0401-SDA	Solvent Deasphalting	P-151	C	Pump Housing	Blank	Wash Oil	Light Cycle Oil	L	N	G	310	290	NA
C-401-20630-P	0401-SDA	Solvent Deasphalting	P-151	P	Seal	Blank	Wash Oil	Light Cycle Oil	L	N	G	310	290	NA
C-401-20679	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	73	130	UK
C-401-20680	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	73	130	UK
C-401-20680.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Charge Oil	Resid	N	N	G	73	130	NA
C-401-20681	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	81	130	UK
C-401-20681.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	81	130	NA
C-401-20681-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	140	200	UK
C-401-20682	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	123	130	UK
C-401-20682.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	L	N	G	140	46	NA
C-401-20682-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	140	46	UK
C-401-20684.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20684.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20684.9	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20684-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	343	140	UK
C-401-20685.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20685-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	343	140	UK
C-401-20686.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20686.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20686-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	343	140	UK
C-401-20687.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20687.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20687.9	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	343	140	NA
C-401-20687-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	343	140	UK
C-401-20688.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20688.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20688.9	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20688-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	330	140	UK
C-401-20689.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20689.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.25	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20689-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	330	140	UK
C-401-20690.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20690-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	330	140	UK
C-401-20691.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.25	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20691.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20691.8	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	330	140	NA
C-401-20691-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	330	140	UK
C-401-20692.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20692.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20692.9	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20692-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	321	140	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-20693.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20693.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20693-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	321	140	UK
C-401-20694.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20694-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	0.75	Hot Oil	Lube Oil	L	N	G	321	140	UK
C-401-20695.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20695.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20695.9	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20695-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	321	140	UK
C-401-20696.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20696.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20696.9	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20696-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	321	140	UK
C-401-20697.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20697.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20697-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	321	140	UK
C-401-20698.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20698-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	321	140	UK
C-401-20699.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.25	Hot Oil	Lube Oil	L	N	G	321	140	NA
C-401-20699-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	321	140	UK
C-401-20700.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20700.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20700.9	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20700-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	380	20	UK
C-401-20701.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20701-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	380	20	UK
C-401-20702.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20702.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20702-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	380	20	UK
C-401-20703.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.25	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20703.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20703.8	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20703-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.25	Hot Oil	Lube Oil	L	N	G	380	20	UK
C-401-20704.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	380	20	NA
C-401-20704-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	380	20	UK
C-401-20705.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	442	140	NA
C-401-20705.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	442	140	NA
C-401-20705-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	442	140	UK
C-401-20706-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	240	140	UK
C-401-20707-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	12	Hot Oil	Lube Oil	L	N	G	240	140	UK
C-401-20708-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	240	140	UK
C-401-20710-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75		Unknown	L	N	G	145	350	UK
C-401-20716-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	12	Hot Oil	Lube Oil	L	N	G	456	140	UK
C-401-20717.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	456	140	NA
C-401-20717-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	456	140	UK
C-401-20718.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	12	Hot Oil	Lube Oil	L	N	G	456	140	NA
C-401-20718-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Control	12	Hot Oil	Lube Oil	L	N	G	456	140	UK
C-401-20719-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	456	140	UK
C-401-20720-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	18	Hot Oil	Lube Oil	L	N	G	438	120	UK
C-401-20721.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	106	120	NA
C-401-20721.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	106	120	NA
C-401-20721-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	106	120	UK
C-401-20722.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.25	Hot Oil	Lube Oil	L	N	G	106	120	NA
C-401-20722.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	106	120	NA
C-401-20722-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	3 Way	0.25	Hot Oil	Lube Oil	L	N	G	106	120	UK
C-401-20723.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee out	0.75	Hot Oil	Lube Oil	L	N	G	418	120	NA
C-401-20723.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	418	120	NA
C-401-20723-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	418	120	UK
C-401-20724.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	418	120	NA
C-401-20724.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	418	120	NA
C-401-20724-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	418	120	UK
C-401-20725.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Hot Oil	Lube Oil	L	N	G	420	120	NA
C-401-20725-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	8	Hot Oil	Lube Oil	L	N	G	420	120	UK
C-401-20726-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	420	120	UK
C-401-20727.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	105	120	NA
C-401-20727-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	420	120	UK
C-401-20728-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	105	120	UK
C-401-20729-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	105	120	UK
C-401-20730.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Hot Oil	Lube Oil	L	N	G	25	420	NA
C-401-20730-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	8	Hot Oil	Lube Oil	L	N	G	25	420	UK
C-401-20731-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	25	420	UK
C-401-20732-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	25	420	UK
C-401-20762-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	90	140	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-20733.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	25	420	NA
C-401-20733-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	25	420	UK
C-401-20734.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	25	420	NA
C-401-20734-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	25	420	UK
C-401-20735.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	25	197	NA
C-401-20735.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	25	197	NA
C-401-20736.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	25	348	NA
C-401-20736.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Hot Oil	Lube Oil	L	N	G	25	348	NA
C-401-20736-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	25	197	UK
C-401-20737.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	355	148	NA
C-401-20737-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	355	148	UK
C-401-20738.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tee	0.75	Hot Oil	Lube Oil	L	N	G	355	148	NA
C-401-20738.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Hot Oil	Lube Oil	L	N	G	355	148	NA
C-401-20738-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	355	148	UK
C-401-20739-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	8	Hot Oil	Lube Oil	L	N	G	425	148	UK
C-401-20740-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	425	148	UK
C-401-20741.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	425	148	NA
C-401-20741-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	425	148	UK
C-401-20742.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	425	148	NA
C-401-20742-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	425	148	UK
C-401-20743-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	116	148	UK
C-401-20744.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Hot Oil	Lube Oil	L	N	G	471	140	NA
C-401-20744-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	Hot Oil	Lube Oil	L	N	G	417	140	UK
C-401-20745-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	154	140	UK
C-401-20746.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	154	140	NA
C-401-20746-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	154	140	UK
C-401-20747.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	154	140	NA
C-401-20747-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	154	140	UK
C-401-20749-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	154	140	UK
C-401-20750.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	308	140	NA
C-401-20750-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	308	140	UK
C-401-20751.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	308	140	NA
C-401-20751-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	308	140	UK
C-401-20752.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	277	140	NA
C-401-20752-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	277	140	UK
C-401-20753.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	277	140	NA
C-401-20753-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	277	140	UK
C-401-20754-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	8	Hot Oil	Lube Oil	L	N	G	308	140	UK
C-401-20755-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	79	140	UK
C-401-20756.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	79	140	NA
C-401-20756-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	79	140	UK
C-401-20757.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	79	140	NA
C-401-20757-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	79	140	UK
C-401-20758.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	140	140	NA
C-401-20758-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20759-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	8	Hot Oil	Lube Oil	L	N	G	408	140	UK
C-401-20735-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	25	420	UK
C-401-20760-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	98	140	UK
C-401-20761.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	90	140	NA
C-401-20761-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	90	140	UK
C-401-20762.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	90	140	NA
C-401-20763-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	140	140	UK
C-401-20764.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	413	140	NA
C-401-20764-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	413	140	UK
C-401-20765.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.75	Hot Oil	Lube Oil	L	N	G	413	140	NA
C-401-20765.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Hot Oil	Lube Oil	L	N	G	413	140	NA
C-401-20765-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	413	140	UK
C-401-20768-P	0401-SDA	Solvent Deasphalting	P-140A	P	Seal	Blank	DAO Product	Deasphalted Oil	N	N	G	354	210	NA
C-401-20768-P	0401-SDA	Solvent Deasphalting	P-140A	C	Pump Housing	Blank	DAO Product	Deasphalted Oil	N	N	G	354	210	NA
C-401-20769.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	DAO	Deasphalted Oil	L	N	G	265	200	NA
C-401-20769-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	DAO	Deasphalted Oil	L	N	G	265	200	UK
C-401-20770.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	DAO	Deasphalted Oil	L	N	G	363	200	NA
C-401-20770-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	363	200	UK
C-401-20771.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	363	200	NA
C-401-20771-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	363	200	UK
C-401-20772.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	162	200	NA
C-401-20772-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	162	200	UK
C-401-20773.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	DAO	Deasphalted Oil	L	N	G	362	200	NA
C-401-20773-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	6	DAO	Deasphalted Oil	L	N	G	362	200	UK
C-401-20774-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	162	200	UK
C-401-20775-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	DAO	Deasphalted Oil	L	N	G	70	200	UK
C-401-20776.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1	DAO	Deasphalted Oil	L	N	G	70	200	NA
C-401-20776-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	70	200	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-20777-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	DAO	Deasphalted Oil	L	N	G	363	200	UK
C-401-20777-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	70	200	UK
C-401-20778-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	DAO	Deasphalted Oil	L	N	G	110	200	UK
C-401-20779-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Butterfly	10	DAO	Deasphalted Oil	L	N	G	410	200	UK
C-401-20780-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	139	4	UK
C-401-20781.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	L	N	G	139	4	NA
C-401-20781-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	139	4	UK
C-401-20782.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	139	4	NA
C-401-20782-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	139	4	UK
C-401-20784.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	L	N	G	81	200	NA
C-401-20784-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	81	200	UK
C-401-20785-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	DAO	Deasphalted Oil	L	N	G	81	200	UK
C-401-20786.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1	DAO	Deasphalted Oil	L	N	G	81	200	NA
C-401-20786-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	81	200	UK
C-401-20787-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	81	200	UK
C-401-20788-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	DAO	Deasphalted Oil	L	N	G	81	200	UK
C-401-20789.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	L	N	G	80	200	NA
C-401-20789-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	80	200	UK
C-401-20790.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	DAO	Deasphalted Oil	L	N	G	77	200	NA
C-401-20790-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	DAO	Deasphalted Oil	L	N	G	77	200	UK
C-401-20791-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	77	200	UK
C-401-20792-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	185	0	UK
C-401-20793.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	L	N	G	185	0	NA
C-401-20793-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	185	0	UK
C-401-20794.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	185	0	NA
C-401-20794-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	185	0	UK
C-401-20795-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	200	200	UK
C-401-20796.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	180	200	NA
C-401-20796.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	180	200	NA
C-401-20796-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	180	200	UK
C-401-20797-P	0401-SDA	Solvent Deasphalting	P-140	P	Seal	Blank	DAO Product	Deasphalted Oil	N	N	G	393	340	NA
C-401-20797-P	0401-SDA	Solvent Deasphalting	P-140	C	Pump Housing	Blank	DAO Product	Deasphalted Oil	N	N	G	393	340	NA
C-401-20798.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	294	46	NA
C-401-20798-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	294	46	UK
C-401-20799-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	276	46	UK
C-401-20800-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	140	46	UK
C-401-20802.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	DAO	Deasphalted Oil	L	N	G	396	28	NA
C-401-20802-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	358	46	UK
C-401-20803-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	140	46	UK
C-401-20804-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	140	46	UK
C-401-20805.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	140	46	NA
C-401-20805-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	140	46	UK
C-401-20807.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75		Unknown	L	N	G	84	350	NA
C-401-20807.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	DAO	Deasphalted Oil	L	N	G	84	350	NA
C-401-20807.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	L	N	G	84	350	NA
C-401-20807-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	84	350	UK
C-401-20808-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	L	N	G	84	350	UK
C-401-20809-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1		Unknown	L	N	G	84	350	UK
C-401-20810-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75		Unknown	L	N	G	73	350	UK
C-401-20811.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75		Unknown	L	N	G	78	350	NA
C-401-20811-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75		Unknown	L	N	G	78	350	UK
C-401-20812-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5		Unknown	L	N	G	148	350	UK
C-401-20815.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75		Unknown	L	N	G	402	350	NA
C-401-20815-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75		Unknown	L	N	G	402	350	UK
C-401-20816.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.5		Unknown	L	N	G	360	350	NA
C-401-20816-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75		Unknown	L	N	G	360	350	UK
C-401-20817.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8		Unknown	L	N	G	360	350	NA
C-401-20817-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8		Unknown	L	N	G	360	350	UK
C-401-20818-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3		Unknown	L	N	G	160	350	UK
C-401-20912-P	0401-SDA	Solvent Deasphalting	P-103	P	Seal	Blank	SDA Feed	Resid	N	N	G	310	630	NA
C-401-20912-P	0401-SDA	Solvent Deasphalting	P-103	C	Pump Housing	Blank	SDA Feed	Resid	N	N	G	310	630	NA
C-401-20933	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	Charge Oil	Resid	N	N	G	191	130	UK
C-401-20933.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	Charge Oil	Resid	N	N	G	191	130	NA
C-401-20950-P	0401-SDA	Solvent Deasphalting	P-102A	C	Pump Housing	Blank	SDA Feed	Resid	L	N	G	293	700	NA
C-401-20950-P	0401-SDA	Solvent Deasphalting	P-102A	P	Seal	Blank	SDA Feed	Resid	L	N	G	293	700	NA
C-401-20965	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	91	70	UK
C-401-20965.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	91	70	NA
C-401-20967	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	91	70	UK
C-401-20969	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	91	70	UK
C-401-20969	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	Charge Oil	Resid	N	N	G	91	70	NA
C-401-20970	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	205	70	UK
C-401-20970.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	Charge Oil	Resid	N	N	G	205	70	NA
C-401-20971	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	86	70	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-20971.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	86	70	NA
C-401-20972	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	205	70	UK
C-401-20972.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	205	70	NA
C-401-20973	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	205	70	UK
C-401-20974	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	Charge Oil	Resid	N	N	G	205	70	UK
C-401-20974.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	Charge Oil	Resid	N	N	G	205	70	NA
C-401-20977	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Charge Oil	Resid	N	N	G	77	70	UK
C-401-20977.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1	Charge Oil	Resid	N	N	G	77	135	NA
C-401-20988	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	226	890	UK
C-401-20988.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	Charge Oil	Resid	N	N	G	226	890	NA
C-401-20989	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	226	890	UK
C-401-20996	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	181	890	UK
C-401-20996.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	181	890	NA
C-401-20999	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	210	140	UK
C-401-20999.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	Charge Oil	Resid	N	N	G	210	140	NA
C-401-21200.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	Charge Oil	Resid	N	N	P	93	105	NA
C-401-21008	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	P	100	120	UK
C-401-21008.1	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	P	100	120	NA
C-401-21009	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	P	100	120	UK
C-401-21009.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	P	100	120	NA
C-401-21012	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	90	120	UK
C-401-21013	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	89	120	UK
C-401-21013.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	89	120	NA
C-401-21014	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	80	120	UK
C-401-21014.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	Charge Oil	Resid	N	N	G	80	120	NA
C-401-21015	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	Charge Oil	Resid	N	N	G	137	120	UK
C-401-21015.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Charge Oil	Resid	N	N	G	137	120	NA
C-401-21016	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	100	120	UK
C-401-21017	South Isomax	Hydrotreater and Hydrocracker	SDA	V	1/4 Turn	0.75	Charge Oil	Resid	N	N	G	203	120	UK
C-401-21018	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	203	120	UK
C-401-21019	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	203	120	UK
C-401-21023	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	115	890	UK
C-401-21024	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	115	890	UK
C-401-21024.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	115	890	NA
C-401-21025	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	115	890	UK
C-401-21025.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	Charge Oil	Resid	N	N	G	115	890	NA
C-401-21026	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	182	890	UK
C-401-21027	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	8	Charge Oil	Resid	N	N	G	291	890	UK
C-401-21027.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Charge Oil	Resid	N	N	G	291	890	NA
C-401-21028	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	Charge Oil	Resid	N	N	G	148	890	UK
C-401-21101-P	0401-SDA	Solvent Deasphalting	P-135	P	Seal	Blank	Hot Oil	Lube Oil	N	N	G	318	45	NA
C-401-21101-P	0401-SDA	Solvent Deasphalting	P-135	C	Pump Housing	Blank	Hot Oil	Lube Oil	N	N	G	318	45	NA
C-401-21192	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	P	115	90	UK
C-401-21119-P	0401-SDA	Solvent Deasphalting	P-135A	C	Pump Housing	Blank	Hot Oil	Lube Oil	L	N	G	471	70	NA
C-401-21119-P	0401-SDA	Solvent Deasphalting	P-135A	P	Seal	Blank	Hot Oil	Lube Oil	L	N	G	471	70	NA
C-401-21172	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Asphalt	Asphalt	N	N	G	145	75	UK
C-401-21178-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5		Unknown	L	N	G	127	350	UK
C-401-21181	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	104	150	UK
C-401-21182	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	140	690	UK
C-401-21182.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1	Charge Oil	Resid	N	N	G	228	690	NA
C-401-21191	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	Charge Oil	Resid	N	N	P	90	105	UK
C-401-21191.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Charge Oil	Resid	N	N	P	90	105	NA
C-401-21192.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	P	115	90	NA
C-401-21193	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	LCO	Light Cycle Oil	N	N	P	100	90	UK
C-401-21193.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Union	1.5	WASH OIL	Light Cycle Oil	N	N	P	80	90	NA
C-401-21964	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	108	890	UK
C-401-21964.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	Charge Oil	Resid	N	N	G	108	890	NA
C-401-21965	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	143	890	UK
C-401-21965.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	Charge Oil	Resid	N	N	G	143	890	NA
C-401-21966	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	143	890	UK
C-401-21966.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	143	890	NA
C-401-21967	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	143	890	UK
C-401-21967.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	143	890	NA
C-401-21198	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	P	95	110	UK
C-401-21198.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75		Unknown	N	N	P	95	110	NA
C-401-21983	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	114	890	UK
C-401-21983.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1	Charge Oil	Resid	N	N	G	182	890	NA
C-401-21199	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	Charge Oil	Resid	N	N	P	91	100	UK
C-401-21199.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	Charge Oil	Resid	N	N	P	91	100	NA
C-401-21200	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	3	Charge Oil	Resid	N	N	P	93	105	UK
C-401-21202	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	VGO	Vacuum Gas Oil	N	N	P	93	110	UK
C-401-21202.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	VGO	Vacuum Gas Oil	N	N	P	93	110	NA
C-401-21203	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	VGO	Vacuum Gas Oil	N	N	P	115	45	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-21203.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	VGO	Vacuum Gas Oil	N	N	P	115	45	NA
C-401-21204	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	2	VGO	Vacuum Gas Oil	N	N	P	115	45	UK
C-401-21204.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	VGO	Vacuum Gas Oil	N	N	P	115	45	NA
C-401-21205	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	VGO	Vacuum Gas Oil	N	N	P	115	45	UK
C-401-21205.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	VGO	Vacuum Gas Oil	N	N	P	115	45	NA
C-401-21206	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	Charge Oil	Resid	N	N	P	186	90	UK
C-401-21206.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Charge Oil	Resid	N	N	P	186	90	NA
C-401-21207	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	Charge Oil	Resid	N	N	P	80	90	UK
C-401-21207.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Charge Oil	Resid	N	N	P	80	90	NA
C-401-21208	South Isomax	Hydrotreater and Hydrocracker	SDA	PRD		0.75	Charge Oil	Resid	N	N	P	93	90	NA
C-401-21208.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Union	0.75	Charge Oil	Resid	N	N	P	93	90	NA
C-401-21209	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	P	85	90	UK
C-401-21209.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Union	0.75	Charge Oil	Resid	N	N	P	85	90	NA
C-401-21210	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	WASH OIL	Light Cycle Oil	N	N	P	115	160	UK
C-401-21210.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Union	2	WASH OIL	Light Cycle Oil	N	N	P	91	160	NA
C-401-21211	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	DAO	Deasphalted Oil	N	N	P	138	160	UK
C-401-21211.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Union	1.5	DAO	Deasphalted Oil	N	N	P	138	160	NA
C-401-21212	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	8	DAO	Deasphalted Oil	N	N	P	194	160	UK
C-401-21212.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	DAO	Deasphalted Oil	N	N	P	194	160	NA
C-401-21214	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	DAO	Deasphalted Oil	N	N	P	138	160	UK
C-401-21214.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	1	DAO	Deasphalted Oil	N	N	P	138	160	NA
C-401-21215	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	DAO	Deasphalted Oil	N	N	P	358	160	UK
C-401-21215.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	DAO	Deasphalted Oil	N	N	P	358	160	NA
C-401-21216	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	LCO	Light Cycle Oil	N	N	P	79	290	UK
C-401-21216.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	LCO	Light Cycle Oil	N	N	P	79	290	NA
C-401-21218	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	WASH OIL	Light Cycle Oil	N	N	P	85	280	UK
C-401-21222	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	4	DAO	Deasphalted Oil	N	N	P	91	160	UK
C-401-21222.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	DAO	Deasphalted Oil	N	N	P	91	160	NA
C-401-21223	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.5	DAO	Deasphalted Oil	N	N	P	91	160	UK
C-401-21223.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Elbow	0.5	DAO	Deasphalted Oil	N	N	P	91	160	NA
C-401-21224	South Isomax	Hydrotreater and Hydrocracker	SDA	PRD		1	DAO	Deasphalted Oil	N	N	P	91	160	NA
C-401-21224.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	1	DAO	Deasphalted Oil	N	N	P	91	160	NA
C-401-21240	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	WASH OIL	Light Cycle Oil	N	N	G	80	130	UK
C-401-21240.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	WASH OIL	Light Cycle Oil	N	N	G	80	130	NA
C-401-21243	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	275	130	UK
C-401-21243.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	275	130	NA
C-401-21244	South Isomax	Hydrotreater and Hydrocracker	SDA	V	MOV	10	Charge Oil	Resid	N	N	G	176	130	UK
C-401-21244.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	Charge Oil	Resid	N	N	G	275	130	NA
C-401-21244	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	Charge Oil	Resid	N	N	G	275	130	UK
C-401-21245	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	275	130	UK
C-401-21245.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	Charge Oil	Resid	N	N	G	275	130	NA
C-401-21257.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	MCO	Medium Cycle Oil	L	N	P	88	12	NA
C-401-21257-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	MCO	Medium Cycle Oil	L	N	P	88	12	UK
C-401-21258.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	MCO	Medium Cycle Oil	L	N	P	88	12	NA
C-401-21258-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	MCO	Medium Cycle Oil	L	N	P	88	12	UK
C-401-21259-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	MCO	Medium Cycle Oil	L	N	P	79	12	UK
C-401-21260.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	HGO	Heavy Gas Oil	L	N	P	82	0	NA
C-401-21260-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	HGO	Heavy Gas Oil	L	N	P	82	0	UK
C-401-21261.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	HGO	Heavy Gas Oil	L	N	P	82	0	NA
C-401-21261-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	HGO	Heavy Gas Oil	L	N	P	82	0	UK
C-401-21262.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	HGO	Heavy Gas Oil	L	N	P	82	0	NA
C-401-21262.6	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	HGO	Heavy Gas Oil	L	N	P	82	0	NA
C-401-21262-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	HGO	Heavy Gas Oil	L	N	P	82	0	UK
C-401-21263.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	LCO	Light Cycle Oil	L	N	P	70	16	NA
C-401-21263-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	2	LCO	Light Cycle Oil	L	N	P	70	16	UK
C-401-21264.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	LCO	Light Cycle Oil	L	N	P	70	16	NA
C-401-21264-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	3	LCO	Light Cycle Oil	L	N	P	70	16	UK
C-401-21265.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	LCO	Light Cycle Oil	L	N	P	70	0	NA
C-401-21265-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	L	N	P	70	0	UK
C-401-21266.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	LCO	Light Cycle Oil	L	N	P	70	0	NA
C-401-21266-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	L	N	P	70	0	UK
C-401-21267-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	4	DAO	Deasphalted Oil	L	N	P	70	16	UK
C-401-21268-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	4	DAO	Deasphalted Oil	L	N	P	170	16	UK
C-401-21270.2	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	L	N	P	88	16	NA
C-401-21270-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Hand Valve	0.75	DAO	Deasphalted Oil	L	N	P	88	16	UK
C-401-21817	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	118	80	UK
C-401-21818	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Needle	0.375	Hot Oil	Lube Oil	N	N	G	300	80	UK
C-401-21818.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Tube Fitting	0.375	Hot Oil	Lube Oil	N	N	G	300	80	NA
C-401-21819	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Needle	0.375	Hot Oil	Lube Oil	N	N	G	72	80	UK
C-401-21819	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	0.75	Hot Oil	Lube Oil	N	N	G	76	80	UK
C-401-21819.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Cap	0.375	Hot Oil	Lube Oil	N	N	G	72	80	NA
C-401-21819.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	76	80	NA
C-401-21820	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Hot Oil	Lube Oil	N	N	G	335	80	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-21820.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1	Hot Oil	Lube Oil	N	N	G	335	80	NA
C-401-21821	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1	Hot Oil	Lube Oil	N	N	G	336	80	UK
C-401-21821.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1	Hot Oil	Lube Oil	N	N	G	336	80	NA
C-401-21822	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Needle	0.5	Hot Oil	Lube Oil	N	N	G	300	80	UK
C-401-21822.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.5	Hot Oil	Lube Oil	N	N	G	300	80	NA
C-401-21851	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Control	1.5	LCO	Light Cycle Oil	N	N	G	116	15	UK
C-401-21851.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	LCO	Light Cycle Oil	N	N	G	116	15	NA
C-401-21852	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	115	15	UK
C-401-21852.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	115	15	NA
C-401-21853	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	4	LCO	Light Cycle Oil	N	N	G	115	15	UK
C-401-21853.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	LCO	Light Cycle Oil	N	N	G	115	15	NA
C-401-21854	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	2	LCO	Light Cycle Oil	N	N	G	115	15	UK
C-401-21854.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	2	LCO	Light Cycle Oil	N	N	G	115	15	NA
C-401-21855	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	4	LCO	Light Cycle Oil	N	N	G	115	15	UK
C-401-21855.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	LCO	Light Cycle Oil	N	N	G	115	15	NA
C-401-21856	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	115	15	UK
C-401-21856.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	115	15	NA
C-401-21857	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	67	15	UK
C-401-21858	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	64	15	UK
C-401-21858.5	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Cap	0.75	LCO	Light Cycle Oil	N	N	G	64	15	NA
C-401-21859	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	64	15	UK
C-401-21859.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	64	15	NA
C-401-21860.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	10	AS	Asphalt	L	N	G	321	16	NA
C-401-21860-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Control	10	AS	Asphalt	L	N	G	321	16	UK
C-401-21861.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Threaded	0.75	AS	Asphalt	L	N	G	123	16	NA
C-401-21861-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	G	123	16	UK
C-401-21862.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	10	AS	Asphalt	L	N	G	260	16	NA
C-401-21862-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	10	AS	Asphalt	L	N	G	260	16	UK
C-401-21863-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	G	214	16	UK
C-401-21864	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	10	AS	Asphalt	L	N	G	289	16	UK
C-401-21864.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	10	AS	Asphalt	L	N	G	289	16	NA
C-401-21865.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	10	AS	Asphalt	L	N	G	363	16	NA
C-401-21865-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Control	10	AS	Asphalt	L	N	G	363	16	UK
C-401-21866.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	10	AS	Asphalt	L	N	G	350	16	NA
C-401-21866-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	10	AS	Asphalt	L	N	G	350	16	UK
C-401-21869.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	10	AS	Asphalt	L	N	G	290	16	NA
C-401-21869-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	10	AS	Asphalt	L	N	G	290	16	UK
C-401-21870.2	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Plug	0.75	AS	Asphalt	L	N	G	150	16	NA
C-401-21870-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	G	150	16	UK
C-401-21871.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	10	AS	Asphalt	L	N	G	235	16	NA
C-401-21871-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	10	AS	Asphalt	L	N	G	235	16	UK
C-401-21872-V	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	10	AS	Asphalt	L	N	G	235	16	UK
C-401-21876	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Control	3	DAO	Deasphalted Oil	N	N	G	105	181	UK
C-401-21876.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	DAO	Deasphalted Oil	N	N	G	105	181	NA
C-401-21878	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	4	DAO	Deasphalted Oil	N	N	G	81	181	UK
C-401-21878.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	DAO	Deasphalted Oil	N	N	G	81	181	NA
C-401-21879	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	3	DAO	Deasphalted Oil	N	N	G	81	181	UK
C-401-21879.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	3	DAO	Deasphalted Oil	N	N	G	81	181	NA
C-401-21880	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	4	DAO	Deasphalted Oil	N	N	G	81	181	UK
C-401-21880.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	4	DAO	Deasphalted Oil	N	N	G	81	181	NA
C-401-21881	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	N	N	G	81	181	UK
C-401-21881.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	N	N	G	81	181	NA
C-401-21882-P	0401-SDA	Solvent Deasphalting	P-2530	P	Seal	Unknown	Asphalt	Asphalt	N	N	G	402	95	NA
C-401-21882-P	0401-SDA	Solvent Deasphalting	P-2530	C	Pump Housing	Unknown	Asphalt	Asphalt	N	N	G	402	95	NA
C-401-21883	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Tar	Tar	N	N	G	291	15	UK
C-401-21883.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Elbow	0.75	Tar	Tar	N	N	G	291	15	NA
C-401-21884	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Tar	Tar	N	N	G	174	360	UK
C-401-21885	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	8	Tar	Tar	N	N	G	330	360	UK
C-401-21885.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	8	Tar	Tar	N	N	G	330	360	NA
C-401-21886	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Tar	Tar	N	N	G	150	360	UK
C-401-21887	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	6	Tar	Tar	N	N	G	357	15	UK
C-401-21887.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	6	Tar	Tar	N	N	G	357	15	NA
C-401-21889	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Tar	Tar	N	N	G	221	15	UK
C-401-21890	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Tar	Tar	N	N	G	151	15	UK
C-401-21896	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	141	95	UK
C-401-21896.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.5	LCO	Light Cycle Oil	N	N	G	120	95	NA
C-401-21897	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	141	95	UK
C-401-21897.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Elbow	0.75	LCO	Light Cycle Oil	N	N	G	141	95	NA
C-401-21898	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	141	95	UK
C-401-21898.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Elbow	0.75	LCO	Light Cycle Oil	N	N	G	141	95	NA
C-401-21899	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Globe	0.75	LCO	Light Cycle Oil	N	N	G	80	95	UK
C-401-21899.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	80	95	NA
C-401-21900	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	80	95	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-401-21900.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.75	LCO	Light Cycle Oil	N	N	G	80	95	NA
C-401-21900.4	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.75	LCO	Light Cycle Oil	N	N	G	80	95	NA
C-401-21901	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.5	LCO	Light Cycle Oil	N	N	G	80	115	UK
C-401-21901.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.5	LCO	Light Cycle Oil	N	N	G	80	115	NA
C-401-21902.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Threaded	0.5	LCO	Light Cycle Oil	N	N	G	80	115	NA
C-401-21904	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	80	360	UK
C-401-21905	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	80	360	UK
C-401-21905.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Pressure Indicator/Gauge (	0.5	LCO	Light Cycle Oil	N	N	G	80	360	NA
C-401-21906	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	80	360	UK
C-401-21906.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	0.75	LCO	Light Cycle Oil	N	N	G	80	360	NA
C-401-21908	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	DAO	Deasphalted Oil	N	N	G	81	181	UK
C-401-21908.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Plug	0.75	DAO	Deasphalted Oil	N	N	G	81	181	NA
C-401-21915-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	G	103	650	UK
C-401-21916	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	141	690	UK
C-401-21916.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	6	AS	Asphalt	L	N	G	68	650	NA
C-401-21916.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	Charge Oil	Resid	N	N	G	141	690	NA
C-401-21916-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	6	AS	Asphalt	L	N	G	68	650	UK
C-401-21917.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	6	AS	Asphalt	L	N	G	68	650	NA
C-401-21917-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	6	AS	Asphalt	L	N	G	68	650	UK
C-401-21928	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	10	AS	Asphalt	L	N	P	338	13	UK
C-401-21928.2	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	0.75	AS	Asphalt	L	N	P	338	13	NA
C-401-21929-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Ball	0.75	AS	Asphalt	L	N	P	338	13	UK
C-401-21931-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	10	AS	Asphalt	L	N	P	156	13	Y
C-401-21932.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Threaded	0.75	AS	Asphalt	L	N	P	93	13	NA
C-401-21932.6	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Union	0.75	AS	Asphalt	L	N	P	93	13	NA
C-401-21932-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	P	93	13	UK
C-401-21933-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	P	82	13	UK
C-401-21934.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Plug	0.75	AS	Asphalt	L	N	P	80	13	NA
C-401-21934-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	P	80	13	UK
C-401-21935.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Flange	2	AS	Asphalt	L	N	P	164	650	NA
C-401-21935-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	2	AS	Asphalt	L	N	P	164	650	UK
C-401-21936.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Union	0.75	AS	Asphalt	L	N	G	363	16	NA
C-401-21936.6	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	90 in	0.75	AS	Asphalt	L	N	G	363	16	NA
C-401-21936-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Ball	0.75	AS	Asphalt	L	N	G	363	16	UK
C-401-21937.11	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Union in	0.75	AS	Asphalt	L	N	G	82	16	NA
C-401-21937.2	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Threaded	0.75	AS	Asphalt	L	N	G	82	16	NA
C-401-21937.5	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	90 out	0.75	AS	Asphalt	L	N	G	82	16	NA
C-401-21937.8	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Tee	0.75	AS	Asphalt	L	N	G	82	16	NA
C-401-21937-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	G	82	16	UK
C-401-21938.1	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Threaded	0.25	AS	Asphalt	L	N	P	83	13	NA
C-401-21938.10	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Coupling	0.25	AS	Asphalt	L	N	P	83	13	NA
C-401-21938.4	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Tube Fitting	0.25	AS	Asphalt	L	N	P	83	13	NA
C-401-21938.7	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Plug	0.25	AS	Asphalt	L	N	P	83	13	NA
C-401-21938-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Needle	0.25	AS	Asphalt	L	N	P	83	13	UK
C-401-21940.3	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	C	Threaded	0.75	AS	Asphalt	L	N	G	122	16	NA
C-401-21940-V	South Isomax	Hydrotreater and Hydrocracker	Tar Stripper	V	Gate	0.75	AS	Asphalt	L	N	G	122	16	UK
C-401-21956	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	1.5	Charge Oil	Resid	N	N	G	110	150	UK
C-401-21956.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	Charge Oil	Resid	N	N	G	110	150	NA
C-401-21957	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	2	Charge Oil	Resid	N	N	G	97	150	UK
C-401-21957.3	South Isomax	Hydrotreater and Hydrocracker	SDA	C	Flange	1.5	Charge Oil	Resid	N	N	G	97	150	NA
C-401-21959	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Gate	0.75	Charge Oil	Resid	N	N	G	80	150	UK
C-401-21902	South Isomax	Hydrotreater and Hydrocracker	SDA	V	Check	0.5	LCO	Light Cycle Oil	N	N	G	80	115	UK
C-402-200019-P	0402-H2 Mfg	Hydrogen Production	P-335A	P	Seal	Unknown	MEA Stripper Reflux	Amine	L	N	G	81	10	NA
C-402-200019-P	0402-H2 Mfg	Hydrogen Production	P-335A	C	Pump Housing	Unknown	MEA Stripper Reflux	Amine	L	N	G	81	10	NA
C-402-20010-P	0402-H2 Mfg	Hydrogen Production	P-335A	P	Seal	Unknown	MEA Stripper Reflux	Amine	N	N	G	100	10	NA
C-402-20010-P	0402-H2 Mfg	Hydrogen Production	P-335A	C	Pump Housing	Unknown	MEA Stripper Reflux	Amine	N	N	G	100	10	NA
C-402-20088-P	0402-H2 Mfg	Hydrogen Production	P-336	P	Seal	Blank	MEA	Amine	N	N	G	62	0	NA
C-402-20088-P	0402-H2 Mfg	Hydrogen Production	P-336	C	Pump Housing	Unknown	MEA	Amine	N	N	G	62	0	NA
C-402-20101-P	0402-H2 Mfg	Hydrogen Production	P-332A	P	Seal	Unknown	Lean MEA	Amine	L	N	G	178	35	NA
C-402-20101-P	0402-H2 Mfg	Hydrogen Production	P-332A	C	Pump Housing	Unknown	Lean MEA	Amine	L	N	G	178	35	NA
C-402-20121-P	0402-H2 Mfg	Hydrogen Production	P-332	P	Seal	Unknown	Lean MEA	Amine	N	N	G	102	30	NA
C-402-20121-P	0402-H2 Mfg	Hydrogen Production	P-332	C	Pump Housing	Unknown	Lean MEA	Amine	N	N	G	102	30	NA
C-403-20006-P	0403-TKC REACT	Hydrotreater and Hydrocracker	P-400	P	Seal	Blank	VGO Feed	Gas Oil	N	N	G	73	0	NA
C-403-20006-P	0403-TKC REACT	Hydrotreater and Hydrocracker	P-400	C	Pump Housing	Unknown	VGO Feed	Gas Oil	N	N	G	73	0	NA
C-403-20019-P	0403-TKC REACT	Hydrotreater and Hydrocracker	P-400A	P	Seal	Blank	VGO Feed	Gas Oil	L	N	G	129	265	NA
C-403-20019-P	0403-TKC REACT	Hydrotreater and Hydrocracker	P-400A	C	Pump Housing	Unknown	VGO Feed	Gas Oil	L	N	G	129	265	NA
C-403-20222-P	0406-ISO DIST	Gas Recovery	P-713A	P	Seal	Blank	TKC FRAC BTMS	Gas Oil (Cracked)	L	N	G	382	150	NA
C-403-20222-P	0406-ISO DIST	Gas Recovery	P-713A	C	Pump Housing	Unknown	TKC FRAC BTMS	Gas Oil (Cracked)	L	N	G	382	150	NA
C-403-20236-P	0406-ISO DIST	Gas Recovery	P-713	P	Seal	Blank	TKC FRAC BTMS	Gas Oil (Cracked)	L	N	G	528	225	NA
C-403-20236-P	0406-ISO DIST	Gas Recovery	P-713	C	Pump Housing	Unknown	TKC FRAC BTMS	Gas Oil (Cracked)	L	N	G	528	225	NA
C-404-20001-P	0404-TKN REACTION	Catalytic Cracking	P-5011A	P	Seal	Blank	TKN Feed	Medium Cycle Oil	N	N	G	82	80	NA
C-404-20001-P	0404-TKN REACTION	Catalytic Cracking	P-5011A	C	Pump Housing	Unknown	TKN Feed	Medium Cycle Oil	N	N	G	82	80	NA
C-404-20009-P	0404-TKN REACTION	Catalytic Cracking	P-5011	P	Seal	Blank	TKN Feed	Medium Cycle Oil	L	N	G	62	40	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-404-20009-P	0404-TKN REACTION	Catalytic Cracking	P-5011	C	Pump Housing	Unknown	TKN Feed	Medium Cycle Oil	L	N	G	62	40	NA
C-404-20201-P	0404-TKN REACTION	Catalytic Cracking	P-501	P	Seal	Blank	TKN Feed	Medium Cycle Oil	N	N	G	149	60	NA
C-404-20201-P	0404-TKN REACTION	Catalytic Cracking	P-501	C	Pump Housing	Unknown	TKN Feed	Medium Cycle Oil	N	N	G	149	60	NA
C-404-20228-P	0404-TKN REACTION	Catalytic Cracking	P-501B	P	Seal	Blank	TKN Feed	Medium Cycle Oil	L	N	G	260	80	NA
C-404-20228-P	0404-TKN REACTION	Catalytic Cracking	P-501B	C	Pump Housing	Unknown	TKN Feed	Medium Cycle Oil	L	N	G	260	80	NA
C-406-20051-P	0406-ISO DIST	Gas Recovery	P-737A	P	Seal	Blank	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	35	503	NA
C-406-20051-P	0406-ISO DIST	Gas Recovery	P-737A	C	Pump Housing	Unknown	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	35	503	NA
C-406-20078-P	0406-ISO DIST Gas RCVY	Gas Recovery	P-737	P	Seal	Blank	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	621	37	NA
C-406-20078-P	0406-ISO DIST Gas RCVY	Gas Recovery	P-737	C	Pump Housing	Unknown	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	621	37	NA
C-406-20108-P	0406-ISO DIST	Gas Recovery	P-733A	P	Seal	Blank	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	88	130	NA
C-406-20108-P	0406-ISO DIST	Gas Recovery	P-733A	C	Pump Housing	Unknown	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	88	130	NA
C-406-20126-P	0406-ISO DIST	Gas Recovery	P-733	P	Seal	Blank	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	50	144	NA
C-406-20126-P	0406-ISO DIST	Gas Recovery	P-733	C	Pump Housing	Unknown	ISO Splitter BTMS	Hydrocracked Distillates, Heavy	L	N	G	50	144	NA
C-410-20001-P	0410-MISC UTIL	Utilities	P-2540	P	Seal	Blank	MEA	Amine	L	N	G	0	57	NA
C-410-20001-P	0410-MISC UTIL	Utilities	P-2540	C	Pump Housing	Unknown	MEA	Amine	L	N	G	0	57	NA
C-412-20058-P	0412-4H2S Plant	Gas Recovery	P-1026	P	Seal	Blank	Lean DEA	Amine	N	N	G	57	250	NA
C-412-20058-P	0412-4H2S Plant	Gas Recovery	P-1026	C	Pump Housing	Unknown	Lean DEA	Amine	N	N	G	57	250	NA
C-412-20064-P	0412-4H2S Plant	Gas Recovery	P-1026A	P	Seal	Blank	Lean DEA	Amine	L	N	G	88	280	NA
C-412-20064-P	0412-4H2S Plant	Gas Recovery	P-1026A	C	Pump Housing	Unknown	Lean DEA	Amine	L	N	G	88	280	NA
C-414-20101-P	0414-LT NEU H	Hydrocracker	P-1101A	P	Seal	Blank	LNC Reactor Feed	Vacuum Tower Bottoms	N	N	G	261	2	NA
C-414-20101-P	0414-LT NEU H	Hydrocracker	P-1101A	C	Pump Housing	Blank	LNC Reactor Feed	Vacuum Tower Bottoms	N	N	G	261	2	NA
C-414-20105-P	0414-LT NEU H	Hydrocracker	P-1101	P	Seal	Blank	LNC Reactor Feed	Vacuum Tower Bottoms	L	N	G	364	16	NA
C-414-20105-P	0414-LT NEU H	Hydrocracker	P-1101	C	Pump Housing	Blank	LNC Reactor Feed	Vacuum Tower Bottoms	L	N	G	364	16	NA
C-414-20173-P	0414-LT NEU H	Hydrocracker	P-1191	P	Seal	Unknown	VGO	Vacuum Gas Oil	N	N	G	134	0	NA
C-414-20173-P	0414-LT NEU H	Hydrocracker	P-1191	C	Pump Housing	Unknown	VGO	Vacuum Gas Oil	N	N	G	134	0	NA
C-415-20339-P	0415-LT NEU H/C	Hydrocracker	P-1205A	P	Seal	Blank	LNC ATM Bottoms	Atmospheric Tower Bottoms	L	N	G	464	150	NA
C-415-20339-P	0415-LT NEU H/C	Hydrocracker	P-1205A	C	Pump Housing	Blank	LNC ATM Bottoms	Atmospheric Tower Bottoms	L	N	G	464	150	NA
C-415-20359-P	0415-LT NEU H/C	Hydrocracker	P-1205A	P	Seal	Blank	LNC ATM Bottoms	Atmospheric Tower Bottoms	N	N	G	546	150	NA
C-415-20359-P	0415-LT NEU H/C	Hydrocracker	P-1205A	C	Pump Housing	Blank	LNC ATM Bottoms	Atmospheric Tower Bottoms	N	N	G	546	150	NA
C-415-20373-P	0415-LT NEU H/C	Hydrocracker	P-1265A	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	L	N	G	372	350	NA
C-415-20373-P	0415-LT NEU H/C	Hydrocracker	P-1265A	P	Seal	Blank	LNC VAC SC5	Lube Oil	L	N	G	372	350	NA
C-415-20373-P	0415-LT NEU H/C	Hydrocracker	P-1265A	P	Seal	Unknown	LNC VAC SC5	Lube Oil	L	N	G	202	300	NA
C-415-20373-P	0415-LT NEU H/C	Hydrocracker	P-1265A	C	Pump Housing	Unknown	LNC VAC SC5	Lube Oil	L	N	G	202	300	NA
C-415-20393-P	0415-LT NEU H/C	Hydrocracker	P-1265A	P	Seal	Blank	LNC VAC SC5	Lube Oil	N	N	G	138	0	NA
C-415-20393-P	0415-LT NEU H/C	Hydrocracker	P-1265A	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	N	N	G	138	0	NA
C-415-20411-P	0415-LT NEU H/C	Hydrocracker	P-1255A	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	L	N	G	129	0	NA
C-415-20411-P	0415-LT NEU H/C	Hydrocracker	P-1255A	P	Seal	Blank	LNC VAC SC5	Lube Oil	L	N	G	129	0	NA
C-415-20438-P	0415-LT NEU H/C	Hydrocracker	P-1255A	P	Seal	Blank	LNC VAC Bottoms	Vacuum Tower Bottoms	N	N	G	481	310	NA
C-415-20438-P	0415-LT NEU H/C	Hydrocracker	P-1255A	C	Pump Housing	Blank	LNC VAC Bottoms	Vacuum Tower Bottoms	N	N	G	481	310	NA
C-415-20556-P	0415-LT NEU H/C	Hydrocracker	P-1258	P	Seal	Blank	LNC VAC SC5	Lube Oil	L	N	G	110	10	NA
C-415-20556-P	0415-LT NEU H/C	Hydrocracker	P-1258	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	L	N	G	110	10	NA
C-415-20570-P	0415-LT NEU H/C	Hydrocracker	P-1258A	P	Seal	Blank	LNC VAC SC5	Lube Oil	N	N	G	508	85	NA
C-415-20570-P	0415-LT NEU H/C	Hydrocracker	P-1258A	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	N	N	G	508	85	NA
C-415-20594-P	0415-LT NEU H/C	Hydrocracker	P-1249	P	Seal	Blank	LNC VAC SC5	Lube Oil	L	N	G	179	275	NA
C-415-20594-P	0415-LT NEU H/C	Hydrocracker	P-1249	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	L	N	G	179	275	NA
C-415-20595-P	0415-LT NEU H/C	Hydrocracker	P-1248	P	Seal	Blank	LNC VAC SC4	Diesel	N	N	G	129	30	NA
C-415-20595-P	0415-LT NEU H/C	Hydrocracker	P-1248	C	Pump Housing	Blank	LNC VAC SC4	Diesel	N	N	G	129	30	NA
C-415-20627-P	0415-LT NEU H/C	Hydrocracker	P-1249A	P	Seal	Blank	LNC VAC SC5	Lube Oil	L	N	G	163	100	NA
C-415-20627-P	0415-LT NEU H/C	Hydrocracker	P-1249A	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	L	N	G	163	100	NA
C-415-20628-P	0415-LT NEU H/C	Hydrocracker	P-1248A	P	Seal	Blank	LNC VAC SC4	Diesel	N	N	G	268	165	NA
C-415-20628-P	0415-LT NEU H/C	Hydrocracker	P-1248A	C	Pump Housing	Blank	LNC VAC SC4	Diesel	N	N	G	268	165	NA
C-415-20687-P	0415-LT NEU H/C	Hydrocracker	P-1269A	P	Seal	Blank	LNC VAC SC5	Lube Oil	L	N	G	67	0	NA
C-415-20687-P	0415-LT NEU H/C	Hydrocracker	P-1269A	C	Pump Housing	Blank	LNC VAC SC5	Lube Oil	L	N	G	67	0	NA
C-415-20706-P	0415-LT NEU H/C	Hydrocracker	P-1269A	P	Seal	4	LNC VAC SC4	Diesel	N	N	G	70	5	NA
C-415-20706-P	0415-LT NEU H/C	Hydrocracker	P-1269A	C	Pump Housing	Blank	LNC VAC SC4	Diesel	N	N	G	70	5	NA
C-416-20002	LT NEU H/F 13	Hydrotreater		C	Manway	30	Hot Oil	Lube Oil	L	N	G	50	50	NA
C-416-20015-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	160	350	UK
C-416-20016.2	LT NEU H/F 13	Hydrotreater		C	Flange	8	Hot Oil	Lube Oil	L	N	G	519	350	NA
C-416-20016.4	LT NEU H/F 13	Hydrotreater		C	Flange	8	Hot Oil	Lube Oil	L	N	G	519	350	NA
C-416-20016-V	LT NEU H/F 13	Hydrotreater		V	Gate	8	Hot Oil	Lube Oil	L	N	G	519	350	UK
C-416-20017.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	Hot Oil	Lube Oil	L	N	G	434	350	NA
C-416-20017-V	LT NEU H/F 13	Hydrotreater		V	Control	6	Hot Oil	Lube Oil	L	N	G	434	350	UK
C-416-20018.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	278	350	NA
C-416-20018-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	278	350	UK
C-416-20019.1	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20019.12	LT NEU H/F 13	Hydrotreater		C	Plug	0.25	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20019.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20019.4	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20019.6	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20019.9	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20019-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	Hot Oil	Lube Oil	L	N	G	57	350	UK
C-416-20021.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	105	350	NA
C-416-20021.4	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	105	350	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-416-20021-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.75	Hot Oil	Lube Oil	L	N	G	105	350	UK
C-416-20022.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	105	350	NA
C-416-20022-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	105	350	UK
C-416-20023.4	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	105	350	NA
C-416-20023-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	232	350	UK
C-416-20024.10	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20024.2	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20024.5	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20024.8	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	57	350	NA
C-416-20024-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	Hot Oil	Lube Oil	L	N	G	57	350	UK
C-416-20025.10	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	L	N	G	47	350	NA
C-416-20025.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	47	350	NA
C-416-20025.5	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	L	N	G	47	350	NA
C-416-20025.8	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	47	350	NA
C-416-20025-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	Hot Oil	Lube Oil	L	N	G	47	350	UK
C-416-20026.10	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	Hot Oil	Lube Oil	L	N	G	50	350	NA
C-416-20026.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	50	350	NA
C-416-20026.5	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	L	N	G	50	350	NA
C-416-20026.8	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	Hot Oil	Lube Oil	L	N	G	50	350	NA
C-416-20026-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	Hot Oil	Lube Oil	L	N	G	50	350	UK
C-416-20027-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	Hot Oil	Lube Oil	L	N	G	54	350	UK
C-416-20028.3	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	136	350	NA
C-416-20028-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	136	350	UK
C-416-20029.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	179	350	NA
C-416-20029-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	179	350	UK
C-416-20031.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	Hot Oil	Lube Oil	L	N	G	50	350	NA
C-416-20034-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	298	350	UK
C-416-20037-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	242	350	UK
C-416-20039.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	Hot Oil	Lube Oil	L	N	G	263	230	NA
C-416-20039-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	263	230	UK
C-416-20040.2	LT NEU H/F 13	Hydrotreater		C	Flange	8	Hot Oil	Lube Oil	L	N	G	389	230	NA
C-416-20040-V	LT NEU H/F 13	Hydrotreater		V	Gate	8	Hot Oil	Lube Oil	L	N	G	389	230	UK
C-416-20041.2	LT NEU H/F 13	Hydrotreater		C	Flange	2	Hot Oil	Lube Oil	L	N	G	240	230	NA
C-416-20041.3	LT NEU H/F 13	Hydrotreater		C	Flange	2	Hot Oil	Lube Oil	L	N	G	240	230	NA
C-416-20041-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	Hot Oil	Lube Oil	L	N	G	240	230	UK
C-416-20042.3	LT NEU H/F 13	Hydrotreater		C	Flange	1	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	62	230	NA
C-416-20042-V	LT NEU H/F 13	Hydrotreater		V	Ball	1	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	62	230	UK
C-416-20043.2	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	70	230	NA
C-416-20043-V	LT NEU H/F 13	Hydrotreater		V	Needle	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	70	230	UK
C-416-20044.3	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	59	230	NA
C-416-20044-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	59	230	UK
C-416-20045.3	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	59	230	NA
C-416-20045-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	59	230	UK
C-416-20046.11	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	53	230	NA
C-416-20046.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	53	230	NA
C-416-20046-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	Hot Oil	Lube Oil	L	N	G	53	230	UK
C-416-20048.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	296	230	NA
C-416-20048-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	296	230	UK
C-416-20049.4	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Lube Oil	L	N	G	179	230	NA
C-416-20049-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	179	230	UK
C-416-20050-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	328	230	UK
C-416-20051.2	LT NEU H/F 13	Hydrotreater		C	Flange	2	Hot Oil	Lube Oil	L	N	G	384	230	NA
C-416-20051-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	Hot Oil	Lube Oil	L	N	G	384	230	UK
C-416-20052.3	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	Hot Oil	Lube Oil	L	N	G	360	230	NA
C-416-20089-P	0416-LT NEU	Hydrotreater	P-1360A	P	Seal	Blank	Hot Oil	Lube Oil	L	N	G	346	20	NA
C-416-20089-P	0416-LT NEU	Hydrotreater	P-1360A	C	Pump Housing	Blank	Hot Oil	Lube Oil	L	N	G	346	20	NA
C-416-20103-P	0416-LT NEU	Hydrotreater	P-1360	P	Seal	Unknown	Hot Oil	Lube Oil	N	N	G	446	210	NA
C-416-20103-P	0416-LT NEU	Hydrotreater	P-1360	C	Pump Housing	Unknown	Hot Oil	Lube Oil	N	N	G	446	210	NA
C-416-20105.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	L	N	G	429	330	NA
C-416-20105-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	L	N	G	429	330	UK
C-416-20113-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	NUTRL OIL	Lube Oil	L	N	G	83	60	UK
C-416-20115.3	LT NEU H/F 13	Hydrotreater		C	Flange	1	NUTRL OIL	Lube Oil	L	N	G	56	60	NA
C-416-20115-V	LT NEU H/F 13	Hydrotreater		V	Control	1	NUTRL OIL	Lube Oil	L	N	G	56	60	UK
C-416-20116.2	LT NEU H/F 13	Hydrotreater		C	Plug	1	NUTRL OIL	Lube Oil	L	N	G	59	60	NA
C-416-20116-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	NUTRL OIL	Lube Oil	L	N	G	59	60	UK
C-416-20117-V	LT NEU H/F 13	Hydrotreater		V	Gate	1.5	NUTRL OIL	Lube Oil	L	N	G	58	60	UK
C-416-20118.2	LT NEU H/F 13	Hydrotreater		C	Flange	2	NUTRL OIL	Lube Oil	L	N	G	60	60	NA
C-416-20118-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	NUTRL OIL	Lube Oil	L	N	G	60	60	UK
C-416-20119-V	LT NEU H/F 13	Hydrotreater		V	Globe	1.5	NUTRL OIL	Lube Oil	L	N	G	58	60	UK
C-416-20120-V	LT NEU H/F 13	Hydrotreater		V	Gate	1.5	NUTRL OIL	Lube Oil	L	N	G	55	60	UK
C-416-20135-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	L	N	G	60	60	UK
C-416-20138-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	L	N	G	73	60	UK
C-416-20139-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	L	N	G	67	60	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-416-20144-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	59	150	UK
C-416-20145.3	LT NEU H/F 13	Hydrotreater		C	Flange	1	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	61	150	NA
C-416-20145-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	61	150	UK
C-416-20146-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	66	150	UK
C-416-20147.2	LT NEU H/F 13	Hydrotreater		C	Bonnet	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	106	150	NA
C-416-20148.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	131	150	NA
C-416-20148-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	131	150	UK
C-416-20149.3	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	179	150	NA
C-416-20149-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	179	150	UK
C-416-20150.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	164	150	NA
C-416-20150-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	164	150	UK
C-416-20151.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	79	150	NA
C-416-20151-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	79	150	UK
C-416-20153.2	LT NEU H/F 13	Hydrotreater		C	Flange	1	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	58	200	NA
C-416-20153-V	LT NEU H/F 13	Hydrotreater		V	Control	1	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	58	200	UK
C-416-20154.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	60	200	NA
C-416-20154-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	60	200	UK
C-416-20155-V	LT NEU H/F 13	Hydrotreater		V	Gate	1.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	66	200	UK
C-416-20162-V	LT NEU H/F 13	Hydrotreater		V	Control	3	NUTRL OIL	Lube Oil	L	N	G	185	98	UK
C-416-20166-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	71	200	UK
C-416-20168.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	117	200	NA
C-416-20168-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	117	200	UK
C-416-20177-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	L	N	G	110	0	UK
C-416-20178-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	L	N	G	93	0	UK
C-416-20179.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	NUTRL OIL	Lube Oil	L	N	G	142	0	NA
C-416-20179-V	LT NEU H/F 13	Hydrotreater		V	Needle	0.75	NUTRL OIL	Lube Oil	L	N	G	142	0	UK
C-416-20181.2	LT NEU H/F 13	Hydrotreater		C	Flange	2	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	73	200	NA
C-416-20181-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	73	200	UK
C-416-20182-V	LT NEU H/F 13	Hydrotreater		V	Ball	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	101	0	UK
C-416-20183-V	LT NEU H/F 13	Hydrotreater		V	Ball	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	96	0	UK
C-416-20184-V	LT NEU H/F 13	Hydrotreater		V	Needle	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	118	0	UK
C-416-20185-V	LT NEU H/F 13	Hydrotreater		V	Ball	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	130	0	UK
C-416-20186.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.25	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	105	0	NA
C-416-20186.5	LT NEU H/F 13	Hydrotreater		C	Plug	0.25	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	105	0	NA
C-416-20186-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	105	0	UK
C-416-20187-V	LT NEU H/F 13	Hydrotreater		V	Needle	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	118	0	UK
C-416-20188.7	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	95	0	NA
C-416-20189-P	0416-LT NEU	Hydrotreater	P-1301A	P	Seal	Blank	Reactor Feed	Lube Oil	L	N	G	161	16	NA
C-416-20189-P	0416-LT NEU	Hydrotreater	P-1301A	C	Pump Housing	Blank	Reactor Feed	Lube Oil	L	N	G	161	16	NA
C-416-20190-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	114	70	UK
C-416-20191-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	114	70	UK
C-416-20192-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	114	70	UK
C-416-20193-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	114	70	UK
C-416-20194-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	66	70	UK
C-416-20195-P	0416-LT NEU	Hydrotreater	P-1301	P	Seal	Unknown	Reactor Feed	Lube Oil	N	N	G	209	45	NA
C-416-20195-P	0416-LT NEU	Hydrotreater	P-1301	C	Pump Housing	Unknown	Reactor Feed	Lube Oil	N	N	G	209	45	NA
C-416-20196-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	15	UK
C-416-20197-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	15	UK
C-416-20198-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	15	UK
C-416-20199-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	15	UK
C-416-20200-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	95	49	UK
C-416-20201-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	95	49	UK
C-416-20202-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	95	49	UK
C-416-20203-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	95	49	UK
C-416-20204-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	95	49	UK
C-416-20205-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	145	60	UK
C-416-20206-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	110	60	UK
C-416-20207-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20208-V	LT NEU H/F 13	Hydrotreater		V	Globe	6	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20209-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20210-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20211-V	LT NEU H/F 13	Hydrotreater		V	Globe	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20212-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20213-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20214-V	LT NEU H/F 13	Hydrotreater		V	Globe	6	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20215-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	92	60	UK
C-416-20223-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	102	0	UK
C-416-20224-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	93	0	UK
C-416-20225	LT NEU H/F 13	Hydrotreater		PRD		3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	145	0	NA
C-416-20226-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	145	0	UK
C-416-20227-V	LT NEU H/F 13	Hydrotreater		V	Globe	3	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	141	0	UK
C-416-20228-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	112	0	UK
C-416-20290-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Lube Products	Lube Oil	N	N	G	124	350	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-416-20291.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	Lube Products	Lube Oil	N	N	G	179	350	NA
C-416-20229-V	LT NEU H/F 13	Hydrotreater		V	Check	6	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	133	0	UK
C-416-20230-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	86	0	UK
C-416-20231-V	LT NEU H/F 13	Hydrotreater		V	Globe	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	P	86	0	UK
C-416-20232-V	LT NEU H/F 13	Hydrotreater		V	Check	6	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	101	0	UK
C-416-20234.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	Hot Oil	Lube Oil	N	N	G	450	200	NA
C-416-20234.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	Hot Oil	Lube Oil	N	N	G	450	200	NA
C-416-20234-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	Hot Oil	Lube Oil	N	N	G	450	200	UK
C-416-20235.3	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	437	200	NA
C-416-20235-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	437	200	UK
C-416-20236.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	Hot Oil	Lube Oil	N	N	G	328	200	NA
C-416-20236-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	328	200	UK
C-416-20237.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	431	200	NA
C-416-20237-V	LT NEU H/F 13	Hydrotreater		V	Control	3	Hot Oil	Lube Oil	N	N	G	431	200	UK
C-416-20238.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	Hot Oil	Lube Oil	N	N	G	340	200	NA
C-416-20238-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	340	200	UK
C-416-20239.3	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	440	200	NA
C-416-20239-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	440	200	UK
C-416-20240.3	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	339	200	NA
C-416-20240-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	334	200	UK
C-416-20241.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	Hot Oil	Lube Oil	N	N	G	128	200	NA
C-416-20241-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	128	200	UK
C-416-20242.3	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	Hot Oil	Lube Oil	N	N	G	244	200	NA
C-416-20242-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	249	200	UK
C-416-20243.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	Hot Oil	Lube Oil	N	N	G	192	200	NA
C-416-20243-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	192	200	UK
C-416-20244-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	283	200	UK
C-416-20245.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	Hot Oil	Lube Oil	N	N	G	383	200	NA
C-416-20245-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	137	200	UK
C-416-20246.11	LT NEU H/F 13	Hydrotreater		C	Plug	0.25	Hot Oil	Lube Oil	N	N	G	78	200	NA
C-416-20246.2	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	Hot Oil	Lube Oil	N	N	G	78	200	NA
C-416-20246.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	N	N	G	78	200	NA
C-416-20246.8	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	N	N	G	78	200	NA
C-416-20246-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	Hot Oil	Lube Oil	N	N	G	78	200	UK
C-416-20247.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Hot Oil	N	N	G	89	200	NA
C-416-20247-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	308	200	UK
C-416-20248.5	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	Hot Oil	Lube Oil	N	N	G	90	200	NA
C-416-20248-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	310	200	UK
C-416-20249.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	Hot Oil	Lube Oil	N	N	G	369	200	NA
C-416-20249-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	Hot Oil	Lube Oil	N	N	G	369	200	UK
C-416-20250-V	LT NEU H/F 13	Hydrotreater		V	Check	4	Hot Oil	Lube Oil	N	N	G	371	200	UK
C-416-20251.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	165	200	NA
C-416-20251-V	LT NEU H/F 13	Hydrotreater		V	Globe	3	Hot Oil	Lube Oil	N	N	G	165	200	UK
C-416-20252-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	333	200	UK
C-416-20253.2	LT NEU H/F 13	Hydrotreater		C	Plug	3	Hot Oil	Lube Oil	N	N	G	278	200	NA
C-416-20253-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	238	200	UK
C-416-20254-V	LT NEU H/F 13	Hydrotreater		V	Control	2	Hot Oil	Lube Oil	N	N	G	458	200	UK
C-416-20255.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	458	200	NA
C-416-20255-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	458	200	UK
C-416-20256.3	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	458	200	NA
C-416-20256-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	458	200	UK
C-416-20259.2	LT NEU H/F 13	Hydrotreater		C	Plug	3	Hot Oil	Lube Oil	N	N	G	335	200	NA
C-416-20259-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Hot Oil	Lube Oil	N	N	G	335	200	UK
C-416-20260.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	326	200	NA
C-416-20260.3	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Lube Oil	N	N	G	326	200	NA
C-416-20260-V	LT NEU H/F 13	Hydrotreater		V	Globe	3	Hot Oil	Lube Oil	N	N	G	326	200	UK
C-416-20261.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	Hot Oil	Lube Oil	N	N	G	88	200	NA
C-416-20261-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	273	200	UK
C-416-20262.3	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.75	Hot Oil	Lube Oil	N	N	G	87	200	NA
C-416-20262-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	Hot Oil	Lube Oil	N	N	G	278	200	UK
C-416-20263.1	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	N	N	G	81	200	NA
C-416-20263.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	N	N	G	81	200	NA
C-416-20263.6	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	Hot Oil	Lube Oil	N	N	G	81	200	NA
C-416-20267-V	LT NEU H/F 13	Hydrotreater		V	Control	1	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	337	350	UK
C-416-20268-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	162	350	UK
C-416-20269-V	LT NEU H/F 13	Hydrotreater		V	Gate	1.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	275	350	UK
C-416-20270-V	LT NEU H/F 13	Hydrotreater		V	Globe	1.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	302	350	UK
C-416-20271-V	LT NEU H/F 13	Hydrotreater		V	Gate	1.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	284	350	UK
C-416-20272-V	LT NEU H/F 13	Hydrotreater		V	Check	4	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	321	350	UK
C-416-20273.2	LT NEU H/F 13	Hydrotreater		C	Flange	4	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	321	350	NA
C-416-20273-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	321	350	UK
C-416-20274.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	111	350	NA
C-416-20274-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	111	350	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-416-20275.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	239	350	NA
C-416-20275-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	239	350	UK
C-416-20276.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	429	350	NA
C-416-20276-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	429	350	UK
C-416-20277.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	349	350	NA
C-416-20277-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	349	350	UK
C-416-20280.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	229	350	NA
C-416-20280-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	229	350	UK
C-416-20281.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	223	350	NA
C-416-20281-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	168	350	UK
C-416-20282.2	LT NEU H/F 13	Hydrotreater		C	Flange	2	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	150	350	NA
C-416-20282-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	150	350	UK
C-416-20283.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	212	350	NA
C-416-20283.5	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	212	350	NA
C-416-20283.8	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	212	350	NA
C-416-20283-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	212	350	UK
C-416-20284.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	130	350	NA
C-416-20284.5	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	130	350	NA
C-416-20284-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	130	350	UK
C-416-20285.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	130	350	NA
C-416-20285.4	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	130	350	NA
C-416-20285-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	130	350	UK
C-416-20286.1	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	NA
C-416-20286.12	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	NA
C-416-20286.4	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	NA
C-416-20286.5	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	NA
C-416-20286.7	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	NA
C-416-20286-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	UK
C-416-20287.3	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	NA
C-416-20287-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	UK
C-416-20288.4	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	NA
C-416-20288-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	120	500	UK
C-416-20289.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	Lube Products	Lube Oil	N	N	G	90	350	NA
C-416-20289-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	Lube Products	Lube Oil	N	N	G	90	350	UK
C-416-20292.2	LT NEU H/F 13	Hydrotreater		C	Flange	4	Lube Products	Lube Oil	N	N	G	179	350	NA
C-416-20292-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	Lube Products	Lube Oil	N	N	G	179	350	UK
C-416-20293.2	LT NEU H/F 13	Hydrotreater		C	Flange	4	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	180	350	NA
C-416-20293.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	180	350	NA
C-416-20293-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LNHF VAC BTMS	Vacuum Tower Bottoms	N	N	G	180	350	UK
C-416-20294-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	95	500	UK
C-416-20296-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	130	500	UK
C-416-20297-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LUBE PRODUCTS	Lube Oil	L	N	G	125	500	UK
C-416-20298.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	LUBE PRODUCTS	Lube Oil	L	N	G	87	500	NA
C-416-20298.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	LUBE PRODUCTS	Lube Oil	L	N	G	87	500	NA
C-416-20298.6	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	LUBE PRODUCTS	Lube Oil	L	N	G	87	500	NA
C-416-20298.7	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LUBE PRODUCTS	Lube Oil	L	N	G	87	500	NA
C-416-20298-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LUBE PRODUCTS	Lube Oil	L	N	G	87	500	UK
C-416-20299-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	90	500	UK
C-416-20300.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	157	500	NA
C-416-20300-V	LT NEU H/F 13	Hydrotreater		V	Needle	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	157	500	UK
C-416-20301-V	LT NEU H/F 13	Hydrotreater		V	Needle	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	67	500	UK
C-416-20302.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	145	500	NA
C-416-20302.5	LT NEU H/F 13	Hydrotreater		C	UN	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	145	500	NA
C-416-20302-V	LT NEU H/F 13	Hydrotreater		V	Ball	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	145	500	UK
C-416-20303.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	150	500	NA
C-416-20303.4	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	150	500	NA
C-416-20303-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	150	500	UK
C-416-20304.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	145	500	NA
C-416-20304-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	145	500	UK
C-416-20305.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	189	500	NA
C-416-20305-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	189	500	UK
C-416-20306.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	326	500	NA
C-416-20306-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	326	500	UK
C-416-20307.3	LT NEU H/F 13	Hydrotreater		C	Flange	2	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	76	500	NA
C-416-20307-V	LT NEU H/F 13	Hydrotreater		V	Control	2	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	76	100	UK
C-416-20308.3	LT NEU H/F 13	Hydrotreater		C	Flange	2	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	99	100	NA
C-416-20308-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	99	100	UK
C-416-20309.3	LT NEU H/F 13	Hydrotreater		C	Flange	2	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	115	100	NA
C-416-20309-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	115	100	UK
C-416-20310-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	72	100	UK
C-416-20311.1	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	220	100	NA
C-416-20311-V	LT NEU H/F 13	Hydrotreater		V	Check	3	LNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	228	100	UK
C-416-20312.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	Hot Oil	Lube Oil	L	N	G	61	230	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-416-20312-V	LT NEU H/F 13	Hydrotreater		V	Needle	0.5	Hot Oil	Lube Oil	L	N	G	61	230	UK
C-416-20313.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	Hot Oil	Lube Oil	L	N	G	59	230	NA
C-416-20313-V	LT NEU H/F 13	Hydrotreater		V	Check	6	Hot Oil	Lube Oil	L	N	G	59	230	UK
C-416-20314	LT NEU H/F 13	Hydrotreater		V	Check	0.75	Hot Oil	Lube Oil	L	N	G	54	2695	UK
C-416-20314.2	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	54	2695	NA
C-416-20315.10	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20315.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20315.5	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20315.8	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20316.10	LT NEU H/F 13	Hydrotreater		C	Plug	0.25	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20316.13	LT NEU H/F 13	Hydrotreater		C	Plug	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20316.3	LT NEU H/F 13	Hydrotreater		C	Threaded	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20316.6	LT NEU H/F 13	Hydrotreater		C	Tube Fitting	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20316.9	LT NEU H/F 13	Hydrotreater		C	Plug	0.25	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20316-V	LT NEU H/F 13	Hydrotreater		V	3 Way	0.5	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	UK
C-416-20317.3	LT NEU H/F 13	Hydrotreater		C	Threaded	1	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20317-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	UK
C-416-20318.2	LT NEU H/F 13	Hydrotreater		C	Plug	1	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20318.4	LT NEU H/F 13	Hydrotreater		C	Threaded	1	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	108	88	NA
C-416-20319-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	75	88	UK
C-416-20320.1	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	61	88	NA
C-416-20320-V	LT NEU H/F 13	Hydrotreater		V	Check	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	L	N	G	61	88	UK
C-416-20321.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	WAX FEED	Lube Oil	N	N	P	90	0	NA
C-416-20321-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	WAX FEED	Lube Oil	N	N	P	90	0	UK
C-416-20326-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	WAX FEED	Lube Oil	N	N	G	90	0	UK
C-416-20338-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	L	N	G	88	20	UK
C-416-20340.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	L	N	G	370	100	NA
C-416-20340.4	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	L	N	G	370	100	NA
C-416-20340-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	L	N	G	370	100	UK
C-416-20354.3	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF REACT FEED	Vacuum Tower Bottoms	Blank	Blank	G	126	58	NA
C-416-20354-V	LT NEU H/F 13	Hydrotreater		V	Gate	3	LNHF REACT FEED	Vacuum Tower Bottoms	Blank	Blank	G	126	58	UK
C-416-20355-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF REACT FEED	Vacuum Tower Bottoms	Blank	Blank	G	126	58	UK
C-416-20356.2	LT NEU H/F 13	Hydrotreater		C	Flange	3	LNHF REACT FEED	Vacuum Tower Bottoms	Blank	Blank	G	126	50	NA
C-416-20373.2	LT NEU H/F 13	Hydrotreater		C	Flange	2	NUTRL OIL	Lube Oil	L	N	G	57	100	NA
C-416-20373-V	LT NEU H/F 13	Hydrotreater		V	Globe	2	NUTRL OIL	Lube Oil	L	N	G	57	100	UK
C-416-20376.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	L	N	G	55	100	NA
C-416-20376-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	L	N	G	55	100	UK
C-416-20419.2	LT NEU H/F 13	Hydrotreater		C	Plug	1	WASH OIL	Light Cycle Oil	Blank	Blank	G	120	250	NA
C-416-20419-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	WASH OIL	Light Cycle Oil	Blank	Blank	G	120	250	UK
C-416-20420.2	LT NEU H/F 13	Hydrotreater		C	Plug	1	WASH OIL	Light Cycle Oil	Blank	Blank	G	114	250	NA
C-416-20420-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	WASH OIL	Light Cycle Oil	Blank	Blank	G	114	250	UK
C-416-20421.2	LT NEU H/F 13	Hydrotreater		C	Threaded	1	NUTRL OIL	Lube Oil	N	N	G	80	50	NA
C-416-20421.4	LT NEU H/F 13	Hydrotreater		C	Plug	1	WASH OIL	Light Cycle Oil	N	N	G	78	60	NA
C-416-20421-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	WASH OIL	Light Cycle Oil	N	N	G	78	60	UK
C-416-20422.2	LT NEU H/F 13	Hydrotreater		C	Plug	1	WASH OIL	Light Cycle Oil	N	N	G	83	60	NA
C-416-20422-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	WASH OIL	Light Cycle Oil	N	N	G	83	60	UK
C-416-20423-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	WASH OIL	Light Cycle Oil	N	N	G	80	60	UK
C-416-20424.4	LT NEU H/F 13	Hydrotreater		C	Plug	1	WASH OIL	Light Cycle Oil	N	N	G	81	60	NA
C-416-20424-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	WASH OIL	Light Cycle Oil	N	N	G	81	60	UK
C-416-20425.2	LT NEU H/F 13	Hydrotreater		C	Plug	1	WASH OIL	Light Cycle Oil	N	N	G	93	60	NA
C-416-20425-V	LT NEU H/F 13	Hydrotreater		V	Gate	1	WASH OIL	Light Cycle Oil	N	N	G	93	60	UK
C-416-20426.2	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	LUBE PRODUCTS	Lube Oil	N	N	G	80	60	NA
C-416-20426-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LUBE PRODUCTS	Lube Oil	N	N	G	80	60	UK
C-416-20428.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	80	50	NA
C-416-20428-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	80	50	UK
C-416-20429.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	230	50	NA
C-416-20429-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	230	50	UK
C-416-20430.2	LT NEU H/F 13	Hydrotreater		C	Threaded	0.75	NUTRL OIL	Lube Oil	N	N	G	113	50	NA
C-416-20430-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	113	50	UK
C-416-20431.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	NUTRL OIL	Lube Oil	N	N	G	120	50	NA
C-416-20431-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	NUTRL OIL	Lube Oil	N	N	G	131	60	UK
C-416-20432-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	131	60	UK
C-416-20433.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	NUTRL OIL	Lube Oil	N	N	G	86	60	NA
C-416-20433-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	NUTRL OIL	Lube Oil	N	N	G	86	60	UK
C-416-20434.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	86	60	NA
C-416-20434-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	86	60	UK
C-416-20435.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	86	60	NA
C-416-20435-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	86	60	UK
C-416-20436.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	98	60	NA
C-416-20436-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	98	60	UK
C-416-20437.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	87	60	NA
C-416-20437.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	87	60	NA
C-416-20437-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	87	60	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-416-20438-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	79	60	UK
C-416-20439.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	87	60	NA
C-416-20439-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	87	60	UK
C-416-20440.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	91	60	NA
C-416-20440-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	91	60	UK
C-416-20441.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	87	60	NA
C-416-20441-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	87	60	UK
C-416-20442.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	110	60	NA
C-416-20442-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	110	60	UK
C-416-20443.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	109	60	NA
C-416-20443-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	109	60	UK
C-416-20444.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	78	60	NA
C-416-20444-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	78	60	UK
C-416-20445.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	408	60	NA
C-416-20445-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	108	60	UK
C-416-20446.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	110	60	NA
C-416-20446-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	110	60	UK
C-416-20447.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	88	60	NA
C-416-20447-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	88	60	UK
C-416-20448.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	110	60	NA
C-416-20448-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	110	60	UK
C-416-20449.2	LT NEU H/F 13	Hydrotreater		C	Plug	6	NUTRL OIL	Lube Oil	N	N	G	110	60	NA
C-416-20449-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	110	60	UK
C-416-20450-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	88	60	UK
C-416-20451.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	88	60	NA
C-416-20451-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	88	60	UK
C-416-20452.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	79	60	NA
C-416-20452-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	79	60	UK
C-416-20453-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	79	60	UK
C-416-20454.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	89	60	NA
C-416-20454-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	79	60	UK
C-416-20455.3	LT NEU H/F 13	Hydrotreater		C	Flange	2	NUTRL OIL	Lube Oil	N	N	G	70	60	NA
C-416-20455-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	NUTRL OIL	Lube Oil	N	N	G	70	60	UK
C-416-20456.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	102	60	NA
C-416-20456-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	102	60	UK
C-416-20457.2	LT NEU H/F 13	Hydrotreater		C	Plug	6	NUTRL OIL	Lube Oil	N	N	G	116	60	NA
C-416-20457-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	116	60	UK
C-416-20458.2	LT NEU H/F 13	Hydrotreater		C	Plug	0.75	NUTRL OIL	Lube Oil	N	N	G	107	60	NA
C-416-20458-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	107	60	UK
C-416-20459.2	LT NEU H/F 13	Hydrotreater		C	Flange	4	NUTRL OIL	Lube Oil	N	N	G	87	60	NA
C-416-20459-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	NUTRL OIL	Lube Oil	N	N	G	87	60	UK
C-416-20460.3	LT NEU H/F 13	Hydrotreater		C	Flange	0.75	NUTRL OIL	Lube Oil	N	N	G	89	60	NA
C-416-20460-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	89	60	UK
C-416-20461.2	LT NEU H/F 13	Hydrotreater		C	Flange	4	NUTRL OIL	Lube Oil	N	N	G	76	60	NA
C-416-20461.4	LT NEU H/F 13	Hydrotreater		C	Flange	4	NUTRL OIL	Lube Oil	N	N	G	76	60	NA
C-416-20461-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	NUTRL OIL	Lube Oil	N	N	G	76	60	UK
C-416-20462-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LUBE PRODUCTS	Lube Oil	N	N	G	77	60	UK
C-416-20463.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	LUBE PRODUCTS	Lube Oil	N	N	G	77	60	NA
C-416-20463-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LUBE PRODUCTS	Lube Oil	N	N	G	77	60	UK
C-416-20464.2	LT NEU H/F 13	Hydrotreater		C	Flange	2	LUBE PRODUCTS	Lube Oil	N	N	G	77	60	NA
C-416-20464-V	LT NEU H/F 13	Hydrotreater		V	Gate	2	LUBE PRODUCTS	Lube Oil	N	N	G	77	60	UK
C-416-20465.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	177	60	NA
C-416-20465-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	171	60	UK
C-416-20466-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	NUTRL OIL	Lube Oil	N	N	G	100	60	UK
C-416-20467.2	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	169	60	NA
C-416-20467.3	LT NEU H/F 13	Hydrotreater		C	Flange	6	NUTRL OIL	Lube Oil	N	N	G	169	60	NA
C-416-20467-V	LT NEU H/F 13	Hydrotreater		V	Gate	6	NUTRL OIL	Lube Oil	N	N	G	169	60	UK
C-416-20468.2	LT NEU H/F 13	Hydrotreater		C	Flange	4	LUBE PRODUCTS	Lube Oil	N	N	G	102	60	NA
C-416-20468-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LUBE PRODUCTS	Lube Oil	N	N	G	102	60	UK
C-416-20469.3	LT NEU H/F 13	Hydrotreater		C	Flange	4	LUBE PRODUCTS	Lube Oil	N	N	G	141	60	NA
C-416-20469-V	LT NEU H/F 13	Hydrotreater		V	Gate	4	LUBE PRODUCTS	Lube Oil	N	N	G	14	60	UK
C-416-20470-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LUBE PRODUCTS	Lube Oil	N	N	G	67	60	UK
C-417-20005-P	0417-HV NEU H	Hydrocracker	P-1401A	P	Seal	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	N	N	G	162	0	NA
C-417-20005-P	0417-HV NEU H	Hydrocracker	P-1401A	C	Pump Housing	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	N	N	G	162	0	NA
C-417-20015-P	0417-HV NEU H	Hydrocracker	P-1401	P	Seal	Unknown	HNC React Feed	Lube Oil	N	N	G	299	0	NA
C-417-20015-P	0417-HV NEU H	Hydrocracker	P-1401	C	Pump Housing	Unknown	HNC React Feed	Lube Oil	N	N	G	299	0	NA
C-418-20336-P	0418-HV NEU H/C	Hydrocracker	P-1555	P	Seal	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	L	N	G	255	180	NA
C-418-20336-P	0418-HV NEU H/C	Hydrocracker	P-1555	C	Pump Housing	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	L	N	G	255	180	NA
C-418-20362-P	0418-HV NEU H/C	Hydrocracker	P-1555A	P	Seal	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	N	N	G	594	400	NA
C-418-20362-P	0418-HV NEU H/C	Hydrocracker	P-1555A	C	Pump Housing	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	N	N	G	594	400	NA
C-418-20394-P	0418-HV NEU H/C	Hydrocracker	P-1505	P	Seal	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	L	N	G	269	105	NA
C-418-20394-P	0418-HV NEU H/C	Hydrocracker	P-1505	C	Pump Housing	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	L	N	G	269	105	NA
C-418-20408-P	0418-HV NEU H/C	Hydrocracker	P-1505A	P	Seal	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	L	N	G	274	105	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-418-20408-P	0418-HV NEU H/C	Hydrocracker	P-1505A	C	Pump Housing	Unknown	HNC VAC BTMS	Vacuum Tower Bottoms	L	N	G	274	105	NA
C-418-20507-P	0418-HV NEU H/C	Hydrocracker	P-1568	P	Seal	Unknown	HNC VAC SC6	Lube Oil	L	N	G	288	100	NA
C-418-20507-P	0418-HV NEU H/C	Hydrocracker	P-1568	C	Pump Housing	Unknown	HNC VAC SC6	Lube Oil	L	N	G	288	100	NA
C-418-20508-P	0418-HV NEU H/C	Hydrocracker	P-1569	P	Seal	Unknown	HNC VAC SC6	Lube Oil	L	N	G	532	120	NA
C-418-20508-P	0418-HV NEU H/C	Hydrocracker	P-1569	C	Pump Housing	Unknown	HNC VAC SC6	Lube Oil	L	N	G	532	120	NA
C-418-20518-P	0418-HV NEU H/C	Hydrocracker	P-1569A	P	Seal	Unknown	HNC VAC SC6	Lube Oil	N	N	G	208	110	NA
C-418-20518-P	0418-HV NEU H/C	Hydrocracker	P-1569A	C	Pump Housing	Unknown	HNC VAC SC6	Lube Oil	N	N	G	208	110	NA
C-418-20523-P	0418-HV NEU H/C	Hydrocracker	P-1568A	P	Seal	Unknown	HNC VAC SC6	Lube Oil	N	N	G	503	100	NA
C-418-20523-P	0418-HV NEU H/C	Hydrocracker	P-1568A	C	Pump Housing	Unknown	HNC VAC SC6	Lube Oil	N	N	G	503	100	NA
C-418-20564-P	0418-HV NEU H/C	Hydrocracker	P-1558	P	Seal	Unknown	HNC VAC SC5	Diesel	N	N	G	453	200	NA
C-418-20564-P	0418-HV NEU H/C	Hydrocracker	P-1558	C	Pump Housing	Unknown	HNC VAC SC5	Diesel	N	N	G	453	200	NA
C-418-20570-P	0418-HV NEU H/C	Hydrocracker	P-1558A	P	Seal	Unknown	HNC VAC SC5	Diesel	L	N	G	109	20	NA
C-418-20570-P	0418-HV NEU H/C	Hydrocracker	P-1558A	C	Pump Housing	Unknown	HNC VAC SC5	Diesel	L	N	G	109	20	NA
C-418-20609-P	0418-HV NEU H/C	Hydrocracker	P-1549A	P	Seal	Unknown	HNC VAC SC4	Diesel	L	N	G	66	240	NA
C-418-20609-P	0418-HV NEU H/C	Hydrocracker	P-1549A	C	Pump Housing	Unknown	HNC VAC SC4	Diesel	L	N	G	66	240	NA
C-418-20781-P	0418-HV NEU H/C	Hydrocracker	P-1548A	P	Seal	Unknown	HNC VAC SC4	Diesel	L	N	G	166	90	NA
C-418-20781-P	0418-HV NEU H/C	Hydrocracker	P-1548A	C	Pump Housing	Unknown	HNC VAC SC4	Diesel	L	N	G	166	90	NA
C-419-20123-P	0419-HV NEU	Hydrotreater	P-1601A	P	Seal	Unknown	HNHF React Feed	Light Gas Oil	N	N	G	198	3900	NA
C-419-20123-P	0419-HV NEU	Hydrotreater	P-1601A	C	Pump Housing	Unknown	HNHF React Feed	Light Gas Oil	N	N	G	198	3900	NA
C-419-20139-P	0419-HV NEU	Hydrotreater	P-1601	P	Seal	Unknown	HNHF React Feed	Light Gas Oil	L	N	G	63	0	NA
C-419-20139-P	0419-HV NEU	Hydrotreater	P-1601	C	Pump Housing	Unknown	HNHF React Feed	Light Gas Oil	L	N	G	63	0	NA
C-419-20315-P	0419-HV NEU	Hydrotreater	P-1655A	P	Seal	Unknown	HNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	243	40	NA
C-419-20315-P	0419-HV NEU	Hydrotreater	P-1655A	C	Pump Housing	Unknown	HNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	243	40	NA
C-419-20316-P	0419-HV NEU	Hydrotreater	P-1656A	P	Seal	Unknown	HNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	240	100	NA
C-419-20316-P	0419-HV NEU	Hydrotreater	P-1656A	C	Pump Housing	Unknown	HNHF VAC BTMS	Vacuum Tower Bottoms	L	N	G	240	100	NA
C-419-20344-P	0419-HV NEU	Hydrotreater	P-1656	P	Seal	Unknown	HNHF Vac Btms LOTO	Vacuum Tower Bottoms	N	N	G	66	0	NA
C-419-20344-P	0419-HV NEU	Hydrotreater	P-1656	C	Pump Housing	Unknown	HNHF Vac Btms LOTO	Vacuum Tower Bottoms	N	N	G	66	0	NA
C-419-20345-P	0419-HV NEU	Hydrotreater	P-1655	P	Seal	Unknown	HNHF Vac Btms LOTO	Vacuum Tower Bottoms	N	N	G	64	0	NA
C-419-20345-P	0419-HV NEU	Hydrotreater	P-1655	C	Pump Housing	Unknown	HNHF Vac Btms LOTO	Vacuum Tower Bottoms	N	N	G	64	0	NA
C-420-1	420 LT NEU H/F 17	Hydrotreater	E-174-A	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-10	0420-LT NEU H/F	Hydrotreater		C	Plug	Unknown	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	P	56	0.1	NA
C-420-2	420 LT NEU H/F 17	Hydrotreater	E-174-A	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-20001-P	0420-LT NEU H/F	Hydrotreater	P-1749A	P	Seal	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	84	100	NA
C-420-20001-P	0420-LT NEU H/F	Hydrotreater	P-1749A	C	Pump Housing	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	84	100	NA
C-420-20001-P	0420-LT NEU H/F	Hydrotreater	P-1749A	P		4	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	NA
C-420-20002.1	420 LT NEU H/F 17	Hydrotreater		C	Flange	8	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	80	135	NA
C-420-20002-P	0420-LT NEU H/F	Hydrotreater	P-1748A	P	Seal	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	138	60	NA
C-420-20002-P	0420-LT NEU H/F	Hydrotreater	P-1748A	C	Pump Housing	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	138	60	NA
C-420-20002-P	0420-LT NEU H/F	Hydrotreater	P-1748A	P		8	TKC VAC SC4	Light Gas Oil	N	N	G	150	70	NA
C-420-20004.2	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	62	55	NA
C-420-20004-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	62	55	UK
C-420-20005.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	NA
C-420-20005-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	UK
C-420-20006.1	0420-LT NEU H/F	Hydrotreater		C	Bonnet	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	NA
C-420-20006.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	60	135	NA
C-420-20006-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	UK
C-420-20007.1	0420-LT NEU H/F	Hydrotreater		C	Bonnet	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	NA
C-420-20007.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	60	135	NA
C-420-20007-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	UK
C-420-20008.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	NA
C-420-20008-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	86	110	UK
C-420-20009.3	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	74	135	NA
C-420-20009-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	TKC VAC SC4	Light Gas Oil	N	N	G	72	110	UK
C-420-20010.2	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	53	135	NA
C-420-20010-V	0420-LT NEU H/F	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	N	N	G	72	110	UK
C-420-20010-V	0420-LT NEU H/F	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	N	N	G	87	90	UK
C-420-20011.2	0420-LT NEU H/F	Hydrotreater		C	Flange	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	87	90	NA
C-420-20011.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	67	110	NA
C-420-20011.9	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	63	135	NA
C-420-20011-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	67	110	UK
C-420-20012-V	0420-LT NEU H/F	Hydrotreater		V	Globe	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	67	110	UK
C-420-20013.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	69	110	NA
C-420-20013-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	69	110	UK
C-420-20014-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	74	110	UK
C-420-20015-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	74	110	UK
C-420-20016-V	0420-LT NEU H/F	Hydrotreater		V	Check	3	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	68	110	UK
C-420-20017.3	420 LT NEU H/F 17	Hydrotreater		C	Flange	3	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	55	135	NA
C-420-20017-V	0420-LT NEU H/F	Hydrotreater		V	Gate	3	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	68	110	UK
C-420-20018.2	420 LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	55	135	NA
C-420-20018-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	55	135	UK
C-420-20019.2	420 LT NEU H/F 17	Hydrotreater		C	Flange	10	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	135	135	NA
C-420-20019.3	420 LT NEU H/F 17	Hydrotreater		C	Flange	10	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	135	135	NA
C-420-20019-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	10	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	135	135	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-420-20020-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	55	135	UK
C-420-20021.2	420 LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	55	135	NA
C-420-20021-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	55	135	UK
C-420-20022-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	57	135	UK
C-420-20023.2	420 LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	82	135	NA
C-420-20023-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	82	135	UK
C-420-20024.2	420 LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	93	135	NA
C-420-20024-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	93	135	UK
C-420-20025.2	420 LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	93	135	NA
C-420-20025-V	420 LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	93	135	UK
C-420-20030.2	420 LT NEU H/F 17	Hydrotreater		C	Flange	6	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	194	135	NA
C-420-20036-P	420 LT NEU H/F 17	Hydrotreater		P	Centrifugal	4	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	155	50	NA
C-420-20036-P	0420-LT NEU H/F	Hydrotreater	P-1749	P	Seal	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	450	50	NA
C-420-20036-P	0420-LT NEU H/F	Hydrotreater	P-1749	C	Pump Housing	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	450	50	NA
C-420-20037-P	420 LT NEU H/F 17	Hydrotreater		P	Centrifugal	8	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	147	150	NA
C-420-20037-P	0420-LT NEU H/F	Hydrotreater	P-1748A	P	Seal	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	198	50	NA
C-420-20037-P	0420-LT NEU H/F	Hydrotreater	P-1748A	C	Pump Housing	Blank	TKC VAC SC4	Light Gas Oil	N	N	G	198	50	NA
C-420-20003-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	62	55	UK
C-420-20066-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	60	50	UK
C-420-20067.1	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	87	50	NA
C-420-20067-V	0420-LT NEU H/F	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	87	50	UK
C-420-20068.2	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	87	50	NA
C-420-20068-V	0420-LT NEU H/F	Hydrotreater		PRD		2	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	87	50	NA
C-420-20069-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	66	460	UK
C-420-20070.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	66	460	NA
C-420-20070-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	66	460	UK
C-420-20071-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	66	460	UK
C-420-20072.1	0420-LT NEU H/F	Hydrotreater	LNHF	C	Plug	0.5	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	85	490	NA
C-420-20072.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.5	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	85	490	NA
C-420-20072-V	0420-LT NEU H/F	Hydrotreater		V	3 Way	0.5	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	98	490	UK
C-420-20073.2	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	94	490	NA
C-420-20073.4	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	94	490	NA
C-420-20106.3	0420-LT NEU H/F	Hydrotreater		C	Flange	10	LNHF ATM BTMS	Atmospheric Tower Bottoms	Blank	Blank	G	382	275	NA
C-420-20106-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	Blank	Blank	G	382	275	UK
C-420-20108.3	0420-LT NEU H/F	Hydrotreater		C	Flange	6	TKC VAC SC7	Light Gas Oil	Blank	Blank	G	391	250	NA
C-420-20108-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	Blank	Blank	G	391	250	UK
C-420-20109.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC7	Light Gas Oil	Blank	Blank	G	391	250	NA
C-420-20109-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	Blank	Blank	G	391	250	UK
C-420-20110.3	0420-LT NEU H/F	Hydrotreater		C	Flange	10	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	173	300	NA
C-420-20110-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	Blank	Blank	G	173	300	UK
C-420-20116.3	0420-LT NEU H/F	Hydrotreater		C	Flange	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	Blank	Blank	G	445	425	NA
C-420-20116-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	Blank	Blank	G	445	425	UK
C-420-20117.3	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC BTMS	Vacuum Tower Bottoms	Blank	Blank	G	421	425	NA
C-420-20117-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	Blank	Blank	G	421	425	UK
C-420-20118.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	Blank	Blank	G	421	425	NA
C-420-20118.3	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC BTMS	Vacuum Tower Bottoms	Blank	Blank	G	387	425	NA
C-420-20118-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	Blank	Blank	G	421	425	UK
C-420-20119.3	0420-LT NEU H/F	Hydrotreater		C	Flange	10	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	356	155	NA
C-420-20119-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	356	155	UK
C-420-20121-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	DSL TES FL	Light Gas Oil	N	N	G	56	15	UK
C-420-20122-V	0420-LT NEU H/F	Hydrotreater		V	Check	0.75	DSL TES FL	Light Gas Oil	N	N	G	56	15	UK
C-420-20123.2	0420-LT NEU H/F	Hydrotreater		C	Union	0.75	DSL TES FL	Light Gas Oil	N	N	G	56	15	NA
C-420-20123.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	DSL TES FL	Light Gas Oil	N	N	G	56	15	NA
C-420-20123-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	DSL TES FL	Light Gas Oil	N	N	G	56	15	UK
C-420-20124.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	164	220	NA
C-420-20124-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	164	220	UK
C-420-20125.2	0420-LT NEU H/F	Hydrotreater		C	Flange	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	59	0	NA
C-420-20125-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	58	0	UK
C-420-20126.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	58	0	NA
C-420-20126-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	58	0	UK
C-420-20127-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	76	220	UK
C-420-20128.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	162	220	NA
C-420-20128.3	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC SC4	Light Gas Oil	N	N	G	174	220	NA
C-420-20128-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	162	220	UK
C-420-20129.3	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC SC4	Light Gas Oil	N	N	G	143	220	NA
C-420-20129.6	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	143	220	NA
C-420-20129-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	143	220	UK
C-420-20130-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	107	220	UK
C-420-20131.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	56	0.1	NA
C-420-20131.3	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC SC4	Light Gas Oil	N	N	G	56	0.1	NA
C-420-20131-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	56	0.1	UK
C-420-20132.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	147	31	NA
C-420-20132-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	147	31	UK

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C-420-20133.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	50	0	NA
C-420-20133.4	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	50	0	NA
C-420-20133-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	50	0	UK
C-420-20134-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	53	0	UK
C-420-20135-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	53	0	UK
C-420-20136.2	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	53	0	NA
C-420-20136.5	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	53	0	NA
C-420-20136-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	53	0	UK
C-420-20137-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	48	0	UK
C-420-20138.3	0420-LT NEU H/F	Hydrotreater		C	Flange	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	48	0	NA
C-420-20138-V	0420-LT NEU H/F	Hydrotreater		V	Gate	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	48	0	UK
C-420-20139.2	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	48	0	NA
C-420-20139-V	0420-LT NEU H/F	Hydrotreater		V	Gate	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	48	0	UK
C-420-20140.2	0420-LT NEU H/F	Hydrotreater		C	Plug	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	NA
C-420-20140-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	UK
C-420-20141.2	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	NA
C-420-20141.5	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	NA
C-420-20141.8	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	NA
C-420-20141-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	UK
C-420-20142.3	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	NA
C-420-20142-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	0	UK
C-420-20143-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	10	0	UK
C-420-20144.3	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	21	0	NA
C-420-20144-V	0420-LT NEU H/F	Hydrotreater		V	Gate	3	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	21	0	UK
C-420-20145.1	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	10	0	NA
C-420-20145-V	0420-LT NEU H/F	Hydrotreater		V	Check	3	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	9	0	UK
C-420-20146.2	0420-LT NEU H/F	Hydrotreater		C	Flange	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	9	0	NA
C-420-20146-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	9	0	UK
C-420-20147.2	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	9	0	NA
C-420-20147.5	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	9	0	NA
C-420-20147-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	9	0	UK
C-420-20148-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	12	0	UK
C-420-20149.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	14	18	NA
C-420-20149-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	14	18	UK
C-420-20150.2	0420-LT NEU H/F	Hydrotreater		C	Bonnet	4	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	140	18	NA
C-420-20150-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	140	18	UK
C-420-20151.3	0420-LT NEU H/F	Hydrotreater		C	Flange	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	18	NA
C-420-20151-V	0420-LT NEU H/F	Hydrotreater		V	Control	6	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	50	18	UK
C-420-20152.2	0420-LT NEU H/F	Hydrotreater		C	Flange	1	Flushing Oil	Diesel - Light Gas Oil	N	N	G	55	18	NA
C-420-20152-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	55	18	UK
C-420-20153.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	73	18	NA
C-420-20153-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	73	18	UK
C-420-20154-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	Flushing Oil	Diesel - Light Gas Oil	N	N	G	63	18	UK
C-420-20155-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	LCO	Light Cycle Oil	N	N	G	56	0	UK
C-420-20156-P	0420-LT NEU H/F	Hydrotreater	P-1755A	P	Seal	Unknown	TKC Vac Btms	Vacuum Tower Bottoms	Blank	Blank	G	442	700	NA
C-420-20156-P	0420-LT NEU H/F	Hydrotreater	P-1755A	C	Pump Housing	Blank	Blank	Vacuum Tower Bottoms	Blank	Blank	G	442	700	NA
C-420-20156-P	0420-LT NEU H/F	Hydrotreater	P-1755A	P		4	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	190	900	NA
C-420-20158-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	84	900	UK
C-420-20159.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	1	LCO	Light Cycle Oil	L	N	G	90	120	NA
C-420-20159.4	0420-LT NEU H/F	Hydrotreater		C	Threaded	1	LCO	Light Cycle Oil	N	N	G	101	120	NA
C-420-20159.5	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	LCO	Light Cycle Oil	L	N	G	90	120	NA
C-420-20159-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	L	N	G	90	120	UK
C-420-20160-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	L	N	G	115	120	UK
C-420-20161-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	L	N	G	135	120	UK
C-420-20162.2	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	LCO	Light Cycle Oil	L	N	G	120	300	NA
C-420-20162-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	L	N	G	112	300	UK
C-420-20163-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	L	N	G	111	300	UK
C-420-20164.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	350	900	NA
C-420-20164-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	350	900	UK
C-420-20165.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	394	900	NA
C-420-20165-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	394	900	UK
C-420-20166.3	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	72	900	NA
C-420-20166-V	0420-LT NEU H/F	Hydrotreater		V	Gate	2	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	72	900	UK
C-420-20167.2	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	220	900	NA
C-420-20170-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	181	900	UK
C-420-20182.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	Flushing Oil	Diesel - Light Gas Oil	L	N	G	65	900	NA
C-420-20182-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.5	Flushing Oil	Diesel - Light Gas Oil	L	N	G	65	900	UK
C-420-20183-V	0420-LT NEU H/F	Hydrotreater		V	Globe	1	Flushing Oil	Diesel - Light Gas Oil	L	N	G	65	900	UK
C-420-20184-P	0420-LT NEU H/F	Hydrotreater	P-1755	P	Seal	Unknown	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	258	200	NA
C-420-20184-P	0420-LT NEU H/F	Hydrotreater	P-1755	C	Pump Housing	Unknown	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	258	200	NA
C-420-20184-P	0420-LT NEU H/F	Hydrotreater	P-1755	P		4	TKC VAC BTMS	Vacuum Tower Bottoms	L	N	G	440	200	NA
C-420-20187.2	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	LCO	Light Cycle Oil	N	N	G	90	120	NA
C-420-20187.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	LCO	Light Cycle Oil	N	N	G	103	120	NA

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C-420-20187.5	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.75	LCO	Light Cycle Oil	N	N	G	90	120	NA
C-420-20187-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	90	120	UK
C-420-20188-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	90	120	UK
C-420-20189-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	91	190	UK
C-420-20190.3	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.5	LCO	Light Cycle Oil	N	N	G	91	190	NA
C-420-20190-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	91	190	UK
C-420-20193-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	LCO	Light Cycle Oil	N	N	G	207	350	UK
C-420-20205.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	78	15	NA
C-420-20205-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	78	15	UK
C-420-20206-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	Flushing Oil	Diesel - Light Gas Oil	N	N	G	67	15	UK
C-420-20213.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	59	395	NA
C-420-20213.3	0420-LT NEU H/F	Hydrotreater		C	Flange	6	LCO	Light Cycle Oil	N	N	G	59	395	NA
C-420-20213-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	59	395	UK
C-420-20214.2	0420-LT NEU H/F	Hydrotreater		C	Flange	6	LCO	Light Cycle Oil	N	N	G	400	395	NA
C-420-20214-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC8	Light Gas Oil	N	N	G	121	4	UK
C-420-20214-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	400	395	UK
C-420-20215-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	400	395	UK
C-420-20216.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	LCO	Light Cycle Oil	N	N	G	329	395	NA
C-420-20216-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LCO	Light Cycle Oil	N	N	G	329	395	UK
C-420-20232-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	Flushing Oil	Diesel - Light Gas Oil	N	N	G	68	15	UK
C-420-20236-P	0420-LT NEU H/F	Hydrotreater	P-1778	P	Seal	Unknown	TKC VAC SC7	Light Gas Oil	L	N	G	230	210	NA
C-420-20236-P	0420-LT NEU H/F	Hydrotreater	P-1778	C	Pump Housing	Unknown	TKC VAC SC7	Light Gas Oil	L	N	G	230	210	NA
C-420-20246-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	Flushing Oil	Diesel - Light Gas Oil	N	N	G	257	200	UK
C-420-20247.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	257	200	NA
C-420-20247-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.5	Flushing Oil	Diesel - Light Gas Oil	N	N	G	257	200	UK
C-420-20248.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	473	200	NA
C-420-20262-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	262	85	UK
C-420-20263.1	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	262	85	NA
C-420-20263-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	262	85	UK
C-420-20264.3	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC SC7	Light Gas Oil	N	N	G	461	85	NA
C-420-20264-V	0420-LT NEU H/F	Hydrotreater		V	Globe	3	TKC VAC SC7	Light Gas Oil	N	N	G	461	85	UK
C-420-20265	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC SC4	Light Gas Oil	N	N	G	105	1.1	NA
C-420-20266-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	68.5	5	UK
C-420-20267.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	107	5	NA
C-420-20267-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	107	5	UK
C-420-20268.2	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC SC7	Light Gas Oil	N	N	G	462	0.5	NA
C-420-20268-V	0420-LT NEU H/F	Hydrotreater		V	Gate	3	TKC VAC SC7	Light Gas Oil	N	N	G	462	0.5	UK
C-420-20269.2	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	462	0.5	NA
C-420-20269-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	462	0.5	UK
C-420-20270.3	0420-LT NEU H/F	Hydrotreater		C	Bonnet	1.5	TKC VAC SC7	Light Gas Oil	N	N	G	462	0.5	NA
C-420-20270-V	0420-LT NEU H/F	Hydrotreater		V	Control	1.5	TKC VAC SC7	Light Gas Oil	N	N	G	462	0.5	UK
C-420-20271.2	0420-LT NEU H/F	Hydrotreater		C	Flange	3	TKC VAC SC7	Light Gas Oil	N	N	G	462	0.5	NA
C-420-20307.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC Feed	Light Gas Oil	N	N	G	115	-27	NA
C-420-20360	0420-LT NEU H/F	Hydrotreater	LNHF	C	AG	8	TKC VAC SC4	Light Gas Oil	L	N	G	86	Blank	NA
C-420-20374	0420-LT NEU H/F	Hydrotreater	LNHF	C	AG	8	TKC VAC SC4	Light Gas Oil	L	N	G	174	Blank	NA
C-420-20375-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	L	N	G	72	Blank	UK
C-420-20338	0420-LT NEU H/F	Hydrotreater		C	Flange	10	TKC VAC SC4	Light Gas Oil	N	N	G	190	0	NA
C-420-20342-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	72	0	UK
C-420-20343.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC SC4	Light Gas Oil	N	N	G	176	31	NA
C-420-20343-V	0420-LT NEU H/F	Hydrotreater		V	Globe	4	TKC VAC SC4	Light Gas Oil	N	N	G	176	31	UK
C-420-20344-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	TKC VAC SC4	Light Gas Oil	N	N	G	176	31	UK
C-420-20345.2	0420-LT NEU H/F	Hydrotreater		C	Flange	1.5	TKC VAC SC4	Light Gas Oil	L	N	G	202	0	NA
C-420-20345.2	0420-LT NEU H/F	Hydrotreater		C	Flange	1.5	TKC VAC SC4	Light Gas Oil	N	N	G	195	31	NA
C-420-20346-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	TKC VAC SC4	Light Gas Oil	L	N	G	212	0	UK
C-420-20346-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	TKC VAC SC4	Light Gas Oil	N	N	G	206	31	UK
C-420-20347.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	L	N	G	146	Blank	NA
C-420-20347.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	188	31	NA
C-420-20347-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	L	N	G	146	Blank	UK
C-420-20347-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	201	31	UK
C-420-20348-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	L	N	G	126	Blank	UK
C-420-20348-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	200	31	UK
C-420-20349.2	0420-LT NEU H/F	Hydrotreater		C	Bonnet	6	TKC VAC SC4	Light Gas Oil	L	N	G	91	Blank	NA
C-420-20349.2	0420-LT NEU H/F	Hydrotreater		C	Bonnet	6	TKC VAC SC4	Light Gas Oil	N	N	G	109	0	NA
C-420-20349-V	0420-LT NEU H/F	Hydrotreater		V	Gate	6	TKC VAC SC4	Light Gas Oil	L	N	G	91	Blank	UK
C-420-20349-V	0420-LT NEU H/F	Hydrotreater		V	Gate	6	TKC VAC SC4	Light Gas Oil	N	N	G	109	0	UK
C-420-20350	0420-LT NEU H/F	Hydrotreater	LNHF	C	F	8	TKC VAC SC4	Light Gas Oil	L	N	G	88	Blank	NA
C-420-20350	0420-LT NEU H/F	Hydrotreater	LNHF	C	F	10	TKC VAC SC4	Light Gas Oil	N	N	G	93	0	NA
C-420-20360	0420-LT NEU H/F	Hydrotreater	LNHF	C	F	10	TKC VAC SC4	Light Gas Oil	N	N	G	83	5	NA
C-420-20374	0420-LT NEU H/F	Hydrotreater		C	Flange	10	TKC VAC SC4	Light Gas Oil	N	N	G	177	5	NA
C-420-20375-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	75	5	UK
C-420-20376.2	0420-LT NEU H/F	Hydrotreater		C	Flange	6	TKC VAC SC4	Light Gas Oil	L	N	G	168	Blank	NA
C-420-20376.2	0420-LT NEU H/F	Hydrotreater		C	Flange	6	TKC VAC SC4	Light Gas Oil	N	N	G	175	5	NA
C-420-20376-V	0420-LT NEU H/F	Hydrotreater		V	Gate	6	TKC VAC SC4	Light Gas Oil	L	N	G	168	Blank	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-420-20376-V	0420-LT NEU H/F	Hydrotreater		V	Gate	6	TKC VAC SC4	Light Gas Oil	N	N	G	175	5	UK
C-420-20379-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	56	Blank	UK
C-420-20379-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	54	85	UK
C-420-20307-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC Feed	Light Gas Oil	N	N	G	115	-27	UK
C-420-20380.2	0420-LT NEU H/F	Hydrotreater		C	Flange	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	54	Blank	NA
C-420-20380.2	0420-LT NEU H/F	Hydrotreater		C	Flange	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	50	85	NA
C-420-20380-V	0420-LT NEU H/F	Hydrotreater		V	Control	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	54	Blank	UK
C-420-20380-V	0420-LT NEU H/F	Hydrotreater		V	Control	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	50	85	UK
C-420-20381-V	0420-LT NEU H/F	Hydrotreater		V	Globe	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	53	Blank	UK
C-420-20381-V	0420-LT NEU H/F	Hydrotreater		V	Globe	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	52	85	UK
C-420-20382-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	72	-7.3	UK
C-420-20383.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	72	-7.3	NA
C-420-20383.3	420-LT NEU H/F 17	Hydrotreater		C	Flange	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	72	-7.3	NA
C-420-20383-V	420-LT NEU H/F 17	Hydrotreater		V	Control	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	72	-7.3	UK
C-420-20384-V	420-LT NEU H/F 17	Hydrotreater		V	Globe	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	72	-7.3	UK
C-420-20385.2	0420-LT NEU H/F	Hydrotreater		C	Flange	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	402	42	NA
C-420-20385.2	0420-LT NEU H/F	Hydrotreater		C	Flange	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	415	45	NA
C-420-20385-V	0420-LT NEU H/F	Hydrotreater		V	Globe	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	402	42	UK
C-420-20385-V	0420-LT NEU H/F	Hydrotreater		V	Globe	1	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	415	45	UK
C-420-20386.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	467	42	NA
C-420-20386.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	455	45	NA
C-420-20386-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	467	42	UK
C-420-20386-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	455	45	UK
C-420-20387-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	220	42	UK
C-420-20387-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	240	45	UK
C-420-20388.2	0420-LT NEU H/F	Hydrotreater		C	Flange	2	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	360	42	NA
C-420-20388.2	0420-LT NEU H/F	Hydrotreater		C	Flange	2	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	340	45	NA
C-420-20388-V	0420-LT NEU H/F	Hydrotreater		V	Globe	2	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	360	42	UK
C-420-20389.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	460	28	NA
C-420-20389-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	460	28	UK
C-420-20390.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	446	28	NA
C-420-20390-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	446	28	UK
C-420-20391.3	0420-LT NEU H/F	Hydrotreater		C	Flange	2	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	420	26	NA
C-420-20391-V	0420-LT NEU H/F	Hydrotreater		V	Control	2	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	420	26	UK
C-420-20392-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	431	26	UK
C-420-20393.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	450	40	NA
C-420-20393-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	431	26	UK
C-420-20394-V	0420-LT NEU H/F	Hydrotreater		V	Globe	2	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	360	26	UK
C-420-20395.3	0420-LT NEU H/F	Hydrotreater		C	Tube Fitting	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	185	40	NA
C-420-20395-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	270	26	UK
C-420-20396.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	365	40	NA
C-420-20396-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	410	26	UK
C-420-20397.3	0420-LT NEU H/F	Hydrotreater		C	Flange	1.5	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	407	40	NA
C-420-20397-V	0420-LT NEU H/F	Hydrotreater		V	Control	1.5	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	360	200	UK
C-420-20398-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	240	200	UK
C-420-20399.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	335	200	NA
C-420-20399-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	335	200	UK
C-420-20400-V	0420-LT NEU H/F	Hydrotreater		V	Check	4	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	461	200	UK
C-420-20401.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	430	40	NA
C-420-20401-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	435	200	UK
C-420-20402.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	426	200	NA
C-420-20402-V	0420-LT NEU H/F	Hydrotreater		V	Gate	4	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	426	200	UK
C-420-20403.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	465	200	NA
C-420-20403-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	465	200	UK
C-420-20404.2	0420-LT NEU H/F	Hydrotreater		C	Flange	6	TKC VAC Feed	Light Gas Oil	N	N	G	570	200	NA
C-420-20406	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC Feed	Light Gas Oil	N	N	G	254	200	NA
C-420-20407	0420-LT NEU H/F	Hydrotreater		C	Flange	2	TKC VAC Feed	Light Gas Oil	N	N	G	370	200	NA
C-420-20408.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	72	-27	NA
C-420-20408-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	72	-27	UK
C-420-20409-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	72	-27	UK
C-420-20410-V	420-LT NEU H/F 17	Hydrotreater		V	Check	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	72	-27	UK
C-420-20411.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	203	-27	NA
C-420-20411.3	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	203	-27	NA
C-420-20411-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	203	-27	UK
C-420-20412.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	203	-27	NA
C-420-20412-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	203	-27	UK
C-420-20413.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	1	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	121	-27	NA
C-420-20413-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	1	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	121	-27	UK
C-420-20415.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	N	N	G	172	-27	NA
C-420-20415-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC7	Light Gas Oil	N	N	G	172	-27	UK
C-420-20416.3	420-LT NEU H/F 17	Hydrotreater		C	Flange	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	172	-27	NA
C-420-20416.4	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	N	N	G	172	-27	NA
C-420-20416-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	172	-27	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-420-20417.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	255	-27	NA
C-420-20417-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	255	-27	UK
C-420-20418-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	125	-27	UK
C-420-20419.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	125	-27	NA
C-420-20419-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC BTMS	Vacuum Tower Bottoms	N	N	G	125	-27	UK
C-420-20420.2	420-LT NEU H/F 17	Hydrotreater		C	Tube Fitting	0.5	TKC VAC SC8	Light Gas Oil	N	N	G	106	4	NA
C-420-20420-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC8	Light Gas Oil	N	N	G	106	4	UK
C-420-20421-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	UK
C-420-20422.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	NA
C-420-20422-V	420-LT NEU H/F 17	Hydrotreater		V	Check	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	UK
C-420-20423.3	420-LT NEU H/F 17	Hydrotreater		C	Flange	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	NA
C-420-20423-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	UK
C-420-20424-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	UK
C-420-20425.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	NA
C-420-20425-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	81	-27	UK
C-420-20426-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	171	-27	UK
C-420-20427.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	N	N	G	233	-27	NA
C-420-20427-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC7	Light Gas Oil	N	N	G	233	-27	UK
C-420-20428.3	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	N	N	G	146	-27	NA
C-420-20428-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC7	Light Gas Oil	N	N	G	146	-27	UK
C-420-20429.1	420-LT NEU H/F 17	Hydrotreater		C	Threaded	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	146	-27	NA
C-420-20429-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	146	-27	UK
C-420-20430	420-LT NEU H/F 17	Hydrotreater		C	Manway	18	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	331	-27	NA
C-420-20431.3	420-LT NEU H/F 17	Hydrotreater		C	Threaded	0.5	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	129	-0.05	NA
C-420-20431-V	420-LT NEU H/F 17	Hydrotreater		V	3-way	0.5	LNHF ATM BTMS	Atmospheric Tower Bottoms	N	N	G	129	-0.05	UK
C-420-20434.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	N	N	G	179	-27	NA
C-420-20434-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC7	Light Gas Oil	N	N	G	179	-27	UK
C-420-20435.2	420-LT NEU H/F 17	Hydrotreater		C	Threaded	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	104	0	NA
C-420-20435-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	104	0	UK
C-420-20436-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	136	0	UK
C-420-20437.1	420-LT NEU H/F 17	Hydrotreater		C	Tube Fitting	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	147	0	NA
C-420-20437.6	420-LT NEU H/F 17	Hydrotreater		C	Tube Fitting	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	147	0	NA
C-420-20437-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	147	0	UK
C-420-20438-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	249	0	UK
C-420-20439.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	2	TKC VAC SC7	Light Gas Oil	N	N	G	150	0	NA
C-420-20439-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC7	Light Gas Oil	N	N	G	150	0	UK
C-420-20440.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	N	N	G	346	0	NA
C-420-20440-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC7	Light Gas Oil	N	N	G	346	0	UK
C-420-20441.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	N	N	G	166	0	NA
C-420-20441-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	N	N	G	166	0	UK
C-420-20442.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	100	0	NA
C-420-20442-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	100	0	UK
C-420-20443-V	420-LT NEU H/F 17	Hydrotreater		V	Check	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	73	Blank	UK
C-420-20444.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	74	Blank	NA
C-420-20444-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	74	Blank	UK
C-420-20445-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	76	Blank	UK
C-420-20446.4	420-LT NEU H/F 17	Hydrotreater		C	Flange	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	104	Blank	NA
C-420-20446-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	112	Blank	UK
C-420-20447.3	420-LT NEU H/F 17	Hydrotreater		C	Flange	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	292	Blank	NA
C-420-20447-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	292	Blank	UK
C-420-20448.3	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	N	N	G	137	Blank	NA
C-420-20448-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	N	N	G	137	Blank	UK
C-420-20449.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	108	Blank	NA
C-420-20449-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	108	Blank	UK
C-420-20450.2	420-LT NEU H/F 17	Hydrotreater		C	Tube Fitting	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	188	0	NA
C-420-20450.5	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	188	0	NA
C-420-20450-V	420-LT NEU H/F 17	Hydrotreater		V	3-way	0.5	TKC VAC SC7	Light Gas Oil	N	N	G	188	0	UK
C-420-20451.3	420 LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	L	N	G	39	0	NA
C-420-20451.4	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC7	Light Gas Oil	N	N	G	42	0	NA
C-420-20451-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	233	0	UK
C-420-20452-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC7	Light Gas Oil	N	N	G	224	0	Y
C-420-20453-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	107	26	UK
C-420-20454.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	N	N	G	170	26	NA
C-420-20454.4	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	N	N	G	165	26	NA
C-420-20454-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	N	N	G	154	26	UK
C-420-20455.3	420-LT NEU H/F 17	Hydrotreater		C	Tube Fitting	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	85	26	NA
C-420-20455-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	104	26	UK
C-420-20456.2	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	N	N	G	135	26	NA
C-420-20456-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC4	Light Gas Oil	N	N	G	181	26	UK
C-420-20457.1	420-LT NEU H/F 17	Hydrotreater		C	Threaded	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	78	26	NA
C-420-20457.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	78	26	NA
C-420-20457.4	420-LT NEU H/F 17	Hydrotreater		C	Tube Fitting	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	78	26	NA
C-420-20457-V	420-LT NEU H/F 17	Hydrotreater		V	3-way	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	78	26	UK

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-420-20458.2	420-LT NEU H/F 17	Hydrotreater		C	Threaded	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	116	26	NA
C-420-20458.4	420-LT NEU H/F 17	Hydrotreater		C	Flange	6	TKC VAC SC4	Light Gas Oil	N	N	G	156	26	NA
C-420-20458-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	133	26	UK
C-420-20459-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	110	26	UK
C-420-20460-V	420-LT NEU H/F 17	Hydrotreater		V	3-way	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	119	26	UK
C-420-20461.2	420-LT NEU H/F 17	Hydrotreater		C	Threaded	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	80	26	NA
C-420-20461-V	420-LT NEU H/F 17	Hydrotreater		V	3-way	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	80	26	UK
C-420-20462.2	420-LT NEU H/F 17	Hydrotreater		C	Threaded	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	78	26	NA
C-420-20462-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	78	26	UK
C-420-20463-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	146	26	UK
C-420-20464-V	420-LT NEU H/F 17	Hydrotreater		V	Needle	0.5	TKC VAC SC4	Light Gas Oil	N	N	G	104	26	UK
C-420-20465.2	420 LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	L	N	G	161	0	NA
C-420-20465.4	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC4	Light Gas Oil	N	N	G	170	26	NA
C-420-20465-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	142	26	UK
C-420-20466-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	N	N	G	66	26	UK
C-420-20467.4	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	TKC VAC SC8	Light Gas Oil	N	N	G	74	4	NA
C-420-20467-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	2	TKC VAC SC8	Light Gas Oil	N	N	G	74	4	UK
C-420-20468.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	Flushing Oil	Diesel - Light Gas Oil	N	N	G	74	4	NA
C-420-20468-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC8	Light Gas Oil	N	N	G	71	4	UK
C-420-20469.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC8	Light Gas Oil	N	N	G	71	4	NA
C-420-20469-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC8	Light Gas Oil	N	N	G	71	4	UK
C-420-20470.2	420-LT NEU H/F 17	Hydrotreater		C	Plug	0.75	TKC VAC SC8	Light Gas Oil	N	N	G	71	4	NA
C-420-20470-V	420-LT NEU H/F 17	Hydrotreater		V	Gate	0.75	TKC VAC SC8	Light Gas Oil	N	N	G	71	4	UK
C-420-20472.1	420-LT NEU H/F 17	Hydrotreater		C	Flange	2	Flushing Oil	Diesel - Light Gas Oil	N	N	G	74	4	NA
C-420-20478.1	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	68	0	NA
C-420-20478.3	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	68	0	NA
C-420-20478.6	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	68	0	NA
C-420-20478.9	0420-LT NEU H/F	Hydrotreater		C	Plug	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	68	0	NA
C-420-20478-V	0420-LT NEU H/F	Hydrotreater		V	3 Way	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	68	0	UK
C-420-20479.2	0420-LT NEU H/F	Hydrotreater		C	Threaded	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	79	0	NA
C-420-20479-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	79	0	UK
C-420-20480-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.5	TKC VAC SC4	Light Gas Oil	L	N	G	80	0	UK
C-420-20514.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	Light Gas Oil	L	N	G	208	200	NA
C-420-20514-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	TKC VAC SC4	Light Gas Oil	L	N	G	208	200	UK
C-420-20515.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	200	350	NA
C-420-20515-V	0420-LT NEU H/F	Hydrotreater		V	Gate	0.75	LNHF ATM BTMS	Atmospheric Tower Bottoms	L	N	G	200	350	UK
C-420-20517-V	0420-LT NEU H/F	Hydrotreater		V	Needle	0.5	LCO	Light Cycle Oil	L	N	G	120	183	UK
C-420-20518-V	0420-LT NEU H/F	Hydrotreater		V	Gate	1	LCO	Light Cycle Oil	L	N	G	105	190	UK
C-420-3	420 LT NEU H/F 17	Hydrotreater	E-174-A	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-4	420 LT NEU H/F 17	Hydrotreater	E-174-A	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-5	420 LT NEU H/F 17	Hydrotreater	E-174-B	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-6	420 LT NEU H/F 17	Hydrotreater	E-174-B	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-7	420 LT NEU H/F 17	Hydrotreater	E-174-B	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-8	420 LT NEU H/F 17	Hydrotreater	E-174-B	C	Plug	0.75	TKC VAC SC4	Unknown	N	N	P	130	0.1	NA
C-420-9	0420-LT NEU H/F	Hydrotreater		C	Plug	Unknown	TKC VAC SC4	Vacuum Tower Bottoms	N	N	P	56	0.1	NA
C-422-20037-P	0422-Gas Rcvy	Gas Recovery	P=1930A	P	Seal	Unknown	Lean DEA	Amine	Blank	Blank	G	62	250	NA
C-429-20084-P	0429-H2 MFG	Hydrogen Production	P-382	P	Seal	Blank	Lean MEA	Amine	N	N	G	140	20	NA
C-429-20084-P	0429-H2 MFG	Hydrogen Production	P-382	C	Pump Housing	Unknown	Lean MEA	Amine	N	N	G	140	20	NA
C-429-20096-P	0402-H2 Mfg	Hydrogen Production	P-382A	P	Seal	Unknown	Lean MEA	Amine	L	N	G	168	38	NA
C-429-20096-P	0402-H2 Mfg	Hydrogen Production	P-382A	C	Pump Housing	Unknown	Lean MEA	Amine	L	N	G	168	38	NA
C-429-20238-P	0429-H2 MFG B-Train 2	Hydrogen Production	P-385	P	Seal	Unknown	MEA Stripper	Amine	L	N	G	95	112	NA
C-429-20238-P	0429-H2 MFG B-Train 2	Hydrogen Production	P-385	C	Pump Housing	Unknown	MEA Stripper	Amine	L	N	G	95	112	NA
C-429-20246-P	0429-H2 MFG	Hydrogen Production	P-385A	P	Seal	Blank	MEA Stripper Reflux	Amine	N	N	G	72	20	NA
C-429-20246-P	0429-H2 MFG	Hydrogen Production	P-385A	C	Pump Housing	Unknown	MEA Stripper Reflux	Amine	N	N	G	72	20	NA
C-953-20026-P	0953-NO 5 H2S	Gas Recovery	P-851	P	Seal	Unknown	Amine	Amine	L	N	G	54	0	NA
C-953-20026-P	0953-NO 5 H2S	Gas Recovery	P-851	C	Pump Housing	Unknown	Amine	Amine	L	N	G	54	0	NA
C-953-20045-P	0953-NO 5 H2S	Gas Recovery	P-852	P	Seal	Blank	Amine	Amine	N	N	G	59	5	NA
C-953-20045-P	0953-NO 5 H2S	Gas Recovery	P-852	C	Pump Housing	Unknown	Amine	Amine	N	N	G	59	5	NA
C-955-20096-P	0955-NO 4 Crude	Crude Unit	P-1168	P	Seal	Unknown	Crude VAC SC6	Light Gas Oil	L	N	G	334	170	NA
C-955-20096-P	0955-NO 4 Crude	Crude Unit	P-1168	C	Pump Housing	Unknown	Crude VAC SC6	Light Gas Oil	L	N	G	334	170	NA
C-955-20112-P	0955-NO 4 Crude	Crude Unit	P-1168A	P	Seal	Blank	NO 6 SC	Light Gas Oil	N	N	G	292	45	NA
C-955-20112-P	0955-NO 4 Crude	Crude Unit	P-1168A	C	Pump Housing	Unknown	NO 6 SC	Light Gas Oil	N	N	G	292	45	NA
C-955-20145-P	0955-NO 4 Crude	Crude Unit	P-1169	P	Seal	6	Crude VAC SC6	Light Gas Oil	L	N	G	358	225	NA
C-955-20145-P	0955-NO 4 Crude	Crude Unit	P-1169	C	Pump Housing	Unknown	Crude VAC SC6	Light Gas Oil	L	N	G	358	225	NA
C-955-20395-P	0955-NO 4 Crude	Crude Unit	P-1179	P	Seal	Blank	Crude VAC SC7	Heavy Gas Oil	N	N	G	499	70	NA
C-955-20395-P	0955-NO 4 Crude	Crude Unit	P-1179	C	Pump Housing	Unknown	Crude VAC SC7	Heavy Gas Oil	N	N	G	499	70	NA
C-955-20410-P	0955-NO 4 Crude	Crude Unit	P-1189A	P	Seal	Unknown	Crude VAC SC8	Heavy Gas Oil	L	N	G	378	110	NA
C-955-20410-P	0955-NO 4 Crude	Crude Unit	P-1189A	C	Pump Housing	Unknown	Crude VAC SC8	Heavy Gas Oil	L	N	G	378	110	NA
C-955-20431-P	0955-NO 4 Crude	Crude Unit	P-1189	P	Seal	Blank	Crude VAC SC8	Heavy Gas Oil	N	N	G	472	220	NA
C-955-20431-P	0955-NO 4 Crude	Crude Unit	P-1189	C	Pump Housing	Unknown	Crude VAC SC8	Heavy Gas Oil	N	N	G	472	220	NA
C-955-20540-P	0955-NO 4 Crude	Crude Unit	P-1188	P	Seal	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	L	N	G	500	20	NA
C-955-20540-P	0955-NO 4 Crude	Crude Unit	P-1188	C	Pump Housing	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	L	N	G	500	20	NA
C-955-20557-P	0955-NO 4 Crude	Crude Unit	P-1188A	P	Seal	Blank	Crude VAC BTMS	Vacuum Tower Bottoms	N	N	G	624	50	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-955-20557-P	0955-NO 4 Crude	Crude Unit	P-1188A	C	Pump Housing	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	N	N	G	624	50	NA
C-955-20578-P	0955-NO 4 Crude	Crude Unit	P-1165	P	Seal	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	L	N	G	553	33	NA
C-955-20578-P	0955-NO 4 Crude	Crude Unit	P-1165	C	Pump Housing	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	L	N	G	553	33	NA
C-955-20596-P	0955-NO 4 Crude	Crude Unit	P-1165A	P	Seal	Blank	Crude VAC BTMS	Vacuum Tower Bottoms	N	N	G	585	55	NA
C-955-20596-P	0955-NO 4 Crude	Crude Unit	P-1165A	C	Pump Housing	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	N	N	G	585	55	NA
C-955-20875-P	0955-NO 4 Crude	Crude Unit	P-1105A	P	Seal	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	L	N	G	556	75	NA
C-955-20875-P	0955-NO 4 Crude	Crude Unit	P-1105A	C	Pump Housing	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	L	N	G	556	75	NA
C-955-20893-P	0955-NO 4 Crude	Crude Unit	P-1105	P	Seal	Blank	Crude VAC BTMS	Vacuum Tower Bottoms	N	N	G	658	70	NA
C-955-20893-P	0955-NO 4 Crude	Crude Unit	P-1105	C	Pump Housing	Unknown	Crude VAC BTMS	Vacuum Tower Bottoms	N	N	G	658	70	NA
C-955-20917-P	0955-NO 4 Crude	Crude Unit	P-1159A	P	Seal	Unknown	Crude VAC SC6	Light Gas Oil	L	N	G	541	57	NA
C-955-20917-P	0955-NO 4 Crude	Crude Unit	P-1159A	C	Pump Housing	Unknown	Crude VAC SC6	Light Gas Oil	L	N	G	541	57	NA
C-955-20936-P	0955-NO 4 Crude	Crude Unit	P-1159	P	Seal	Blank	Crude ATM SC5	Light Gas Oil	N	N	G	326	145	NA
C-955-20936-P	0955-NO 4 Crude	Crude Unit	P-1159	C	Pump Housing	Unknown	Crude ATM SC5	Light Gas Oil	N	N	G	326	145	NA
C-955-20965-P	0955-NO 4 Crude	Crude Unit	P-1167	C	Pump Housing	Unknown	Vacuum Resid	Resid	L	N	G	352	82	NA
C-956-20001-P	0956-DHT 16	Hydrotreater	P-16294	P	Seal	Blank	DSL	Diesel	L	N	G	84	110	NA
C-956-20001-P	0956-DHT 16	Hydrotreater	P-16294	C	Pump Housing	Blank	DSL	Diesel	L	N	G	84	110	NA
C-963-20001-P	0956-DHT 16	Hydrotreater	P-1680A	P	Seal	Blank	Lean DEA	Amine	L	N	G	145	310	NA
C-963-20001-P	0956-DHT 16	Hydrotreater	P-1680A	C	Pump Housing	Blank	Lean DEA	Amine	L	N	G	145	310	NA
C-120-20375-P	0120-POLE YA	Tank Farm		P	Seal	6	LCO	Cycle Oil	N	N	G	70	165	NA
C-120-20373-P	0120-POLE YA	Tank Farm		P	Seal	6	LCO	Cycle Oil	N	N	G	70	165	NA
C-120-20408	0120-POLE YA	Tank Farm		V	Check Valve	0.75	Gas Oil	Gas Oil	N	N	G	78	165	UK
C-120-20414-V	0120-POLE YA	Tank Farm		V	Ball Valve	1	Gas Oil	Gas Oil	N	N	G	80	165	UK
C-120-20276-V	0120-POLE YA	Tank Farm		V	Gate	0.75	FCC Feed	Gas Oil	N	N	G	86	60	UK
C-120-20284.2	0120-POLE YA	Tank Farm		C	Threaded	0.75	FCC Feed	Gas Oil	N	N	G	81	40	NA
C-120-20313-V	0120-POLE YA	Tank Farm		V	Gate	6	FCC Feed	Gas Oil	N	N	G	176	60	UK
C-120-20313.2	0120-POLE YA	Tank Farm		C	Flange	6	FCC Feed	Gas Oil	N	N	G	176	60	NA
C-120-20310-V	0120-POLE YA	Tank Farm		V	Gate	1	FCC Feed	Gas Oil	N	N	G	102	60	UK
C-120-20311.2	0120-POLE YA	Tank Farm		C	Plug	0.75	FCC Feed	Gas Oil	N	N	G	90	60	NA
C-120-20283-V	0120-POLE YA	Tank Farm		V	Gate	6	FCC Feed	Gas Oil	N	N	G	160	40	UK
C-120-20283.2	0120-POLE YA	Tank Farm		C	Flange	6	FCC Feed	Gas Oil	N	N	G	160	40	NA
C-120-20291-V	0120-POLE YA	Tank Farm		V	Ball Valve	1	VGO	Gas Oil	N	N	G	76	40	UK
C-120-20227-V	0120-POLE YA	Tank Farm		P	Seal	6	Gas Oil	Gas Oil	N	N	G	59	40	NA
C-120-20261-V	0120-POLE YA	Tank Farm		V	Gate	0.75	DAO	Deasphalted Oil	N	N	G	67	40	UK
C-120-20265-V	0120-POLE YA	Tank Farm		V	Gate	0.75	DAO	Deasphalted Oil	N	N	P	67	40	UK
C-120-20260	0120-POLE YA	Tank Farm		C	Flange	8	DAO	Deasphalted Oil	N	N	G	120	40	NA
C-120-20260.1	0120-POLE YA	Tank Farm		C	Flange	8	DAO	Deasphalted Oil	N	N	G	120	40	NA
C-120-20219.2	0120-POLE YA	Tank Farm		C	Plug	0.75	Gas Oil	Gas Oil	N	N	G	70	10	NA
C-120-20815.6	0120-POLE YA	Tank Farm		C	Union	0.75	Gas Oil	Gas Oil	N	N	G	87	10	NA
C-120-20217-V	0120-POLE YA	Tank Farm		V	Gate	0.75	Gas Oil	Gas Oil	N	N	G	77	19	UK
C-120-20225-V	0120-POLE YA	Tank Farm		V	Globe	6	Gas Oil	Gas Oil	N	N	G	58	0	UK
C-120-20236	0120-POLE YA	Tank Farm		C	Manway	24	Gas Oil	Gas Oil	N	N	G	52	40	NA
C-120-20257.3	0120-POLE YA	Tank Farm		C	Flange	8	Gas Oil	Gas Oil	N	N	G	105	40	NA
C-120-20283-P	0120-POLE YA	Tank Farm		P	Seal	1	Neutral Oil	Lube Oil	N	N	G	65	50	NA
C-120-20359-V	0120-POLE YA	Tank Farm		V	Gate	12	Diesel	Diesel	N	N	P	98	50	UK
C-120-10762-V	0120-POLE YA	Tank Farm		V	Gate	0.75	Diesel	Diesel	N	N	G	80	50	UK
C-120-20760.02	0120-POLE YA	Tank Farm		C	Flange	12	Diesel	Diesel	N	N	P	105	50	NA
C-120-20643-P	0120-POLE YA	Tank Farm		P	Seal	8	Neutral Oil	Lube Oil	N	N	G	99	3.5	NA
C-120-20664-P	0120-POLE YA	Tank Farm		P	Seal	8	Neutral Oil	Lube Oil	N	N	G	120	6	NA
C-120-20017-P	0120-POLE YA	Tank Farm		P	Seal	6	VGO	Gas Oil	N	N	G	115	0	NA
C-120-20014.01	0120-POLE YA	Tank Farm		C	Plug	0.75	VGO	Gas Oil	N	N	G	58	0	NA
C-120-20012.02	0120-POLE YA	Tank Farm		C	Threaded	0.75	VGO	Gas Oil	N	N	G	58	0	NA
C-120-20094-P	0120-POLE YA	Tank Farm		P	Seal	20	SDA Feed	Other	N	N	G	275	140	NA
C-120-20092-P	0120-POLE YA	Tank Farm		P	Seal	20	VGO	Gas Oil	N	N	G	275	140	NA
C-120-20140-P	0120-POLE YA	Tank Farm		P	Seal	20	Lean DEA	Amine	N	N	G	275	140	NA
C-120-20110.06	0120-POLE YA	Tank Farm		C	Plug	0.75	SDA Feed	Other	N	N	G	275	140	NA
C-120-20129.1-V	0120-POLE YA	Tank Farm		V	Gate	0.75	SDA Feed	Other	N	N	G	275	140	UK
C-120-20127.1-V	0120-POLE YA	Tank Farm		V	Gate	12	SDA Feed	Other	N	N	G	275	140	UK
C-120-20807.03	0120-POLE YA	Tank Farm		C	Flange	6	SDA Feed	Other	N	N	G	275	140	NA
C-120-20103-V	0120-POLE YA	Tank Farm		V	Ball Valve	1	SDA Feed	Other	N	N	G	275	140	UK
C-1620-20543-P	B & S	Tank Farm	Pole Yard	P	Seal	4	Lube Oil	Lube Oil	N	N	G	73	95	NA
C-1620-20446-P	B & S	Tank Farm	Pole Yard	P	Seal	4	RLOP Feed	Lube Oil	N	N	G	73	Head Press	NA
C-1620-20473.2	B & S	Tank Farm	Pole Yard	C	Plug	0.75	RLOP Feed	Lube Oil	N	N	G	59	Head Press	NA
C-1620-20403-V	B & S	Tank Farm	Pole Yard	V	Ball Valve	1	RLOP Feed	Lube Oil	N	N	P	98	Head Press	Y
C-1620-20468.3	B & S	Tank Farm	Pole Yard	C	Flange	2	RLOP Feed	Lube Oil	N	N	G	66	Head Press	NA
C-1620-20453-V	B & S	Tank Farm	Pole Yard	V	Gate	0.75	RLOP Feed	Lube Oil	N	N	G	58	Head Press	UK
C-1620-20003-P	B & S	Tank Farm	Pole Yard	P	Seal	6	Diesel	Diesel	N	N	G	50	10	NA
C-1620-20026	B & S	Tank Farm	Pole Yard	PRD	Press PRD	0.75	Diesel	Diesel	N	N	P	50	10	NA
C-1620-20029	B & S	Tank Farm	Pole Yard	PRD	PRD	0.75	Diesel	Diesel	N	N	P	50	10	NA
C-1620-20039	B & S	Tank Farm	Pole Yard	PRD	PRD	0.75	Diesel	Diesel	N	N	P	50	10	NA
C-1620-20041-V	B & S	Tank Farm	Pole Yard	V	Gate	0.75	Diesel	Diesel	N	N	P	50	10	UK
C-1620-20018-V	B & S	Tank Farm	Pole Yard	V	Needle	0.25	Diesel	Diesel	N	N	G	55	10	UK
C-1620-20077.2	B & S	Tank Farm	Pole Yard	C	Threaded	0.25	Diesel	Diesel	N	N	G	55	3	NA
C-1620-20004	B & S	Tank Farm	Pole Yard	C	Manway	30	Diesel	Diesel	N	N	G	71	10	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
C-1620-20084-P	B & S	Tank Farm	RPH SP Hill	P	Seal	6	Diesel	Diesel	N	N	G	60	Head Press	NA
C-1620-20110	B & S	Tank Farm	RPH SP Hill	PRD	PRD	0.75	Diesel	Diesel	N	N	G	55	Head Press	NA
C-1620-20112	B & S	Tank Farm	RPH SP Hill	PRD	PRD	0.75	Diesel	Diesel	N	N	G	55	Head Press	NA
C-1620-20088-V	B & S	Tank Farm	RPH SP Hill	V	Ball Valve	0.75	Diesel	Diesel	N	N	P	55	Head Press	UK
C-1620-20030.3	B & S	Tank Farm	RPH SP Hill	C	Flange	8	Diesel	Diesel	N	N	G	53	Head Press	NA
C-1620-20121-V	B & S	Tank Farm	RPH SP Hill	V	Twin Seal	12	Diesel	Diesel	N	N	G	64	Head Press	UK
C-1620-21021.2	B & S	Tank Farm	RPH SP Hill	C	Bonnet	12	Diesel	Diesel	N	N	G	64	Head Press	NA
C-1620-20178-P	B & S	Tank Farm	RPH SP Hill	P	Seal	8	Diesel	Diesel	N	N	G	58	Head Press	NA
C-1620-20160-V	B & S	Tank Farm	RPH SP Hill	V	Needle	0.5	Diesel	Diesel	N	N	G	56	Head Press	N
C-1620-20209-V	B & S	Tank Farm	RPH SP Hill	V	Seal	6	Diesel	Diesel	N	N	G	60	Head Press	UK
C-1620-20252-V	B & S	Tank Farm	RPH SP Hill	V	Ball Valve	1	Diesel	Diesel	N	N	P	68	Head Press	UK
C-1620-20362-V	B & S	Tank Farm	RPH SP Hill	V	Ball Valve	1	Tetramer	Tetramer	N	N	P	52	Head Press	UK
C-1620-20399.1	B & S	Tank Farm	RPH SP Hill	C	Threaded	0.5	Tetramer	Tetramer	N	N	G	54	Head Press	UK
C-1620-20398-V	B & S	Tank Farm	RPH SP Hill	V	Control Valve	16	Tetramer	Tetramer	N	N	G	58	Head Press	UK
C-1620-20323-V	B & S	Tank Farm	RPH SP Hill	V	Twin Seal	3	Tetramer	Tetramer	N	N	G	62	Head Press	UK
C-1620-20323.4	B & S	Tank Farm	RPH SP Hill	C	Bonnet	3	Tetramer	Tetramer	N	N	G	62	Head Press	NA
C-1620-20333-V	B & S	Tank Farm	RPH SP Hill	V	Gate	0.75	Tetramer	Tetramer	N	N	G	62	Head Press	Y
C-1626-20450-P	B & S	Tank Farm	Quarry	P	Seal	6	Neutral Oil	Lube Oil	N	N	G	66	Head Press	NA
C-1626-20355-P	B & S	Tank Farm	Quarry	P	Seal	6	Neutral Oil	Lube Oil	N	N	G	66	Head Press	NA
C-1626-20453.3	B & S	Tank Farm	Quarry	C	Flange	8	Neutral Oil	Lube Oil	N	N	P	66	Head Press	NA
C-1626-20175-P	B & S	Tank Farm	Quarry	P	Seal	6	Neutral Oil	Lube Oil	N	N	G	66	Head Press	NA
C-1626-20250-V	B & S	Tank Farm	Quarry	V	Ball Valve	1	Neutral Oil	Lube Oil	N	N	P	69	Head Press	UK
C-1626-20218-P	B & S	Tank Farm	Quarry	P	Seal	6	Neutral Oil	Lube Oil	N	N	G	77	Head Press	NA
C-1626-20003-P	B & S	Tank Farm	Quarry	P	Seal	6	Lube Oil	Lube Oil	N	N	G	63	Head Press	NA
C-1626-20024-V	B & S	Tank Farm	Quarry	V	Gate	6	Lube Oil	Lube Oil	N	N	G	64	Head Press	UK
C-1626-20204-P	B & S	Tank Farm	Quarry	P	Seal	6	Neutral Oil	Lube Oil	N	N	G	69	Head Press	NA
C-1626-20556.1	B & S	Tank Farm	Quarry	C	Flange	8	Lube Oil	Lube Oil	N	N	G	73	30	NA
C-1626-20558.8	B & S	Tank Farm	Quarry	C	Threaded	0.5	Lube Oil	Lube Oil	N	N	G	65	30	NA
C-1626-20558-V	B & S	Tank Farm	Quarry	V	Needle	0.5	Lube Oil	Lube Oil	N	N	G	65	30	UK
C-1626-20042-P	B & S	Tank Farm	Quarry	P	Seal	6	Lube Oil	Lube Oil	N	N	G	66	Head Press	NA
C-1626-20109-P	B & S	Tank Farm	Quarry	P	Seal	6	Lube Oil	Lube Oil	N	N	G	66	Head Press	NA
C-1626-20341-P	B & S	Tank Farm	Quarry	P	Seal	6	Lube Oil	Lube Oil	N	N	G	68	Head Press	NA
C-1621-20079-P	B & S	Tank Farm	Main TK RD	P	Seal	6	HCO	Heavy Cycle Oil	N	N	G	51	Head Press	NA
C-1621-20077-P	B & S	Tank Farm	Main TK RD	P	Seal	6	VGO	Gas Oil	N	N	G	60	Head Press	NA
C-1621-20135-V	B & S	Tank Farm	Main TK RD	V	Gate	0.75	HCO	Heavy Cycle Oil	N	N	P	73	Head Press	Y
C-1621-20087.2	B & S	Tank Farm	Main TK RD	C	Threaded	0.5	HCO	Heavy Cycle Oil	N	N	G	64	Head Press	NA
C-1621-20001-P	B & S	Tank Farm	Main TK RD	P	Seal	6	Lube Oil	Lube Oil	N	N	G	66	Head Press	NA
C-1621-20005-P	B & S	Tank Farm	Main TK RD	P	Seal	10	VGO	Gas Oil	N	N	G	61	Head Press	NA
C-1627-20203-V	B & S	Tank Farm	24 PS	V	Control Valve	3	Tempered Oil	Other	N	N	G	61	75	UK
C-1627-20218-V	B & S	Tank Farm	24 PS	V	Bellow Valve	0.75	Tempered Oil	Other	N	N	G	70	185	UK
C-1627-20217-V	B & S	Tank Farm	24 PS	V	Gate	0.75	Tempered Oil	Other	N	N	G	70	185	UK
C-1627-20160-V	B & S	Tank Farm	24 PS	V	Bellow Valve	0.75	Fuel Oil	Fuel Oil	N	N	G	142	50	UK
C-1627-20117-V	B & S	Tank Farm	24 PS	V	Check Valve	6	Fuel Oil	Fuel Oil	N	N	G	220	90	UK
C-1627-20001-P	B & S	Tank Farm	CPH 24PS	P	Seal	6	Flushing Oil	Flushing Oil	N	N	G	58	100	NA
C-1627-20305.1	B & S	Tank Farm	CPH 24PS	C	Bonnet	0.75	Tar	Tar	N	N	G	110	140	NA
C-1627-20305.5	B & S	Tank Farm	CPH 24PS	C	Tube Fitting	0.75	Tar	Tar	N	N	G	110	140	NA
C-1627-20305.6	B & S	Tank Farm	CPH 24PS	C	Plug	0.75	Tar	Tar	N	N	G	110	140	NA
C-1627-20305.7	B & S	Tank Farm	CPH 24PS	C	Flange	6	Tar	Tar	N	N	G	110	140	NA
C-1627-20306-V	B & S	Tank Farm	CPH 24PS	V	Gate	0.25	Tar	Tar	N	N	G	110	140	UK
C-1627-20306.3	B & S	Tank Farm	CPH 24PS	C	Threaded	0.25	Tar	Tar	N	N	G	110	140	NA
C-1627-20303-V	B & S	Tank Farm	CPH 24PS	V	Gate	0.75	Tar	Tar	N	N	G	107	140	UK
C-1627-20303.2	B & S	Tank Farm	CPH 24PS	C	Plug	0.25	Tar	Tar	N	N	G	107	140	NA
C-1627-20309.3	B & S	Tank Farm	CPH 24PS	C	Union	0.75	Tempered Oil	Other	N	N	G	66	140	NA
C-1627-20298-V	B & S	Tank Farm	CPH 24PS	V	Gate	0.75	Tempered Oil	Other	N	N	G	120	118	UK
C-1627-20138.2	B & S	Tank Farm	CPH 24PS	C	Flange	12	Fuel Oil	Fuel Oil	N	N	G	97	180	NA
C-1627-20015-V	B & S	Tank Farm	CPH 24PS	V	Gate	6	LCO	Light Cycle Oil	N	N	G	58	98	UK
C-1627-20019-V	B & S	Tank Farm	CPH 24PS	V	3-Way	0.5	Flushing Oil	Flushing Oil	N	N	G	63	30	UK
C-1627-20021-1	B & S	Tank Farm	CPH 24PS	C	Threaded	0.75	LCO	Light Cycle Oil	N	N	G	63	30	NA
C-1627-20233.3	B & S	Tank Farm	CPH 24PS	C	Threaded	0.75	Tempered Oil	Other	N	N	P	73	30	NA
C-1627-20359-V	B & S	Tank Farm	CPH 24PS	V	3-Way	0.5	Cutter Oil	Other	N	N	G	60	30	UK
C-1627-20359.4	B & S	Tank Farm	CPH 24PS	C	Plug	0.5	Cutter Oil	Other	N	N	G	60	30	NA
C-1627-20359.5	B & S	Tank Farm	CPH 24PS	C	Threaded	0.5	Cutter Oil	Other	N	N	G	60	30	NA
C-1627-20359.8	B & S	Tank Farm	CPH 24PS	C	Tube Fitting	0.5	Cutter Oil	Other	N	N	G	60	30	NA
C-1627-20186	B & S	Tank Farm	CPH 24PS	V	Gate	12	Flushing Oil	Flushing Oil	N	N	G	60	30	UK
C-1627-20002.5	B & S	Tank Farm	CPH 24PS	C	Threaded	0.25	Flushing Oil	Flushing Oil	N	N	G	64	100	NA
C-422-20054-P	0422-Gas Rcvy	Gas Recovery	P-1930	P	Seal	Unknown	Lean DEA	Amine	L	N	G	95	112	NA
C-420-20003-P	0420-LT NEU H/F	Hydrotreater	P-1749A	V	Needle Valve	0.5	TKC VAC SC4	Other	N	N	G	62	55	UK
C-1627-20001-P	1627-CPH-24	Tank Farm		C	Pump Housing	Blank	Flushing Oil	Flushing Oil	N	N	G	65.5	100	NA
C-1627-20001-P	1627-CPH-24	Tank Farm		C	Pump Housing	Blank	Flushing Oil	Fuel Oil	N	N	G	83	50	NA
C-1627-20241-P	1627-CPH-24	Tank Farm	P-343	P	Seal	Blank	Tempered Oil	Fuel Oil	L	N	G	115	120	NA
C-402-20019-P	0402-H2 MFG A-Train 3	Hydrogen Production		P	Pump Housing	Unknown	MEA Stripper	Amine	L	N	G	81	10	NA
D-1	DSU	Hydrotreater	Syn Jet Manifold	V	GT	4	JT	Jet	N	Blank	G	51.5	107	Y
D-3	DSU	Hydrotreater	Syn Jet Manifold	V	CV	4	JT	Jet	N	Blank	G	50.5	107	Y

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D-5	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	4	JT	Jet	N	Blank	G	50.8	107	NA
D-7	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	4	JT	Jet	N	Blank	G	51.6	107	NA
D-9	DSU	Hydrotreater	Syn Jet	V	GT	0.75	JT	Jet	N	Blank	G	50.7	107	Y
D-11	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	50.8	107	Y
D-13	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	4	JT	Jet	N	Blank	G	53.6	107	NA
D-15	DSU	Hydrotreater	Syn Jet Manifold	V	GT	4	JT	Jet	N	Blank	G	52.3	107	Y
D-17	DSU	Hydrotreater	Syn Jet Manifold	V	GT	4	JT	Jet	N	Blank	G	60.5	107	Y
D-19	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	4	JT	Jet	N	Blank	G	64.9	107	NA
D-21	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	55.9	107	Y
D-23	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	57.7	107	Y
D-25	DSU	Hydrotreater	Syn Jet Manifold	C	TF	0.5	JT	Jet	N	Blank	G	53.1	107	NA
D-27	DSU	Hydrotreater	Syn Jet Manifold	C	Bushing	0.75	JT	Jet	N	Blank	G	47.6	107	NA
D-29	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	JT	Jet	N	Blank	G	47.1	107	Y
D-31	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	JT	Jet	N	Blank	G	55.6	107	Y
D-33	DSU	Hydrotreater	Syn Jet Manifold	C	PL	0.5	JT	Jet	N	Blank	G	56.6	107	NA
D-35	DSU	Hydrotreater	Syn Jet Manifold	V	CV	4	JT	Jet	N	Blank	G	68.6	107	Y
D-37	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	4	JT	Jet	N	Blank	G	73.1	107	NA
D-39	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	64	107	Y
D-41	DSU	Hydrotreater	Syn Jet Manifold	V	GT	4	JT	Jet	N	Blank	G	65.4	107	Y
D-43	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	65.7	107	Y
D-45	DSU	Hydrotreater	Syn Jet Manifold	C	BS	0.75	JT	Jet	N	Blank	G	63.8	107	NA
D-47	DSU	Hydrotreater	Syn Jet Manifold	C	TF	0.5	JT	Jet	N	Blank	G	63.6	107	NA
D-49	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	JT	Jet	N	Blank	G	77.3	107	Y
D-51	DSU	Hydrotreater	Synjet Manifold	V	BL	0.5	JT	Jet	N	Blank	G	60.5	107	Y
D-53	DSU	Hydrotreater	Synjet Manifold	V	N	0.5	JT	Jet	N	Blank	G	63.9	107	Y
D-55	DSU	Hydrotreater	Synjet Manifold	C	TF	0.5	JT	Jet	N	Blank	G	80.1	107	NA
D-57	DSU	Hydrotreater	Synjet Manifold	V	N	0.5	JT	Jet	N	Blank	G	63.7	107	Y
D-59	DSU	Hydrotreater	Synjet Manifold	V	BL	0.5	JT	Jet	N	Blank	G	62.9	107	Y
D-61	DSU	Hydrotreater	Synjet Manifold	C	Flange	0.5	JT	Jet	N	Blank	G	60.7	107	NA
D-63	DSU	Hydrotreater	Synjet Manifold	V	N	0.5	LGO	Gas Oil	N	Blank	G	61.4	107	Y
D-65	DSU	Hydrotreater	Synjet Manifold	C	TF	0.5	LGO	Gas Oil	N	Blank	G	61.4	107	NA
D-67	DSU	Hydrotreater	Synjet Manifold	V	BL	0.5	LGO	Gas Oil	N	Blank	G	62.4	107	Y
D-69	DSU	Hydrotreater	Synjet Manifold	C	BP	0.5	LGO	Gas Oil	N	Blank	G	60.6	107	NA
D-71	DSU	Hydrotreater	Synjet Manifold	C	Flange	0.5	LGO	Gas Oil	N	Blank	G	53.4	107	NA
D-2	DSU	Hydrotreater	P16189	V	GT	6	JT	Jet	L	N	G	62.5	1000	Y
D-4	DSU	Hydrotreater	P16189	C	BP	0.75	JT	Jet	L	N	G	62.5	1000	NA
D-6	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	62.5	1000	Y
D-8	DSU	Hydrotreater	P16189	C	FL	6	JT	Jet	L	N	G	62.5	1000	NA
D-10	DSU	Hydrotreater	P16189	C	Flange	3	JT	Jet	L	N	G	62.5	1000	NA
D-12	DSU	Hydrotreater	P16189	V	GT	1	JT	Jet	L	N	G	62.5	1000	Y
D-14	DSU	Hydrotreater	P16189	C	Flange	1	JT	Jet	L	N	G	62.5	1000	NA
D-16	DSU	Hydrotreater	P16189	V	GT	1	JT	Jet	L	N	G	62.5	1000	Y
D-18	DSU	Hydrotreater	P16189	C	Flange	1	JT	Jet	L	N	G	62.5	1000	NA
D-20	DSU	Hydrotreater	P16189	V	BL	0.5	JT	Jet	L	N	G	62.5	1000	Y
D-22	DSU	Hydrotreater	P16189	C	TF	0.5	JT	Jet	L	N	G	62.5	1000	NA
D-24	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	62.5	1000	Y
D-26	DSU	Hydrotreater	P16189	C	Tube Fitting	0.5	JT	Jet	L	N	G	62.5	1000	NA
D-28	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	62.5	1000	Y
D-30	DSU	Hydrotreater	P16189	C	Flange	0.5	JT	Jet	N	N	G	57.7	1000	NA
D-32	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	57.7	1000	Y
D-34	DSU	Hydrotreater	P16189	C	Flange	0.5	JT	Jet	L	N	G	57.7	1000	NA
D-36	DSU	Hydrotreater	P16189	V	BL	0.5	JT	Jet	L	N	G	57.7	1000	Y
D-38	DSU	Hydrotreater	P16189	C	Flange	0.5	JT	Jet	L	N	G	57.7	1000	NA
D-40	DSU	Hydrotreater	P16189	V	BL	0.25	JT	Jet	L	N	G	57.7	1000	Y
D-42	DSU	Hydrotreater	P16189	C	TF	0.25	JT	Jet	L	N	G	57.7	1000	NA
D-44	DSU	Hydrotreater	P16189	V	N	0.75	JT	Jet	L	N	G	57.7	1000	Y
D-46	DSU	Hydrotreater	P16189	C	Flange	3	JT	Jet	L	N	G	57.7	1000	NA
D-48	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	57.7	1000	Y
D-50	DSU	Hydrotreater	P16189	V	GT	6	JT	Jet	L	N	G	57.7	50	Y
D-52	DSU	Hydrotreater	P16189	C	Flange	6	JT	Jet	L	N	G	57.7	50	NA
D-54	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	57.7	50	Y
D-56	DSU	Hydrotreater	P16189	C	Flange	6	JT	Jet	L	N	G	57.7	50	NA
D-58	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	57.7	50	Y
D-60	DSU	Hydrotreater	P16189	C	EL	0.75	JT	Jet	L	N	G	62.5	50	NA
D-62	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	62.5	50	Y
D-64	DSU	Hydrotreater	P16189	C	Tee	0.75	JT	Jet	L	N	G	62.5	50	NA
D-66	DSU	Hydrotreater	P16189	V	GT	0.5	JT	Jet	L	N	G	62.5	50	Y
D-68	DSU	Hydrotreater	P16189	C	TF	0.5	JT	Jet	L	N	G	62.5	50	NA
D-70	DSU	Hydrotreater	P16189	V	GT	0.5	GO	Gas Oil	L	N	G	62.5	50	Y
D-72	DSU	Hydrotreater	P16189	C	BP	0.5	Jet	Jet	L	N	G	62.5	50	NA
D-73	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	67.5	107	Y
D-74	DSU	Hydrotreater	P16189	V	GT	4	JT	Jet	L	N	G	62.5	1000	Y
D-75	DSU	Hydrotreater	Syn Jet Manifold	C	BP	0.75	JT	Jet	N	Blank	G	71.1	107	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-76	DSU	Hydrotreater	P16189	C	BP	0.75	JT	Jet	L	N	G	62.5	1000	NA
D-78	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	62.5	1000	Y
D-79	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	68.1	107	Y
D-80	DSU	Hydrotreater	P16189	V	CV	4	JT	Jet	L	N	G	62.5	1000	Y
D-81	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	0.75	JT	Jet	N	Blank	G	72.4	107	NA
D-82	DSU	Hydrotreater	P16189	C	Flange	0.75	JT	Jet	L	N	G	62.5	1000	NA
D-83	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	70.1	107	Y
D-84	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	62.5	1000	Y
D-85	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	3	JT	Jet	N	Blank	G	76.6	107	NA
D-86	DSU	Hydrotreater	P16189	C	BP	0.75	JT	Jet	L	N	G	62.5	1000	NA
D-87	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.5	JT	Jet	N	Blank	G	61.2	107	Y
D-88	DSU	Hydrotreater	P16189	V	GT	4	JT	Jet	L	N	G	62.5	1000	Y
D-89	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.5	JT	Jet	N	Blank	G	60.9	107	Y
D-90	DSU	Hydrotreater	P16189	C	Flange	4	JT	Jet	L	N	G	62.5	1000	NA
D-91	DSU	Hydrotreater	Syn Jet Manifold	C		0.75	JT	Jet	N	Blank	G	55.4	107	NA
D-92	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	62.5	1000	Y
D-93	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	JT	Jet	N	Blank	G	54.9	107	Y
D-94	DSU	Hydrotreater	P16189	C	Flange	4	JT	Jet	L	N	G	62.5	1000	NA
D-95	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	3	JT	Jet	N	Blank	G	74.8	107	NA
D-96	DSU	Hydrotreater	P16189	V	CV	3	JT	Jet	L	N	G	62.5	1000	Y
D-97	DSU	Hydrotreater	Syn Jet Manifold	V	GT	3	JT	Jet	N	Blank	G	77.6	107	Y
D-98	DSU	Hydrotreater	P16189	C	Flange	0.5	JT	Jet	L	N	G	57.7	1000	NA
D-99	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	4	LGO	Gas Oil	N	Blank	G	97.5	98	NA
D-100	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	57.7	1000	Y
D-101	DSU	Hydrotreater	Syn Jet Manifold	V	GT	4	LGO	Gas Oil	N	Blank	G	98.5	98	Y
D-102	DSU	Hydrotreater	P16189	C		0.5	JT	Jet	L	N	G	57.7	1000	NA
D-103	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	LGO	Gas Oil	N	Blank	G	61.7	98	Y
D-104	DSU	Hydrotreater	P16189	V	BL	0.5	JT	Jet	L	N	G	57.7	1000	Y
D-105	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	LGO	Gas Oil	N	Blank	G	59.2	98	Y
D-106	DSU	Hydrotreater	P16189	C	TF	0.5	JT	Jet	L	N	G	57.7	1000	NA
D-107	DSU	Hydrotreater	Syn Jet Manifold	C		0.5	LGO	Gas Oil	N	Blank	G	64.6	98	NA
D-108	DSU	Hydrotreater	P16189	V	BL	0.5	JT	Jet	L	N	G	57.7	1000	Y
D-109	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.5	LGO	Gas Oil	N	Blank	G	73.8	98	Y
D-110	DSU	Hydrotreater	P16189	C	TF	0.5	JT	Jet	L	N	G	57.7	1000	NA
D-111	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.5	LGO	Gas Oil	N	Blank	G	65.2	98	Y
D-112	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	57.7	1000	Y
D-113	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	4	LGO	Gas Oil	N	Blank	G	94	98	NA
D-114	DSU	Hydrotreater	P16189	C		0.5	JT	Jet	L	N	G	57.7	1000	NA
D-115	DSU	Hydrotreater	Syn Jet Manifold	V	GT	3	JT	Jet	N	Blank	G	78.3	107	Y
D-116	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	57.7	1000	Y
D-117	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	3	JT	Jet	N	Blank	G	79.7	107	NA
D-118	DSU	Hydrotreater	P16189	C		0.5	JT	Jet	L	N	G	57.7	50	NA
D-119	DSU	Hydrotreater	Syn Jet Manifold	V	GT	3	JT	Jet	N	Blank	G	60	107	Y
D-120	DSU	Hydrotreater	P16189	V	GT	1	JT	Jet	L	N	G	57.7	50	Y
D-121	DSU	Hydrotreater	Syn Jet Manifold	V	GT	3	JT	Jet	N	Blank	G	63.4	107	Y
D-122	DSU	Hydrotreater	P16189	C	Flange	4	JT	Jet	L	N	G	57.7	50	NA
D-123	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	3	JT	Jet	N	Blank	G	78.8	107	NA
D-124	DSU	Hydrotreater	P16189	V		4	JT	Jet	L	N	G	57.7	50	Y
D-125	DSU	Hydrotreater	Syn Jet Manifold	V		3	JT	Jet	N	Blank	G	77.3	107	Y
D-126	DSU	Hydrotreater	P16189	C	Flange	6	JT	Jet	L	N	G	57.7	50	NA
D-127	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	75.1	107	Y
D-128	DSU	Hydrotreater	P16189	V	GT	1	JT	Jet	L	N	G	57.7	50	Y
D-129	DSU	Hydrotreater	Syn Jet Manifold	C		0.75	JT	Jet	N	Blank	G	75.7	107	NA
D-130	DSU	Hydrotreater	P16189	C		0.75	JT	Jet	L	N	G	57.7	50	NA
D-131	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	73.2	107	Y
D-132	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	57.7	50	Y
D-133	DSU	Hydrotreater	Syn Jet Manifold	C		0.75	JT	Jet	N	Blank	G	122.2	107	NA
D-134	DSU	Hydrotreater	P16189	C		0.75	JT	Jet	L	N	G	57.7	50	NA
D-135	DSU	Hydrotreater	Syn Jet Manifold	V	GT	3	JT	Jet	N	Blank	G	81.5	107	Y
D-136	DSU	Hydrotreater	P16189	V	GT	6	JT	Jet	L	N	G	57.7	50	Y
D-137	DSU	Hydrotreater	Syn Jet Manifold	V	GT	3	JT	Jet	N	Blank	G	81.2	107	Y
D-138	DSU	Hydrotreater	P16189	C		0.5	JT	Jet	L	N	G	57.7	50	NA
D-139	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	3	J	Jet	N	Blank	G	81.4	107	NA
D-140	DSU	Hydrotreater	P16189	V	GT	0.75	JT	Jet	L	N	G	57.7	50	Y
D-141	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	LGO	Gas Oil	N	Blank	G	59.3	98	Y
D-142	DSU	Hydrotreater	P16189	C	BP	0.5	JT	Jet	L	N	G	57.7	50	NA
D-143	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	0.75	LGO	Gas Oil	N	Blank	G	58.7	98	NA
D-144	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	57.7	50	Y
D-145	DSU	Hydrotreater	Syn Jet Manifold	V	BL	0.75	LGO	Gas Oil	N	Blank	G	62.1	98	Y
D-146	DSU	Hydrotreater	P16189	C	BP	0.5	JT	Jet	L	N	G	57.7	50	NA
D-148	DSU	Hydrotreater	P16189	V	N	0.5	JT	Jet	L	N	G	57.7	50	Y
D-147	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	LGO	Gas Oil	N	Blank	G	47.4	0	Y
D-149	DSU	Hydrotreater	Syn Jet Manifold	C		0.5	LGO	Gas Oil	N	Blank	G	46.6	0	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-151	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	LGO	Gas Oil	N	Blank	G	46.9	0	Y
D-153	DSU	Hydrotreater	Syn Jet Manifold	C		0.5	LGO	Gas Oil	N	Blank	G	46.3	0	NA
D-155	DSU	Hydrotreater	Syn Jet Manifold	V	BL	0.5	LGO	Gas Oil	N	Blank	G	47.1	0	Y
D-157	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	47.6	0	Y
D-159	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	47.1	0	Y
D-161	DSU	Hydrotreater	Syn Jet Manifold	C	Flange	0.75	JT	Jet	N	Blank	G	46.9	0	NA
D-163	DSU	Hydrotreater	Syn Jet Manifold	V	BL	0.75	JT	Jet	N	Blank	G	47.3	0	Y
D-165	DSU	Hydrotreater	Syn Jet Manifold	C		0.5	JT	Jet	N	Blank	G	47.1	0	NA
D-167	DSU	Hydrotreater	Syn Jet Manifold	V	N	0.5	JT	Jet	N	Blank	G	47.5	0	Y
D-169	DSU	Hydrotreater	Syn Jet Manifold	C		0.5	JT	Jet	N	Blank	G	51.4	0	NA
D-171	DSU	Hydrotreater	Syn Jet Manifold	V	BL	0.5	JT	Jet	N	Blank	G	49.6	0	Y
D-173	DSU	Hydrotreater	Syn Jet Manifold	V	GT	0.75	JT	Jet	N	Blank	G	47.6	0	Y
D-150	DSU	Hydrotreater	V-751	V	GT	6	JT	Jet	N	N	T	67.2	36.5	Y
D-152	DSU	Hydrotreater	V-751	C	BP	0.75	JT	Jet	N	N	T	67.2	36.5	NA
D-154	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	T	67.2	36.5	Y
D-156	DSU	Hydrotreater	V-751	C	PL	0.75	JT	Jet	N	N	T	67.2	36.5	NA
D-158	DSU	Hydrotreater	V-751	PRD		4	JT	Jet	N	N	T	67.2	36.5	NA
D-160	DSU	Hydrotreater	V-751	C	Flange	2	JT	Jet	N	N	T	67.2	36.5	NA
D-162	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	T	67.2	36.5	Y
D-164	DSU	Hydrotreater	V-751	C	TF	0.5	JT	Jet	N	N	T	67.2	36.5	NA
D-166	DSU	Hydrotreater	V-751	V	GT	6	JT	Jet	N	N	T	67.2	36.5	Y
D-168	DSU	Hydrotreater	V-751	C	TF	0.5	JT	Jet	N	N	T	67.2	36.5	NA
D-170	DSU	Hydrotreater	V-751	V	N	0.5	JT	Jet	N	N	T	67.2	36.5	Y
D-172	DSU	Hydrotreater	V-751	C		0.5	JT	Jet	N	N	T	67.2	36.5	NA
D-174	DSU	Hydrotreater	V-751	V	GT	0.5	JT	Jet	N	N	T	67.2	36.5	Y
D-175	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	Jet	Jet	L	N	G	47.8	80	Y
D-176	DSU	Hydrotreater	V-751	C	Flange	4	JT	Jet	N	N	T	67.2	36.5	NA
D-177	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	JT	Jet	L	N	G	48.8	80	NA
D-178	DSU	Hydrotreater	V-751	V	GT	4	JT	Jet	N	N	T	67.2	36.5	Y
D-179	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	JT	Jet	L	N	G	48.5	80	NA
D-180	DSU	Hydrotreater	V-751	C	BP	0.75	JT	Jet	N	N	T	67.2	36.5	NA
D-181	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	JT	Jet	L	N	G	48.6	80	Y
D-182	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	T	67.2	36.5	Y
D-183	DSU	Hydrotreater	DSU S. Pipeway	C	BP	0.5	JT	Jet	L	N	G	48.7	80	NA
D-184	DSU	Hydrotreater	V-751	C	BP	0.75	JT	Jet	N	N	T	67.2	36.5	NA
D-185	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	3	JT	Jet	L	N	G	48.6	80	NA
D-186	DSU	Hydrotreater	V-751	PRD		6	JT	Jet	N	N	T	67.2	36.5	NA
D-187	DSU	Hydrotreater	DSU S. Pipeway	V	GT	3	JT	Jet	L	N	G	48.4	80	Y
D-188	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	T	67.2	36.5	Y
D-189	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	3	JT	Jet	L	N	G	48.5	80	NA
D-190	DSU	Hydrotreater	V-751	C	Flange	4	JT	Jet	N	N	T	67.2	36.5	NA
D-191	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	JT	Jet	L	N	G	48.9	80	Y
D-192	DSU	Hydrotreater	V-751	V	GT	6	JT	Jet	N	N	T	67.2	36.5	Y
D-193	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	JT	Jet	L	N	G	48.9	80	NA
D-194	DSU	Hydrotreater	V-751	C		0.75	JT	Jet	N	N	P	67.2	36.5	NA
D-195	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	JT	Jet	L	N	G	50.1	80	Y
D-196	DSU	Hydrotreater	V-752	V	GT	0.75	JT	Jet	N	N	P	67.2	36.5	Y
D-197	DSU	Hydrotreater	DSU S. Pipeway	V	GT	2	JT	Jet	L	N	G	49.8	80	Y
D-198	DSU	Hydrotreater	V-751	C		0.75	JT	Jet	N	N	P	67.2	36.5	NA
D-199	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	2	JT	Jet	L	N	G	50.3	80	NA
D-200	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	P	67.2	36.5	Y
D-201	DSU	Hydrotreater	DSU S. Pipeway	V		2	JT	Jet	L	N	G	49.1	80	Y
D-202	DSU	Hydrotreater	V-751	C		0.75	JT	Jet	N	N	P	67.2	36.5	NA
D-203	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	2	JT	Jet	L	N	G	48.9	80	NA
D-204	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	P	67.2	36.5	Y
D-205	DSU	Hydrotreater	DSU S. Pipeway	V	GT	3	JT	Jet	L	N	G	49.5	80	Y
D-206	DSU	Hydrotreater	V-751	C		0.75	JT	Jet	N	N	P	67.2	36.5	NA
D-208	DSU	Hydrotreater	V-751	V	GT	2	JT	Jet	N	N	P	67.2	36.5	Y
D-210	DSU	Hydrotreater	V-751	C		0.75	JT	Jet	N	N	P	67.2	36.5	NA
D-212	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	P	67.2	36.5	Y
D-214	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	P	67.2	36.5	Y
D-216	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	P	67.2	36.5	Y
D-218	DSU	Hydrotreater	V-751	V	GT	0.75	JT	Jet	N	N	P	67.2	36.5	Y
D-220	DSU	Hydrotreater	V-751	C		0.75	JT	Jet	N	N	P	67.2	36.5	NA
D-222	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-224	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-226	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-228	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-230	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-232	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-234	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-207	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	JT	Jet	L	N	G	51.6	80	Y
D-209	DSU	Hydrotreater	DSU S. Pipeway	C		0.75	LGO	Gas Oil	L	N	G	52.1	80	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-211	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	LGO	Gas Oil	L	N	G	52	80	Y
D-213	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	LGO	Gas Oil	L	N	G	53.2	80	NA
D-215	DSU	Hydrotreater	DSU S. Pipeway	V	N	0.5	LGO	Gas Oil	L	N	G	53.1	80	Y
D-217	DSU	Hydrotreater	DSU S. Pipeway	V	N	0.5	LGO	Gas Oil	L	N	G	52.8	80	Y
D-219	DSU	Hydrotreater	DSU S. Pipeway	C	BP	0.5	LGO	Gas Oil	L	N	G	51.2	80	NA
D-221	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	LGO	Gas Oil	L	N	G	53.3	80	Y
D-223	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	4	LGO	Gas Oil	L	N	G	54.2	80	NA
D-225	DSU	Hydrotreater	DSU S. Pipeway	V	GT	4	LGO	Gas Oil	L	N	G	54.3	80	Y
D-227	DSU	Hydrotreater	DSU S. Pipeway	V	CV	4	LGO	Gas Oil	L	N	G	59.5	0	Y
D-229	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	4	LGO	Gas Oil	L	N	G	59.2	0	NA
D-231	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	LGO	Gas Oil	L	N	G	60.2	0	Y
D-233	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	LGO	Gas Oil	L	N	G	59.2	0	Y
D-235	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	LGO	Gas Oil	L	N	G	59.5	0	NA
D-236	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-237	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	LGO	Gas Oil	L	N	G	59.3	0	Y
D-238	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-239	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	LGO	Gas Oil	L	N	G	58.6	0	NA
D-240	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-241	DSU	Hydrotreater	DSU S. Pipeway	V	GT	4	LGO	Gas Oil	L	N	G	59.5	0	Y
D-242	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-243	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	4	LGO	Gas Oil	L	N	G	60	0	NA
D-244	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	101.2	900	NA
D-245	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	LGO	Gas Oil	L	N	G	61.9	0	Y
D-247	DSU	Hydrotreater	DSU S. Pipeway	C		0.75	LGO	Gas Oil	L	N	G	61.8	0	NA
D-249	DSU	Hydrotreater	DSU S. Pipeway	V	N	0.5	JT	Jet	L	N	G	60.8	108	Y
D-251	DSU	Hydrotreater	DSU S. Pipeway	V	N	0.5	JT	Jet	L	N	G	61.3	108	Y
D-253	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	JT	Jet	L	N	G	61	108	NA
D-255	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	JT	Jet	L	N	G	61	108	NA
D-257	DSU	Hydrotreater	DSU S. Pipeway	V	N	0.5	JT	Jet	L	N	G	58.4	108	Y
D-259	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	JT	Jet	L	N	G	61.1	108	NA
D-261	DSU	Hydrotreater	DSU S. Pipeway	C		0.5	JT	Jet	L	N	G	63.4	108	NA
D-263	DSU	Hydrotreater	DSU S. Pipeway	V	N	0.5	JT	Jet	L	N	G	60.9	108	Y
D-265	DSU	Hydrotreater	DSU S. Pipeway	C	Plug	0.5	JT	Jet	L	N	G	61.5	108	NA
D-267	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	JT	Jet	L	N	G	60.8	108	Y
D-269	DSU	Hydrotreater	DSU S. Pipeway	V	GT	3	JT	Jet	L	N	G	60.5	108	Y
D-271	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	3	JT	Jet	L	N	G	60	108	NA
D-273	DSU	Hydrotreater	DSU S. Pipeway	V	CV	3	JT	Jet	L	N	G	60.8	108	Y
D-275	DSU	Hydrotreater	DSU S. Pipeway	V	GT	0.75	JT	Jet	L	N	G	61.9	108	Y
D-277	DSU	Hydrotreater	DSU S. Pipeway	V	GT	2	JT	Jet	L	N	G	60.5	108	Y
D-279	DSU	Hydrotreater	DSU S. Pipeway	C	Flange	2	JT	Jet	L	N	G	60.4	108	NA
D-281	DSU	Hydrotreater	DSU S. Pipeway	V	GT	3	JT	Jet	L	N	G	60.3	108	Y
D-246	DSU	Hydrotreater	V. 751	C		0.5	JT	Jet	L	N	P	79.3	40	NA
D-248	DSU	Hydrotreater	V. 751	C		0.5	JT	Jet	L	N	P	79.3	40	NA
D-250	DSU	Hydrotreater	V. 751	C		0.5	JT	Jet	L	N	P	79.3	40	NA
D-252	DSU	Hydrotreater	V. 751	C		Blank	JT	Jet	L	N	P	79.3	40	NA
D-254	DSU	Hydrotreater	V. 751	V	GT	2	JT	Jet	L	N	P	79.3	40	Y
D-256	DSU	Hydrotreater	V. 751	C	Flange	3	JT	Jet	L	N	P	79.3	40	NA
D-258	DSU	Hydrotreater	V. 751	V	N	0.5	JT	Jet	L	N	G	70.1	40	Y
D-260	DSU	Hydrotreater	V. 751	C	BP	0.5	JT	Jet	L	N	G	70.1	40	NA
D-262	DSU	Hydrotreater	V. 751	V	N	0.5	JT	Jet	L	N	G	70.1	40	Y
D-264	DSU	Hydrotreater	V. 751	C		0.5	JT	Jet	L	N	G	70.1	40	NA
D-266	DSU	Hydrotreater	V. 751	V	N	0.5	JT	Jet	L	N	G	70.1	40	Y
D-268	DSU	Hydrotreater	V. 751	C		0.5	JT	Jet	L	N	G	70.1	40	NA
D-270	DSU	Hydrotreater	V. 751	V	N	0.5	JT	Jet	L	N	G	70.1	40	Y
D-272	DSU	Hydrotreater	V. 751	C		0.5	JT	Jet	L	N	G	70.1	40	NA
D-274	DSU	Hydrotreater	V. 751	V	GT	0.75	JT	Jet	L	N	G	82.6	40	Y
D-276	DSU	Hydrotreater	V. 751	C	Flange	6	JT	Jet	L	N	G	82.6	40	NA
D-278	DSU	Hydrotreater	V. 751	V		6	JT	Jet	L	N	G	82.6	40	Y
D-280	DSU	Hydrotreater	V. 751	C	Flange	6	JT	Jet	L	N	G	82.6	40	NA
D-282	DSU	Hydrotreater	V. 751	V	GT	6	JT	Jet	L	N	G	82.6	40	Y
D-283	DSU	Hydrotreater	PS-17	V	N	0.5	LGO	Gas Oil	N	Blank	G	49.9	0	Y
D-284	DSU	Hydrotreater	V. 751	V	GT	6	JT	Jet	L	N	G	82.6	40	Y
D-285	DSU	Hydrotreater	PS-17	V	N	0.5	LGO	Gas Oil	N	Blank	G	50	0	Y
D-286	DSU	Hydrotreater	V. 751	V	BL	0.25	JT	Jet	N	N	G	62.6	40	Y
D-287	DSU	Hydrotreater	PS-17	C		0.5	LGO	Gas Oil	N	Blank	G	51.2	0	NA
D-288	DSU	Hydrotreater	V. 751	C		0.25	JT	Jet	N	N	G	62.6	40	NA
D-289	DSU	Hydrotreater	PS-17	C		0.5	LGO	Gas Oil	N	Blank	G	52.3	0	NA
D-291	DSU	Hydrotreater	PS-17	V	GT	0.5	LGO	Gas Oil	N	Blank	G	51.8	0	Y
D-293	DSU	Hydrotreater	PS-17	V	GT	0.5	LGO	Gas Oil	N	Blank	G	51.3	0	Y
D-295	DSU	Hydrotreater	PS-17	V	GT	0.75	LGO	Gas Oil	N	Blank	G	49.9	0	Y
D-297	DSU	Hydrotreater	PS-17	C		0.75	LGO	Gas Oil	N	Blank	G	50.6	0	NA
D-299	DSU	Hydrotreater	PS-17	V	GT	4	LGO	Gas Oil	N	Blank	G	49.9	0	Y
D-301	DSU	Hydrotreater	PS-17	C	Flange	4	LGO	Gas Oil	N	Blank	G	49.4	0	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-303	DSU	Hydrotreater	PS-17	V	GT	4	LGO	Gas Oil	N	Blank	G	49.6	0	Y
D-305	DSU	Hydrotreater	PS-17	V	GL	2	LGO	Gas Oil	N	Blank	G	49.8	0	Y
D-307	DSU	Hydrotreater	PS-17	C	Flange	2	LGO	Gas Oil	N	Blank	G	50	0	NA
D-309	DSU	Hydrotreater	PS-17	V	CV	2	LGO	Gas Oil	N	Blank	G	50.1	0	Y
D-311	DSU	Hydrotreater	PS-17	V	GT	0.75	LGO	Gas Oil	N	Blank	G	51.8	0	Y
D-313	DSU	Hydrotreater	PS-17	C	Flange	4	LGO	Gas Oil	N	Blank	G	50.5	0	NA
D-315	DSU	Hydrotreater	PS-17	V	GT	4	LGO	Gas Oil	N	Blank	G	50.5	0	Y
D-317	DSU	Hydrotreater	PS-17	V	GT	0.75	LGO	Gas Oil	N	Blank	G	51.5	0	Y
D-319	DSU	Hydrotreater	PS-17	V	GT	4	LGO	Gas Oil	N	Blank	G	51.3	0	Y
D-321	DSU	Hydrotreater	PS-17	C	Flange	4	LGO	Gas Oil	N	Blank	G	50.7	0	NA
D-323	DSU	Hydrotreater	PS-17	V	GT	4	LGO	Gas Oil	N	Blank	G	50.7	0	Y
D-325	DSU	Hydrotreater	PS-16	C		0.75	LGO	Gas Oil	N	Blank	G	53.1	0	NA
D-327	DSU	Hydrotreater	PS-16	V	GT	0.75	LGO	Gas Oil	N	Blank	G	53	0	Y
D-329	DSU	Hydrotreater	PS-16	V	N	0.5	LGO	Gas Oil	N	Blank	G	53.4	0	Y
D-331	DSU	Hydrotreater	PS-16	C		0.5	LGO	Gas Oil	N	Blank	G	49	0	NA
D-333	DSU	Hydrotreater	PS-16	V	GT	4	LGO	Gas Oil	N	Blank	G	51.6	0	Y
D-335	DSU	Hydrotreater	PS-16	C	Flange	4	LGO	Gas Oil	N	Blank	G	51.7	0	NA
D-337	DSU	Hydrotreater	PS-16	V	CU	3	LGO	Gas Oil	N	Blank	G	51.9	0	Y
D-339	DSU	Hydrotreater	PS16	V	GT	0.75	LGO	Gas Oil	N	Blank	G	55.3	0	Y
D-341	DSU	Hydrotreater	PS16	C	Flange	4	LGO	Gas Oil	N	Blank	G	53.2	0	NA
D-343	DSU	Hydrotreater	PS16	V	GT	4	LGO	Gas Oil	N	Blank	G	54	0	Y
D-345	DSU	Hydrotreater	PS16	V	N	0.5	LGO	Gas Oil	N	Blank	G	55.7	0	Y
D-347	DSU	Hydrotreater	PS16	V	N	0.5	LGO	Gas Oil	N	Blank	G	54.1	0	Y
D-349	DSU	Hydrotreater	PS16	V	GT	4	LGO	Gas Oil	N	Blank	G	53.3	0	Y
D-351	DSU	Hydrotreater	PS16	C	Flange	4	LGO	Gas Oil	N	Blank	G	54.2	0	NA
D-353	DSU	Hydrotreater	PS16	V	GT	0.5	LGO	Gas Oil	N	Blank	G	55.2	0	Y
D-355	DSU	Hydrotreater	PS16	V	GT	0.5	LGO	Gas Oil	N	Blank	G	55.5	0	Y
D-357	DSU	Hydrotreater	PS16	V	GT	2	LGO	Gas Oil	N	Blank	G	55.1	0	Y
D-359	DSU	Hydrotreater	PS16	C	Flange	4	LGO	Gas Oil	N	Blank	G	54.5	0	NA
D-361	DSU	Hydrotreater	PS16	V	GT	4	LGO	Gas Oil	N	Blank	G	58.2	0	Y
D-363	DSU	Hydrotreater	PS16	V	CU	2	LGO	Gas Oil	N	Blank	G	55.4	0	Y
D-365	DSU	Hydrotreater	PS16	V	GT	0.5	LGO	Gas Oil	N	Blank	G	57.6	0	Y
D-367	DSU	Hydrotreater	PS16	C	BP	0.5	LGO	Gas Oil	N	Blank	G	57.4	0	NA
D-369	DSU	Hydrotreater	PS16	V	GT	4	LGO	Gas Oil	N	Blank	G	55.4	0	Y
D-371	DSU	Hydrotreater	PS16	V	GT	4	LGO	Gas Oil	N	Blank	G	53.6	0	Y
D-440	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	127.1	689	NA
D-442	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	127.1	689	NA
D-444	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	127.1	689	NA
D-456	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	127.1	689	NA
D-458	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-460	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-462	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-464	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-466	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-468	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-470	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-472	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-474	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-476	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-478	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-410	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-412	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-414	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-416	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-418	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-420	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-422	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-424	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-426	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-428	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-430	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-432	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	204.5	689	NA
D-434	DSU	Hydrotreater	E-15250A	C	BP	1	JT	Jet	N	N	T	142.1	689	NA
D-436	DSU	Hydrotreater	E-15250A	C	BP	1	JT	Jet	N	N	T	142.1	689	NA
D-438	DSU	Hydrotreater	E-15250A	C	BP	1	JT	Jet	N	N	T	142.1	689	NA
D-350	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-352	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-354	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-356	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-358	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-360	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-362	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-364	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	186.3	689	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-366	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	123.3	689	NA
D-368	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	123.3	689	NA
D-370	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	123.3	689	NA
D-372	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	123.3	689	NA
D-374	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	123.3	689	NA
D-376	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	123.3	689	NA
D-378	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	123.3	689	NA
D-380	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-382	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-384	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	186.3	689	NA
D-386	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-388	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-390	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-392	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-394	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-396	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-398	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-400	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-402	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-404	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-406	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-408	DSU	Hydrotreater	E-933A	C	BP	1	JT	Jet	N	N	T	260	689	NA
D-538	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-540	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-542	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	194.7	689	NA
D-544	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	194.7	689	NA
D-546	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	194.7	689	NA
D-548	DSU	Hydrotreater	E-15250B	C	BP	1	JT	Jet	N	N	T	194.7	689	NA
D-550	DSU	Hydrotreater	E-15270A	C	BP	1	JT	Jet	N	N	T	194.7	689	NA
D-552	DSU	Hydrotreater	E-15270A	C	BP	1	JT	Jet	N	N	T	194.7	689	NA
D-554	DSU	Hydrotreater	E-15270A	C	BP	1	JT	Jet	N	N	T	194.7	689	NA
D-556	DSU	Hydrotreater	E-15270B	V	GT	0.75	JT	Jet	N	N	T	194.7	689	Y
D-558	DSU	Hydrotreater	E-15270B	C	Flange	2	JT	Jet	N	N	T	194.7	689	NA
D-560	DSU	Hydrotreater	E-15270A	V	GT	0.75	JT	Jet	N	N	T	194.7	689	Y
D-562	DSU	Hydrotreater	E-15270A	C	Flange	2	JT	Jet	N	N	T	194.7	689	NA
D-564	DSU	Hydrotreater	FV-568	V	GT	0.75	JT	Jet	N	N	G	120.5	689	Y
D-566	DSU	Hydrotreater	FV-568	C	Flange	3	JT	Jet	N	N	G	120.5	689	NA
D-568	DSU	Hydrotreater	FV-568	V		2	JT	Jet	N	N	G	120.5	135	Y
D-570	DSU	Hydrotreater	FV-568	C	PL	0.75	JT	Jet	N	N	G	120.5	135	NA
D-572	DSU	Hydrotreater	FV-568	V	GT	0.75	JT	Jet	N	N	G	120.5	135	Y
D-574	DSU	Hydrotreater	CU-284B	V	GT	6	JT	Jet	N	N	G	120.5	135	Y
D-576	DSU	Hydrotreater	CU-284B	C	Flange	6	JT	Jet	N	N	G	120.5	135	NA
D-578	DSU	Hydrotreater	CU-284B	V	GT	0.75	JT	Jet	N	N	G	120.5	135	Y
D-580	DSU	Hydrotreater	CU-284B	C		0.5	JT	Jet	N	N	G	120.5	135	NA
D-582	DSU	Hydrotreater	CU-284B	V	BL	0.5	JT	Jet	N	N	G	120.5	135	Y
D-584	DSU	Hydrotreater	CU-284B	C		0.5	JT	Jet	N	N	G	120.5	135	NA
D-586	DSU	Hydrotreater	CU-284B	V	GT	6	JT	Jet	N	N	G	120.5	135	Y
D-588	DSU	Hydrotreater	CU-284A	C	Flange	6	JT	Jet	N	N	G	120.5	135	NA
D-590	DSU	Hydrotreater	CU-284A	V		4	JT	Jet	N	N	G	120.5	135	Y
D-592	DSU	Hydrotreater	CU-284A	C	Flange	6	JT	Jet	N	N	G	120.5	135	NA
D-594	DSU	Hydrotreater	CU-284A	V	GT	0.75	JT	Jet	N	N	G	120.5	135	Y
D-480	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-482	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-484	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-486	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-488	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-490	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-492	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-494	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-496	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-498	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-500	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-502	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-504	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-506	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-508	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-510	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-512	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-514	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-516	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-518	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-520	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-522	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-524	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-526	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-528	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-530	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-532	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-534	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-536	DSU	Hydrotreater	E-16195	C	BP	1	JT	Jet	N	N	T	67.3	689	NA
D-489	DSU	Hydrotreater	V-758	C	BP	0.5	JT	Jet	N	N	T	66.4	700	NA
D-491	DSU	Hydrotreater	V-758	V	PL	3	JT	Jet	N	N	T	70.2	700	Y
D-493	DSU	Hydrotreater	V-758	C	Flange	2	JT	Jet	N	N	T	112.6	700	NA
D-495	DSU	Hydrotreater	V-758	C	Flange	1	JT	Jet	N	N	T	98.2	700	NA
D-497	DSU	Hydrotreater	V-758	C		Blank	JT	Jet	N	N	T	75.6	700	NA
D-499	DSU	Hydrotreater	V-758	V	GT	0.75	JT	Jet	N	N	T	75.4	700	Y
D-501	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	N	T	77	700	NA
D-503	DSU	Hydrotreater	V-758	V	N	0.5	JT	Jet	N	N	T	84.2	700	Y
D-505	DSU	Hydrotreater	V-758	V	N	0.5	JT	Jet	N	N	T	80.1	700	Y
D-507	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	N	T	69.9	700	NA
D-509	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	N	T	65.1	700	NA
D-511	DSU	Hydrotreater	V-758	V	GT	3	JT	Jet	N	N	T	94.3	700	Y
D-513	DSU	Hydrotreater	V-758	C	Flange	3	JT	Jet	N	N	T	111.3	700	NA
D-515	DSU	Hydrotreater	V-758	V	GT	0.75	JT	Jet	N	N	T	73.1	700	Y
D-517	DSU	Hydrotreater	V-758	C	Flange	3	JT	Jet	N	N	T	72.3	700	NA
D-519	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	N	T	73.1	700	NA
D-521	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	N	T	58.1	700	NA
D-523	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	N	T	45.1	700	NA
D-525	DSU	Hydrotreater	V-758	C	BP	0.5	JT	Jet	N	N	T	14.8	700	NA
D-527	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	N	T	53.6	700	NA
D-529	DSU	Hydrotreater	V-758	PRD	Pilot	3	JT	Jet	N	N	T	71.8	700	NA
D-531	DSU	Hydrotreater	V-758	C	Flange	4	JT	Jet	N	N	T	69	700	NA
D-533	DSU	Hydrotreater	V-758	V	GT	0.75	JT	Jet	N	N	T	70.9	700	Y
D-535	DSU	Hydrotreater	V-758	V	GT	6	JT	Jet	N	N	T	72.5	700	Y
D-537	DSU	Hydrotreater	V-758	C	Flange	6	JT	Jet	N	N	T	69.7	700	NA
D-539	DSU	Hydrotreater	V-758	V	PL	3	JT	Jet	N	N	T	72	700	Y
D-403	DSU	Hydrotreater	S. Pway SE of PS16	V	GT	0.75	DSL	Diesel	L	N	G	59.9	30	Y
D-405	DSU	Hydrotreater	S Pway DSU	C		0.5	DSL	Diesel	L	N	G	60.4	30	NA
D-407	DSU	Hydrotreater	S Pway DSU	V	N	0.5	DSL	Diesel	L	N	G	61.9	30	Y
D-409	DSU	Hydrotreater	S Pway DSU	C		0.5	DSL	Diesel	L	N	G	61	30	NA
D-411	DSU	Hydrotreater	S Pway DSU	V	BL	0.5	DSL	Diesel	L	N	G	60.1	30	Y
D-413	DSU	Hydrotreater	S Pway DSU	V	BL	1	DSL	Diesel	L	N	G	59.5	30	Y
D-415	DSU	Hydrotreater	S Pway DSU	C	Flange	0.5	DSL	Diesel	L	N	G	59.2	30	NA
D-417	DSU	Hydrotreater	S Pway DSU	V	GT	3	DSL	Diesel	L	N	G	59.9	30	Y
D-419	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	JT	Jet	L	N	G	59.2	25	Y
D-421	DSU	Hydrotreater	S Pway DSU	C	Flange	3	JT	Jet	L	N	G	59.4	25	NA
D-423	DSU	Hydrotreater	S Pway DSU	V	CV	3	JT	Jet	L	N	G	59.4	25	Y
D-425	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	JT	Jet	L	N	G	59	25	Y
D-427	DSU	Hydrotreater	S Pway DSU	C	Flange	3	JT	Jet	L	N	G	60.3	25	NA
D-429	DSU	Hydrotreater	S Pway DSU	V	GT	3	JT	Jet	L	N	G	60.7	25	Y
D-431	DSU	Hydrotreater	S Pway DSU	V	GT	2	JT	Jet	L	N	G	59.8	25	Y
D-373	DSU	Hydrotreater	S Pway DSU	V	GT	6	LGO	Gas Oil	L	N	G	64.4	25	Y
D-375	DSU	Hydrotreater	S Pway DSU	V	GT	4	LGO	Gas Oil	L	N	G	72.8	25	Y
D-377	DSU	Hydrotreater	S Pway DSU	C	Flange	4	LGO	Gas Oil	L	N	G	74.9	25	NA
D-379	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	LGO	Gas Oil	L	N	G	65.6	25	Y
D-381	DSU	Hydrotreater	S Pway DSU	V	GT	4	JT	Jet	L	N	G	68	25	Y
D-383	DSU	Hydrotreater	S Pway DSU	C	Flange	4	JT	Jet	N	N	G	59.1	25	NA
D-385	DSU	Hydrotreater	S Pway DSU	V	GT	4	JT	Jet	N	N	G	58.1	25	Y
D-387	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	JT	Jet	N	N	G	58.9	25	Y
D-389	DSU	Hydrotreater	S Pway DSU	V	GT	3	JT	Jet	N	N	G	58.6	25	Y
D-391	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	JT	Jet	N	N	G	58.8	25	Y
D-393	DSU	Hydrotreater	S Pway DSU	C	BP	0.5	JT	Jet	N	N	G	59.1	25	NA
D-395	DSU	Hydrotreater	S Pway DSU	V	GT	2	JT	Jet	N	N	G	58.1	25	Y
D-397	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	JT	Jet	N	N	G	58.8	25	Y
D-399	DSU	Hydrotreater	S Pway DSU	C	Flange	4	JT	Jet	N	N	G	57.5	25	NA
D-401	DSU	Hydrotreater	S Pway DSU	V	GT	4	JT	Jet	N	N	G	57.4	25	Y
D-596	DSU	Hydrotreater	CV-284A	C	Swagelok	0.75	JT	Jet	N	N	G	120.5	689	NA
D-433	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	JT	Jet	N	N	G	65.4	25	Y
D-435	DSU	Hydrotreater	S Pway DSU	C		0.5	JT	Jet	N	N	G	94.3	25	NA
D-437	DSU	Hydrotreater	S Pway DSU	V	N	0.5	JT	Jet	N	N	G	87.8	25	Y
D-439	DSU	Hydrotreater	S Pway DSU	C		0.5	JT	Jet	N	N	G	65.5	25	NA
D-441	DSU	Hydrotreater	S Pway DSU	V	BL	0.5	JT	Jet	N	N	G	65.3	25	Y
D-443	DSU	Hydrotreater	S Pway DSU	V	BL	0.5	JT	Jet	N	N	G	71.6	25	Y
D-445	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	LGO	Gas Oil	N	N	G	65.3	25	Y
D-447	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	LGO	Gas Oil	N	N	G	63.8	25	Y
D-449	DSU	Hydrotreater	S Pway DSU	C		0.5	LGO	Gas Oil	N	N	G	61.7	25	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-451	DSU	Hydrotreater	S Pway DSU	V	N	0.5	LGO	Gas Oil	N	N	G	63.3	25	Y
D-453	DSU	Hydrotreater	S Pway DSU	V	N	0.5	LGO	Gas Oil	N	N	G	61.9	25	Y
D-455	DSU	Hydrotreater	S Pway DSU	C	BP	0.5	LGO	Gas Oil	N	N	G	62.3	25	NA
D-457	DSU	Hydrotreater	S Pway DSU	V	GT	2	LGO	Gas Oil	N	N	G	77.2	25	Y
D-459	DSU	Hydrotreater	S Pway DSU	C		2	LGO	Gas Oil	N	N	G	63	25	NA
D-461	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	LGO	Gas Oil	N	N	G	73.4	25	Y
D-463	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	LGO	Gas Oil	N	N	G	61.2	25	Y
D-465	DSU	Hydrotreater	S Pway DSU	C		0.5	LGO	Gas Oil	N	N	G	61.5	25	NA
D-467	DSU	Hydrotreater	S Pway DSU	V	BL	0.75	LGO	Gas Oil	N	N	G	62	25	Y
D-469	DSU	Hydrotreater	S Pway DSU	V	N	0.5	JT	Jet	N	N	G	73.7	34	Y
D-471	DSU	Hydrotreater	S Pway DSU	C		0.5	JT	Jet	N	N	G	65.6	34	NA
D-473	DSU	Hydrotreater	S Pway DSU	V	BL	0.5	JT	Jet	N	N	G	63.8	34	Y
D-475	DSU	Hydrotreater	S Pway DSU	V	GT	0.75	JT	Jet	N	N	G	61.7	34	Y
D-477	DSU	Hydrotreater	S Pway DSU	V	BL	0.5	JT	Jet	H	Y	G	69.8	70	Y
D-479	DSU	Hydrotreater	P-2944	C		0.5	JT	Jet	H	Y	G	73.8	70	NA
D-481	DSU	Hydrotreater	P-2944	V	GT	6	JT	Jet	H	Y	G	68.6	70	Y
D-483	DSU	Hydrotreater	V-758	C	Flange	2	JT	Jet	N	N	T	67.4	700	NA
D-485	DSU	Hydrotreater	V-758	V	CV	2	JT	Jet	N	N	T	65.5	700	Y
D-487	DSU	Hydrotreater	V-758	V	PL	1	JT	Jet	N	N	T	65.2	700	Y
D-320	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-322	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-324	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-326	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-328	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-330	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-332	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-334	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-336	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-338	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-340	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-342	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-344	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-346	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-348	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	N	N	T	149.9	689	NA
D-290	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-292	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-294	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-296	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-298	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-300	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-302	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-304	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-306	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-308	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-310	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-312	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-314	DSU	Hydrotreater	E-933B	C	BP	1	JT	Jet	N	N	T	249.6	689	NA
D-316	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-318	DSU	Hydrotreater	E-932B	C	BP	1	JT	Jet	N	N	T	104.4	689	NA
D-541	DSU	Hydrotreater	V-758	C	Flange	6	JT	Jet	N	Blank	T	54.2	700	NA
D-543	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	Blank	T	55.5	700	NA
D-545	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	Blank	T	53.9	700	NA
D-547	DSU	Hydrotreater	V-758	PRD	PI	Blank	JT	Jet	N	Blank	T	51.6	700	NA
D-549	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	Blank	T	52.6	700	NA
D-551	DSU	Hydrotreater	V-758	C	Flange	2	JT	Jet	N	Blank	T	54.2	700	NA
D-553	DSU	Hydrotreater	V-758	V	PL	0.75	JT	Jet	N	Blank	T	55.9	700	Y
D-555	DSU	Hydrotreater	V-758	C	Flange	2	JT	Jet	N	Blank	T	55.3	700	NA
D-557	DSU	Hydrotreater	V-758	V	PL	2	JT	Jet	N	Blank	T	54	700	Y
D-559	DSU	Hydrotreater	V-758	C	Flange	2	JT	Jet	N	Blank	T	57.6	700	NA
D-561	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	N	Blank	T	51.8	700	Y
D-563	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	T	53.9	700	NA
D-565	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	N	Blank	T	52.8	700	Y
D-567	DSU	Hydrotreater	V-758	V	GL	1	JT	Jet	N	Blank	T	54.1	700	N
D-569	DSU	Hydrotreater	V-758	C	Flange	8	JT	Jet	N	Blank	P	118.2	700	NA
D-571	DSU	Hydrotreater	V-758	V	GT	2	JT	Jet	N	N	P	76.7	700	Y
D-573	DSU	Hydrotreater	V-758	V	GT	0.75	JT	Jet	N	Blank	P	52.2	700	Y
D-575	DSU	Hydrotreater	V-758	C		0.75	JT	Jet	N	Blank	P	54.5	700	NA
D-577	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	P	55.4	700	NA
D-579	DSU	Hydrotreater	V-758	V	GT	2	JT	Jet	N	Blank	P	60	700	Y
D-581	DSU	Hydrotreater	V-758	C	Flange	2	JT	Jet	N	Blank	P	60.4	700	NA
D-583	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	P	57.5	700	NA
D-585	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	N	Blank	P	56.9	700	Y
D-587	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	P	58.5	700	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-589	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	N	Blank	P	57.7	700	Y
D-591	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	P	58	700	NA
D-593	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	P	58	700	NA
D-595	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	N	Blank	P	60	700	Y
D-597	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	P	59.9	700	NA
D-598	DSU	Hydrotreater	E-15106	V		6	JT	Jet	L	N	G	109.1	689	Y
D-599	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	N	Blank	P	58.6	700	Y
D-600	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-601	DSU	Hydrotreater	V-758	V	GT	2	JT	Jet	N	Blank	P	79.1	700	Y
D-602	DSU	Hydrotreater	E-15106	V	N	0.5	JT	Jet	L	N	G	109.1	689	N
D-603	DSU	Hydrotreater	V-758	C	Flange	2	JT	Jet	N	Blank	G	73.3	700	NA
D-604	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-605	DSU	Hydrotreater	V-758	V	GT	2	JT	Jet	N	Blank	G	65.3	700	Y
D-606	DSU	Hydrotreater	E-15106	V	N	0.5	JT	Jet	L	N	G	109.1	689	N
D-607	DSU	Hydrotreater	V-758	C		2	JT	Jet	N	Blank	G	61.9	700	NA
D-608	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-609	DSU	Hydrotreater	V-758	C	Flange	3	JT	Jet	N	Blank	G	99.7	700	NA
D-610	DSU	Hydrotreater	E-15106	V	N	0.5	JT	Jet	L	N	G	109.1	689	Y
D-611	DSU	Hydrotreater	V-758	V	GT	3	JT	Jet	N	Blank	G	93.6	700	Y
D-612	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-613	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	N	Blank	G	68.4	700	Y
D-614	DSU	Hydrotreater	E-15106	V	N	0.5	JT	Jet	L	N	G	109.1	689	Y
D-615	DSU	Hydrotreater	V-758	C	Flange	3	JT	Jet	N	Blank	G	97.2	700	NA
D-616	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-617	DSU	Hydrotreater	V-758	V	CV	3	JT	Jet	N	Blank	G	102.8	700	Y
D-618	DSU	Hydrotreater	E-15106	V		6	JT	Jet	L	N	G	109.1	689	Y
D-619	DSU	Hydrotreater	V-758	V	GT	3	JT	Jet	N	Blank	G	88.8	700	Y
D-620	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-621	DSU	Hydrotreater	V-758	C	Flange	3	JT	Jet	N	Blank	G	99.6	700	NA
D-622	DSU	Hydrotreater	E-15106	V	N	0.5	JT	Jet	L	N	G	109.1	689	Y
D-623	DSU	Hydrotreater	V-758	V	GL	1	JT	Jet	N	Blank	G	88.9	700	N
D-624	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-625	DSU	Hydrotreater	E-935D	C	Flange	6	JT	Jet	L	N	G	305.1	18	NA
D-626	DSU	Hydrotreater	E-15106	V	GT	0.75	JT	Jet	L	N	G	109.1	689	Y
D-627	DSU	Hydrotreater	V-758	V	N	0.25	JT	Jet	N	Blank	G	64.3	700	Y
D-628	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-629	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	Blank	G	63.8	700	NA
D-630	DSU	Hydrotreater	E-15106	V	N	0.5	JT	Jet	L	N	G	109.1	689	Y
D-631	DSU	Hydrotreater	V-758	C		0.25	JT	Jet	N	Blank	G	67.8	700	NA
D-632	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	109.1	689	NA
D-633	DSU	Hydrotreater	V-758	V	N	0.5	JT	Jet	N	Blank	G	67.5	700	Y
D-634	DSU	Hydrotreater	E-15106	V		4	JT	Jet	L	N	G	109.1	689	N
D-635	DSU	Hydrotreater	V-758	V	N	0.5	JT	Jet	N	Blank	G	70.4	700	Y
D-636	DSU	Hydrotreater	E-15106	C	Flange	6	JT	Jet	L	N	G	109.1	689	NA
D-637	DSU	Hydrotreater	V-758	V	N	0.5	JT	Jet	N	Blank	G	66.2	700	Y
D-638	DSU	Hydrotreater	E-15106	V	GT	3	JT	Jet	L	N	G	234.6	689	Y
D-639	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	G	65.4	700	NA
D-640	DSU	Hydrotreater	E-15106	C	Flange	3	JT	Jet	L	N	G	234.6	689	NA
D-641	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	G	67.2	700	NA
D-642	DSU	Hydrotreater	E-15106	V	GT	0.75	JT	Jet	L	N	G	234.6	689	Y
D-643	DSU	Hydrotreater	V-758	C		0.5	JT	Jet	N	Blank	G	70.2	700	NA
D-644	DSU	Hydrotreater	E-15106	C	Flange	3	JT	Jet	L	N	G	234.6	689	NA
D-646	DSU	Hydrotreater	E-15106	V		3	JT	Jet	L	N	G	234.6	689	Y
D-647	DSU	Hydrotreater	E-935B	C	Flange	6	JT	Jet	L	N	G	243.1	18	NA
D-648	DSU	Hydrotreater	E-15106	V	GT	3	JT	Jet	L	N	G	234.6	689	Y
D-649	DSU	Hydrotreater	E-935B	V	GT	0.75	JT	Jet	L	N	G	81.4	18	Y
D-650	DSU	Hydrotreater	E-15106	V	GT	1.5	JT	Jet	L	N	G	234.6	689	Y
D-651	DSU	Hydrotreater	E-935B	V	GT	0.75	JT	Jet	L	N	G	102.3	18	Y
D-652	DSU	Hydrotreater	E-15106	V	GT	3	JT	Jet	L	N	G	213.2	689	Y
D-653	DSU	Hydrotreater	E-935B	C	Flange	6	JT	Jet	L	N	G	308.4	18	NA
D-654	DSU	Hydrotreater	E-15106	C	Flange	3	JT	Jet	L	N	G	213.7	689	NA
D-655	DSU	Hydrotreater	P2944	V	GT	0.75	JT	Jet	L	N	G	73.6	70	Y
D-656	DSU	Hydrotreater	E-15106	V		3	JT	Jet	L	N	G	213.7	689	Y
D-657	DSU	Hydrotreater	P2944	C	Flange	6	JT	Jet	L	N	G	75.3	70	NA
D-658	DSU	Hydrotreater	E-15106	C	Flange	3	JT	Jet	L	N	G	213.7	689	NA
D-659	DSU	Hydrotreater	P2944	V	GT	6	JT	Jet	L	N	G	75.8	70	Y
D-660	DSU	Hydrotreater	E-15106	V	GT	0.75	JT	Jet	L	N	G	213.7	689	Y
D-661	DSU	Hydrotreater	P-2944	C	Flange	6	JT	Jet	L	N	G	75.5	70	NA
D-662	DSU	Hydrotreater	E-15106	V	GT	3	JT	Jet	L	N	G	213.7	689	Y
D-663	DSU	Hydrotreater	P-2944	V	GT	0.75	JT	Jet	L	N	G	71.5	70	Y
D-664	DSU	Hydrotreater	E-15106	V	GT	2	JT	Jet	L	N	G	213.7	689	Y
D-665	DSU	Hydrotreater	P-2944	C		0.75	JT	Jet	L	N	G	71.4	70	NA
D-666	DSU	Hydrotreater	E-15106	V	GT	3	JT	Jet	L	N	G	113.2	689	Y

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D-667	DSU	Hydrotreater	P-2944	V	GT	3	JT	Jet	L	N	G	84.8	20	Y
D-668	DSU	Hydrotreater	E-15106	C	Flange	3	JT	Jet	L	N	G	113.2	689	NA
D-669	DSU	Hydrotreater	P-2944	C	Flange	3	JT	Jet	L	N	G	79.3	20	NA
D-670	DSU	Hydrotreater	E-15106	V		3	JT	Jet	L	N	G	113.2	689	Y
D-671A	DSU	Hydrotreater	P-2944	V	GL	1.5	JT	Jet	L	N	G	80.3	20	N
D-671B	DSU	Hydrotreater	P-2944	C		0.5	JT	Jet	L	N	G	86.6	20	NA
D-672	DSU	Hydrotreater	E-15106	C		0.75	JT	Jet	L	N	G	113.2	689	NA
D-673A	DSU	Hydrotreater	P-2944	V	GT	1.5	JT	Jet	L	N	G	81.1	20	N
D-673B	DSU	Hydrotreater	P-2944	C		0.5	JT	Jet	L	N	G	80.9	20	NA
D-674	DSU	Hydrotreater	E-15106	V	GT	0.75	JT	Jet	L	N	G	113.2	689	Y
D-675A	DSU	Hydrotreater	P-2944	C	Flange	1.5	JT	Jet	L	N	G	79.8	20	NA
D-675B	DSU	Hydrotreater	P-2944	C	Flange	1.5	JT	Jet	L	N	G	76.5	20	NA
D-676	DSU	Hydrotreater	E-15106	C	BP	0.75	JT	Jet	L	N	G	79.4	689	NA
D-677A	DSU	Hydrotreater	P-2944	V	GT	0.5	JT	Jet	L	N	G	80.4	20	Y
D-677B	DSU	Hydrotreater	P-2944	C		0.75	JT	Jet	L	N	G	78.5	20	NA
D-678	DSU	Hydrotreater	E-15106	V	GT	0.75	JT	Jet	L	N	G	79.4	689	Y
D-679A	DSU	Hydrotreater	P-2944	V	GT	0.5	JT	Jet	L	N	G	82.8	20	Y
D-679B	DSU	Hydrotreater	P-2944	V	GT	0.75	JT	Jet	L	N	G	79	20	Y
D-680	DSU	Hydrotreater	E-15106	C	BP	0.75	JT	Jet	L	N	G	79.4	689	NA
D-681	DSU	Hydrotreater	P-2944	V	GL	0.75	JT	Jet	L	N	G	78	20	Y
D-682	DSU	Hydrotreater	E-15106	V	GT	0.75	JT	Jet	L	N	G	79.4	689	Y
D-683	DSU	Hydrotreater	P-2944	C	Flange	3	JT	Jet	L	N	G	75.1	20	NA
D-684	DSU	Hydrotreater	E-15106	C		0.5	JT	Jet	L	N	G	79.4	689	NA
D-685	DSU	Hydrotreater	P-2944	C		0.5	JT	Jet	L	N	G	102.8	20	NA
D-686	DSU	Hydrotreater	E-15106	V	GT	0.75	JT	Jet	L	N	G	79.4	689	Y
D-687	DSU	Hydrotreater	P-2944	C		0.5	JT	Jet	L	N	G	96	20	NA
D-688	DSU	Hydrotreater	V-287	V	GT	0.75	JT	Jet	L	N	G	121.6	131	Y
D-689	DSU	Hydrotreater	P-2944	V	N	0.5	JT	Jet	L	N	G	87.6	20	Y
D-690	DSU	Hydrotreater	V-287	C	Union	0.75	JT	Jet	L	N	G	121.6	131	NA
D-691	DSU	Hydrotreater	P-2944	V	N	0.5	JT	Jet	L	N	G	89.4	20	Y
D-692	DSU	Hydrotreater	V-287	V	BL	0.5	JT	Jet	L	N	G	121.6	131	Y
D-693	DSU	Hydrotreater	P-2944	V	N	0.5	JT	Jet	L	N	G	87.5	20	Y
D-694	DSU	Hydrotreater	V-287	C		0.5	JT	Jet	L	N	G	121.6	131	NA
D-695	DSU	Hydrotreater	P-2944	V	GT	0.75	JT	Jet	L	N	G	64.4	20	Y
D-696	DSU	Hydrotreater	V-287	V	BL	0.5	JT	Jet	L	N	G	121.6	131	Y
D-697	DSU	Hydrotreater	P-2944	C	Flange	6	JT	Jet	L	N	G	61	20	NA
D-698	DSU	Hydrotreater	V-287	C		0.5	JT	Jet	L	N	G	121.6	131	NA
D-699	DSU	Hydrotreater	P-2944	V	CV	6	JT	Jet	L	N	G	91.6	20	Y
D-700	DSU	Hydrotreater	V-289	V	GT	0.5	JT	Jet	N	N	G	86.3	131	Y
D-701	DSU	Hydrotreater	P-2944	C	Flange	6	JT	Jet	L	N	G	92.2	20	NA
D-702	DSU	Hydrotreater	V-289	C		0.5	JT	Jet	N	N	G	86.3	131	NA
D-703	DSU	Hydrotreater	P-2944	V	GT	0.75	JT	Jet	L	N	G	81.2	20	Y
D-704	DSU	Hydrotreater	V-289	V	GT	0.5	JT	Jet	N	N	G	86.3	131	Y
D-705	DSU	Hydrotreater	P-2944	V	CV	6	JT	Jet	L	N	G	87.6	20	Y
D-707	DSU	Hydrotreater	P-2944	C	Flange	6	JT	Jet	L	N	G	100.3	20	NA
D-709	DSU	Hydrotreater	P-2947	V	GT	6	JT	Jet	H	N	G	259.9	15	Y
D-706	DSU	Hydrotreater	V-287	V	GT	0.75	JT	Jet	N	N	G	64.7	132	Y
D-708	DSU	Hydrotreater	V-287	C		0.75	JT	Jet	N	N	G	64.7	132	NA
D-710	DSU	Hydrotreater	V-287	V	GT	0.75	JT	Jet	N	N	G	64.7	132	Y
D-711	DSU	Hydrotreater	P-2947	C	Flange	6	JT	Jet	L	Y	G	349.1	10	NA
D-712	DSU	Hydrotreater	V-287	C		0.75	JT	Jet	N	N	G	64.7	132	NA
D-713	DSU	Hydrotreater	P-2947	V	GT	6	JT	Jet	L	Y	G	349.3	10	Y
D-714	DSU	Hydrotreater	V-287	V	GT	2	JT	Jet	N	N	G	64.7	132	Y
D-715	DSU	Hydrotreater	P-2947	V	GT	0.75	JT	Jet	L	Y	G	196.6	10	Y
D-716	DSU	Hydrotreater	V-287	C		0.75	JT	Jet	N	N	G	64.7	132	NA
D-717	DSU	Hydrotreater	P-2947	C		0.75	JT	Jet	L	Y	G	82.1	10	NA
D-718	DSU	Hydrotreater	V-287	V	GT	0.75	JT	Jet	N	N	G	64.7	132	Y
D-719	DSU	Hydrotreater	P-2947	V	GT	0.75	JT	Jet	L	Y	G	106.1	10	Y
D-720	DSU	Hydrotreater	V-287	C		0.75	JT	Jet	N	N	G	64.7	132	NA
D-721	DSU	Hydrotreater	P-2947	C		0.5	JT	Jet	L	Y	G	114.1	10	NA
D-722	DSU	Hydrotreater	V-287	V	GT	0.75	JT	Jet	N	N	G	64.7	132	Y
D-723	DSU	Hydrotreater	P-2947	V	N	0.5	JT	Jet	L	Y	G	94.1	10	Y
D-724	DSU	Hydrotreater	V-287	C		0.75	JT	Jet	N	N	G	64.7	132	NA
D-725	DSU	Hydrotreater	P-2947	V	N	0.5	JT	Jet	L	Y	G	92.5	10	Y
D-726	DSU	Hydrotreater	V-287	V	GT	2	JT	Jet	N	N	G	64.7	132	Y
D-726	DSU	Hydrotreater	V-287	V	GT	2	JT	Jet	N	N	G	64.7	132	Y
D-727	DSU	Hydrotreater	P-2947	C		0.5	JT	Jet	L	Y	G	95	10	NA
D-728	DSU	Hydrotreater	V-287	C	Flange	2	JT	Jet	N	N	G	64.7	132	NA
D-729	DSU	Hydrotreater	P-2947	C		0.5	JT	Jet	L	Y	G	153.6	10	NA
D-730	DSU	Hydrotreater	V-287	V	GT	2	JT	Jet	N	N	G	64.7	132	Y
D-731	DSU	Hydrotreater	P-2947	V	N	0.5	JT	Jet	L	Y	G	122.5	10	Y
D-732	DSU	Hydrotreater	V-287	C		0.75	JT	Jet	N	N	G	64.7	132	NA
D-732	DSU	Hydrotreater	V-287	C		0.75	JT	Jet	N	N	G	64.7	132	NA

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D-733	DSU	Hydrotreater	P-2947	V	N	0.5	JT	Jet	L	Y	G	115.5	10	Y
D-734	DSU	Hydrotreater	V-287	V	GT	2	JT	Jet	N	N	G	64.7	132	N
D-735	DSU	Hydrotreater	P-2947	V	N	0.75	JT	Jet	L	N	G	258.7	10	Y
D-736	DSU	Hydrotreater	V-287	C		0.5	JT	Jet	N	N	G	64.7	132	NA
D-737	DSU	Hydrotreater	P-2947	C		0.5	JT	Jet	L	N	G	198	10	NA
D-738	DSU	Hydrotreater	V-287	V	GT	0.75	JT	Jet	N	N	G	64.7	132	N
D-739	DSU	Hydrotreater	P-19164	C		0.5	JT	Jet	L	N	G	113.4	2	NA
D-740	DSU	Hydrotreater	V-287	C	Flange	2	JT	Jet	N	N	G	64.7	132	NA
D-741	DSU	Hydrotreater	P-19164	V	GT	0.75	JT	Jet	L	N	G	82	2	Y
D-742	DSU	Hydrotreater	V-287	V	GT	2	JT	Jet	N	N	G	64.7	132	Y
D-743	DSU	Hydrotreater	P-19164	C	Flange	1	JT	Jet	L	N	G	111.5	2	NA
D-744	DSU	Hydrotreater	V-287	C		2	JT	Jet	N	N	G	64.7	132	NA
D-745	DSU	Hydrotreater	P-19164	C	Flange	1	JT	Jet	L	N	G	103.9	2	NA
D-746	DSU	Hydrotreater	V-287	V	GT	2	JT	Jet	N	N	G	64.7	132	N
D-747	DSU	Hydrotreater	P-19164	C	Flange	1	JT	Jet	L	N	G	93.6	2	NA
D-748	DSU	Hydrotreater	V-287	V	GT	3	JT	Jet	N	N	G	64.7	132	Y
D-749	DSU	Hydrotreater	P-19164	V	GT	1	JT	Jet	L	N	G	78.6	2	Y
D-750	DSU	Hydrotreater	E-935B	V	GT	0.75	JT	Jet	L	N	G	285.9	75	Y
D-751	DSU	Hydrotreater	P-19164	C		0.5	JT	Jet	L	N	G	92	2	NA
D-752	DSU	Hydrotreater	E-935B	C	BP	0.75	JT	Jet	L	N	G	285.9	75	NA
D-753	DSU	Hydrotreater	P-19164	C		0.5	JT	Jet	L	N	G	104.2	2	NA
D-754	DSU	Hydrotreater	E-935B	V	GT	0.75	JT	Jet	L	N	G	285.9	75	N
D-755	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	90.9	2	NA
D-756	DSU	Hydrotreater	E-935B	C	BP	0.5	JT	Jet	L	N	G	285.9	75	NA
D-757	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	78.8	2	Y
D-758	DSU	Hydrotreater	FV-266	V		6	JT	Jet	L	N	G	395.7	30	Y
D-759	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	85.4	2	NA
D-760	DSU	Hydrotreater	FV-266	C	Flange	6	JT	Jet	L	N	G	395.7	30	NA
D-761	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	80.1	2	NA
D-762	DSU	Hydrotreater	FU-266	V	GT	0.75	JT	Jet	L	N	G	395.7	30	N
D-763	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	109.9	2	Y
D-764	DSU	Hydrotreater	FU-266	C	BP	0.75	JT	Jet	L	N	G	395.7	30	NA
D-765	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	144.4	2	NA
D-766	DSU	Hydrotreater	FU-266	V	GT	0.75	JT	Jet	L	N	G	261.2	30	N
D-767	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	111.3	2	NA
D-768	DSU	Hydrotreater	FU-266	V		4	JT	Jet	L	N	G	261.2	30	Y
D-769	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	148	2	NA
D-770	DSU	Hydrotreater	FU-266	C	Flange	6	JT	Jet	L	N	G	261.2	30	NA
D-771	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	112.6	2	NA
D-772	DSU	Hydrotreater	FU-266	V	GT	6	JT	Jet	L	N	G	261.2	30	Y
D-773	DSU	Hydrotreater	P-19161	V	GT	1	JT	Jet	L	N	G	75.8	2	Y
D-774	DSU	Hydrotreater	CV-168	V	N	0.75	JT	Jet	L	N	G	72	24	Y
D-775	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	72	2	NA
D-776	DSU	Hydrotreater	CV-168	C		0.75	JT	Jet	L	N	G	72	24	NA
D-777	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	95.5	2	NA
D-778	DSU	Hydrotreater	CV-168	V	N	0.5	JT	Jet	L	N	G	72	24	Y
D-779	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	67.2	2	Y
D-780	DSU	Hydrotreater	CV-168	C		0.5	JT	Jet	L	N	G	72	24	NA
D-781	DSU	Hydrotreater	P-19161	C	Flange	4	JT	Jet	L	N	G	162.9	2	NA
D-782	DSU	Hydrotreater	CV-168	V	N	0.5	JT	Jet	L	N	G	72	24	Y
D-783	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	133.4	2	NA
D-784	DSU	Hydrotreater	CV-168	C		0.5	JT	Jet	L	N	G	72	24	NA
D-785	DSU	Hydrotreater	P-19161	C		Blank	JT	Jet	L	N	G	108	2	NA
D-786	DSU	Hydrotreater	CV-168	V	N	0.5	JT	Jet	L	N	G	72	24	Y
D-787	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	75.7	2	Y
D-788	DSU	Hydrotreater	CV-168	V	N	0.5	JT	Jet	L	N	G	72	24	Y
D-789	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	111.9	2	NA
D-790	DSU	Hydrotreater	CV-168	C	N	0.5	JT	Jet	L	N	G	72	24	NA
D-791	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	87.6	2	NA
D-792	DSU	Hydrotreater	CV-168	V	N	0.5	JT	Jet	L	N	G	72	24	Y
D-793	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	161.6	2	NA
D-794	DSU	Hydrotreater	CV-168	C		0.5	JT	Jet	L	N	G	72	24	NA
D-795	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	81.5	2	NA
D-796	DSU	Hydrotreater	CV-168	V	Plug	6	JT	Jet	L	N	G	72	24	Y
D-797	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	102.7	900	Y
D-798	DSU	Hydrotreater	CV-168	V	GT	0.75	JT	Jet	L	N	G	72	24	Y
D-799	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	82.3	900	NA
D-800	DSU	Hydrotreater	CV-168	C	Flange	3	JT	Jet	L	N	G	72	24	NA
D-801	DSU	Hydrotreater	P-19161	V	N	0.5	JT	Jet	L	N	G	75.6	900	Y
D-802	DSU	Hydrotreater	CV-168	V		3	JT	Jet	L	N	G	72	24	Y
D-803	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	72.1	900	NA
D-804	DSU	Hydrotreater	V-752	C		10	JT	Jet	L	N	T	207.1	9	NA
D-805	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	72.7	900	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-806	DSU	Hydrotreater	V-752	V	GT	3	JT	Jet	L	N	P	207.1	9	Y
D-807	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	78.9	900	NA
D-808	DSU	Hydrotreater	V-752	C	BP	0.5	JT	Jet	L	N	P	207.1	9	NA
D-809	DSU	Hydrotreater	P-19161	C	Flange	1	JT	Jet	L	N	G	77.6	900	NA
D-810	DSU	Hydrotreater	V-752	V	GT	0.5	JT	Jet	L	N	P	207.1	9	Y
D-811	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	79.5	900	Y
D-812	DSU	Hydrotreater	E-16193	V	GT	0.75	JT	Jet	N	N	G	485.4	800	Y
D-813	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	77.9	900	Y
D-814	DSU	Hydrotreater	E-16193	C	Flange	10	JT	Jet	N	N	G	485.4	800	NA
D-815	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	75	900	Y
D-816	DSU	Hydrotreater	E-16193	V	GT	4	JT	Jet	N	N	G	485.4	800	Y
D-817	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	77.6	900	Y
D-818	DSU	Hydrotreater	E-16193	V		4	JT	Jet	N	N	G	485.4	800	Y
D-819	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	173.6	900	Y
D-820	DSU	Hydrotreater	E-16193	C	Flange	4	JT	Jet	L	N	G	485.4	800	NA
D-821	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	112.4	900	NA
D-822	DSU	Hydrotreater	E-16193	V		4	JT	Jet	L	N	G	485.4	800	Y
D-823	DSU	Hydrotreater	P-19161	V	N	0.5	JT	Jet	L	N	G	78	900	Y
D-824	DSU	Hydrotreater	E-16193	C	Flange	4	JT	Jet	L	N	G	485.4	800	NA
D-825	DSU	Hydrotreater	P-19161	C		0.5	JT	Jet	L	N	G	113.4	900	NA
D-826	DSU	Hydrotreater	E-16193	V	GT	0.75	JT	Jet	L	N	G	485.4	800	Y
D-827	DSU	Hydrotreater	P-19161	C	Flange	2	JT	Jet	L	N	G	235	900	NA
D-828	DSU	Hydrotreater	E-16193	V	GT	4	JT	Jet	L	N	G	485.4	800	Y
D-829	DSU	Hydrotreater	P-19161	V	GT	2	JT	Jet	L	N	G	187.9	900	Y
D-830	DSU	Hydrotreater	E-16193	V	GT	0.75	JT	Jet	L	N	G	485.4	800	Y
D-831	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	148	900	Y
D-832	DSU	Hydrotreater	E-16193	C	Flange	4	JT	Jet	L	N	G	485.4	800	NA
D-833	DSU	Hydrotreater	P-19161	V	GT	2	JT	Jet	L	N	G	90.7	900	Y
D-834	DSU	Hydrotreater	E-16193	V		4	JT	Jet	L	N	G	485.4	800	Y
D-835	DSU	Hydrotreater	P-19161	V	GT	0.75	JT	Jet	L	N	G	81.8	900	N
D-836	DSU	Hydrotreater	E-16194	C		0.75	JT	Jet	L	N	G	334.6	825	NA
D-837	DSU	Hydrotreater	P-19161	C	Flange	0.75	JT	Jet	L	N	G	96	900	NA
D-838	DSU	Hydrotreater	E-16194	V		4	JT	Jet	L	N	G	334.6	825	Y
D-839	DSU	Hydrotreater	P-19161	V	CV	1	JT	Jet	L	N	G	96.1	900	Y
D-840	DSU	Hydrotreater	E-16194	V	GT	6	JT	Jet	L	N	G	334.6	825	Y
D-841	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	76.8	10	Y
D-842	DSU	Hydrotreater	E-16194	C	BP	0.75	JT	Jet	L	N	G	334.6	825	NA
D-843	DSU	Hydrotreater	V-754	V	GL	0.75	JT	Jet	N	N	G	73.2	10	Y
D-844	DSU	Hydrotreater	E-16194	V	GT	0.75	JT	Jet	L	N	G	334.6	825	Y
D-845	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	73.4	10	Y
D-847	DSU	Hydrotreater	V-754	C	GT	0.75	JT	Jet	N	N	G	73.7	10	NA
D-849	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	73.5	10	Y
D-851	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	74.1	10	Y
D-853	DSU	Hydrotreater	V-754	C		0.75	JT	Jet	N	N	G	110.2	10	NA
D-855	DSU	Hydrotreater	V-754	V	CV	6	JT	Jet	N	N	G	166.1	10	Y
D-857	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	96.7	10	Y
D-859	DSU	Hydrotreater	V-754	V	GT	6	JT	Jet	N	N	G	188.8	10	Y
D-861	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	142.7	10	Y
D-863	DSU	Hydrotreater	V-754	C		0.75	JT	Jet	N	N	G	119.9	10	NA
D-865	DSU	Hydrotreater	V-754	V	CV	6	JT	Jet	N	N	G	236.2	10	Y
D-867	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	135.7	10	Y
D-869	DSU	Hydrotreater	V-754	V	GT	10	JT	Jet	N	N	G	283.3	10	Y
D-871	DSU	Hydrotreater	V-754	V	GT	0.75	JT	Jet	N	N	G	128.7	10	Y
D-873	DSU	Hydrotreater	V-754	V	GT	3	JT	Jet	N	N	G	121.4	10	Y
D-875	DSU	Hydrotreater	V-754	C		0.25	JT	Jet	N	N	G	74.6	10	NA
D-877	DSU	Hydrotreater	V-754	V	BL	0.5	JT	Jet	N	N	G	77.6	10	Y
D-879	DSU	Hydrotreater	V-754	C		0.25	JT	Jet	N	N	G	79.1	10	NA
D-881	DSU	Hydrotreater	V-754	C		0.25	JT	Jet	N	N	G	84.5	10	NA
D-883	DSU	Hydrotreater	V-754	V	N	0.5	JT	Jet	N	N	G	80.3	10	Y
D-885	DSU	Hydrotreater	V-754	V	N	0.5	JT	Jet	N	N	G	79.5	10	Y
D-887	DSU	Hydrotreater	V-754	V	N	0.5	JT	Jet	N	N	G	79	10	Y
D-889	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	N	G	78.7	10	NA
D-891	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	N	G	77.3	10	NA
D-893	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	N	G	230.6	10	NA
D-895	DSU	Hydrotreater	F-30	V	GT	0.75	JT	Jet	N	N	G	229.6	10	Y
D-897	DSU	Hydrotreater	F-30	C	Flange	12	JT	Jet	L	N	G	428.9	10	NA
D-899	DSU	Hydrotreater	F-30	V	GT	3	JT	Jet	H	Y	G	255.6	10	Y
D-846	DSU	Hydrotreater	E-16194	V	GT	0.75	JT	Jet	L	N	G	390.7	825	Y
D-848	DSU	Hydrotreater	E-16194	C	Flange	4	JT	Jet	L	N	G	390.7	825	NA
D-850	DSU	Hydrotreater	E-16194	V	GT	4	JT	Jet	L	N	G	390.7	825	Y
D-852	DSU	Hydrotreater	E-16194	C	Flange	4	JT	Jet	L	N	G	390.7	825	NA
D-854	DSU	Hydrotreater	E-16194	V		4	JT	Jet	L	N	G	390.7	825	Y
D-856	DSU	Hydrotreater	E-16194	C	Flange	2	JT	Jet	L	N	G	492.3	825	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-858	DSU	Hydrotreater	E-16194	V	GT	4	JT	Jet	L	N	G	390.2	825	Y
D-860	DSU	Hydrotreater	E-16194	V	GT	0.75	JT	Jet	L	N	G	492.3	825	Y
D-862	DSU	Hydrotreater	E-16194	C	BP	0.75	JT	Jet	L	N	G	492.3	825	NA
D-864	DSU	Hydrotreater	V-752	V	GT	0.75	JT	Jet	L	N	P	358.3	10	Y
D-866	DSU	Hydrotreater	V-752	C	Flange	2	JT	Jet	L	N	P	358.3	10	NA
D-868	DSU	Hydrotreater	V-752	V	GT	2	JT	Jet	L	N	P	358.3	10	Y
D-870	DSU	Hydrotreater	V-752	C	Flange	2	JT	Jet	L	N	P	358.3	10	NA
D-872	DSU	Hydrotreater	V-752	V	GT	2	JT	Jet	L	N	P	358.3	10	Y
D-874	DSU	Hydrotreater	V-752	C		0.5	JT	Jet	L	N	P	358.3	10	NA
D-876	DSU	Hydrotreater	V-752	V	GT	0.75	JT	Jet	L	N	P	358.3	10	Y
D-878	DSU	Hydrotreater	V-752	C	Union	0.75	JT	Jet	L	N	P	358.3	10	NA
D-880	DSU	Hydrotreater	V-752	V	GT	0.75	JT	Jet	L	N	P	358.3	10	Y
D-882	DSU	Hydrotreater	P-15109	V	N	0.25	JT	Jet	L	N	G	72.3	14	Y
D-884	DSU	Hydrotreater	P-15109	C		0.25	JT	Jet	L	N	G	72.3	14	NA
D-886	DSU	Hydrotreater	P-15109	V	N	0.25	JT	Jet	L	N	G	72.3	14	Y
D-888	DSU	Hydrotreater	P-15109	C		0.25	JT	Jet	L	N	G	72.3	14	NA
D-890	DSU	Hydrotreater	P-15109	V	GT	0.5	JT	Jet	L	N	G	72.3	14	Y
D-892	DSU	Hydrotreater	P-15109	C		0.5	JT	Jet	L	N	G	72.3	140	NA
D-894	DSU	Hydrotreater	P-15109	V	GT	0.5	JT	Jet	L	N	G	395.3	140	Y
D-896	DSU	Hydrotreater	P-15109	V	GT	0.5	JT	Jet	L	N	G	395.3	140	Y
D-898	DSU	Hydrotreater	P-15109	V	GT	0.5	JT	Jet	L	N	G	395.3	140	Y
D-900	DSU	Hydrotreater	P-15109	C		6	JT	Jet	L	N	G	395.3	140	NA
D-901	DSU	Hydrotreater	F-30	C	Flange	3	JT	Jet	L	Y	G	392	10	NA
D-902	DSU	Hydrotreater	P-15109	V	GT	6	JT	Jet	L	N	G	395.3	140	Y
D-903	DSU	Hydrotreater	F-30	C	Flange	3	JT	Jet	L	Y	G	418	10	NA
D-904	DSU	Hydrotreater	P-15109	V	GT	0.75	JT	Jet	L	N	G	395.3	140	Y
D-905	DSU	Hydrotreater	F-30	V	GT	3	JT	Jet	L	Y	G	238	10	Y
D-906	DSU	Hydrotreater	P-15109	C	BP	0.75	JT	Jet	L	N	G	395.3	140	NA
D-907	DSU	Hydrotreater	F-30	C	Flange	3	JT	Jet	L	Y	G	424	10	NA
D-908	DSU	Hydrotreater	P-15109	V	GT	6	JT	Jet	L	N	G	395.3	140	Y
D-909	DSU	Hydrotreater	F-30	V	GT	3	JT	Jet	L	Y	G	277	10	Y
D-910	DSU	Hydrotreater	P-15109	C		0.75	JT	Jet	L	N	G	395.3	140	NA
D-911	DSU	Hydrotreater	V-754	V	GT	0.5	JT	Jet	N	Blank	T	56	900	Y
D-912	DSU	Hydrotreater	P-15109	V	GT	2	JT	Jet	L	N	G	66.2	140	Y
D-913	DSU	Hydrotreater	V-754	C	BP	0.5	JT	Jet	N	Blank	T	56	900	NA
D-914	DSU	Hydrotreater	P-15109	C	FL	2	JT	Jet	L	N	G	66.2	140	NA
D-915	DSU	Hydrotreater	V-754	C	PI	2	JT	Jet	N	Blank	T	60	900	NA
D-916	DSU	Hydrotreater	P-2946	V	GT	0.5	JT	Jet	L	N	G	106.2	13	Y
D-917	DSU	Hydrotreater	V-754	V	GT	2	JT	Jet	N	Blank	T	55	900	Y
D-918	DSU	Hydrotreater	P-2946	C		0.5	JT	Jet	L	N	G	106.2	13	NA
D-919	DSU	Hydrotreater	V-754	C	Flange	2	JT	Jet	N	Blank	T	57	900	NA
D-920	DSU	Hydrotreater	P-2946	V	N	0.5	JT	Jet	L	N	G	106.3	13	Y
D-921	DSU	Hydrotreater	V-754	V	GT	2	JT	Jet	N	Blank	T	64	900	N
D-922	DSU	Hydrotreater	P-2946	C		0.5	JT	Jet	L	N	G	106.3	13	NA
D-923	DSU	Hydrotreater	V-754	V	GT	2	JT	Jet	N	Blank	T	58	900	N
D-924	DSU	Hydrotreater	P-2946	V	N	0.5	JT	Jet	L	N	G	106.3	13	Y
D-925	DSU	Hydrotreater	V-754	C	Flange	12	JT	Jet	N	Blank	T	175	900	NA
D-926	DSU	Hydrotreater	P-2946	C		0.5	JT	Jet	L	N	G	106.3	13	NA
D-927-1	DSU	Hydrotreater	P-16192	C	BP	0.75	JT	Jet	L	N	G	67	20	NA
D-927-2	DSU	Hydrotreater	V-754	V	GT	1	JT	Jet	N	Blank	T	64	900	Y
D-928	DSU	Hydrotreater	P-2946	V	GT	0.5	JT	Jet	L	N	G	106.3	13	Y
D-929	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	Blank	T	56	900	NA
D-930	DSU	Hydrotreater	P-2946	C		0.5	JT	Jet	L	N	G	106.3	13	NA
D-931	DSU	Hydrotreater	V-754	V	N	0.5	JT	Jet	N	Blank	T	60	900	Y
D-932	DSU	Hydrotreater	P-2946	C		0.5	JT	Jet	L	N	G	106.3	13	NA
D-933	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	Blank	T	52	900	NA
D-934	DSU	Hydrotreater	P-2946	C		0.5	JT	Jet	L	N	G	63.9	13	NA
D-935	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	Blank	T	55	900	NA
D-936	DSU	Hydrotreater	P-2946	V	GT	0.75	JT	Jet	L	N	G	195.5	13	Y
D-937	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	Blank	T	60	900	NA
D-938	DSU	Hydrotreater	P-2946	C		0.75	JT	Jet	L	N	G	195.5	13	NA
D-939	DSU	Hydrotreater	V-754	C		0.5	JT	Jet	N	Blank	T	60	900	NA
D-940	DSU	Hydrotreater	P-2946	V	GT	6	JT	Jet	L	N	G	395.5	13	Y
D-941	DSU	Hydrotreater	P-2945	V	GT	0.5	JT	Jet	L	N	G	169	225	Y
D-942	DSU	Hydrotreater	P-2946	C	Flange	6	JT	Jet	L	N	G	395.5	13	NA
D-943	DSU	Hydrotreater	P-2945	C		0.5	JT	Jet	L	N	G	152	225	NA
D-944	DSU	Hydrotreater	P-2946	V	GT	0.75	JT	Jet	L	N	G	395.5	13	N
D-945	DSU	Hydrotreater	P-2945	V	N	0.5	JT	Jet	L	N	G	93	225	Y
D-946	DSU	Hydrotreater	P-2946	C		0.75	JT	Jet	L	N	G	395.5	13	NA
D-947	DSU	Hydrotreater	P-2945	C		0.5	JT	Jet	L	N	G	80	225	NA
D-948	DSU	Hydrotreater	P-2946	V	GT	0.75	JT	Jet	L	N	G	395.5	13	Y
D-949	DSU	Hydrotreater	P-2945	C		0.5	JT	Jet	L	N	G	93	225	NA
D-950	DSU	Hydrotreater	P-2946	C		6	JT	Jet	L	N	G	395.5	13	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-951	DSU	Hydrotreater	P-2945	V	N	0.5	JT	Jet	L	N	G	90	225	Y
D-952	DSU	Hydrotreater	P-2946	V	GT	0.75	JT	Jet	L	N	G	395.5	13	Y
D-953	DSU	Hydrotreater	P-2945	C		0.5	JT	Jet	L	N	G	82	225	NA
D-954	DSU	Hydrotreater	P-2946	C		0.5	JT	Jet	L	N	G	383.5	600	NA
D-956	DSU	Hydrotreater	P-2946	V	GT	0.75	JT	Jet	L	N	G	383.5	600	Y
D-957	DSU	Hydrotreater	P-2945	V	N	0.75	JT	Jet	L	N	G	71	225	Y
D-958	DSU	Hydrotreater	P-2946	C	Flange	6	JT	Jet	L	N	G	383.5	600	NA
D-959	DSU	Hydrotreater	P-2945	C		0.75	JT	Jet	L	N	G	71	225	NA
D-960	DSU	Hydrotreater	P-2946	V	GT	6	JT	Jet	L	N	G	383.5	600	Y
D-961	DSU	Hydrotreater	P-2945	C		0.75	JT	Jet	L	N	G	176	225	NA
D-962	DSU	Hydrotreater	P-16192	V	GT	4	JT	Jet	L	N	G	65.8	17	Y
D-963	DSU	Hydrotreater	P-2945	V	GT	0.75	JT	Jet	L	N	G	197	225	Y
D-964	DSU	Hydrotreater	P-16192	C	Flange	4	JT	Jet	L	N	G	65.8	17	NA
D-965	DSU	Hydrotreater	P-2945	V	GT	0.75	JT	Jet	L	N	G	369	225	Y
D-967	DSU	Hydrotreater	P-2945	C	Flange	4	JT	Jet	L	N	G	351	225	NA
D-968	DSU	Hydrotreater	P-16192	V	GT	0.75	JT	Jet	L	N	G	65.8	17	N
D-969	DSU	Hydrotreater	P-2945	V	GT	4	JT	Jet	L	N	G	370	225	Y
D-970	DSU	Hydrotreater	P-16192	C		0.75	JT	Jet	L	N	G	65.8	17	NA
D-971	DSU	Hydrotreater	P-2945	C	Flange	4	JT	Jet	L	N	G	123	225	NA
D-972	DSU	Hydrotreater	P-16192	V	GT	0.75	JT	Jet	L	N	G	73.7	17	Y
D-973	DSU	Hydrotreater	P-2945	V	GT	4	JT	Jet	L	N	G	260	225	Y
D-974	DSU	Hydrotreater	P-16192	C		0.75	JT	Jet	L	N	G	73.7	17	NA
D-975	DSU	Hydrotreater	P-2945	C	Flange	6	JT	Jet	L	N	G	268	15	NA
D-976	DSU	Hydrotreater	P-16192	V	N	0.25	JT	Jet	L	N	G	73.7	17	Y
D-977	DSU	Hydrotreater	P-2945	V	GT	6	JT	Jet	L	N	G	238	15	Y
D-978	DSU	Hydrotreater	P-16192	C	BP	0.25	JT	Jet	L	N	G	73.7	17	NA
D-979	DSU	Hydrotreater	P-2945	V	GT	6	JT	Jet	L	N	G	355	15	Y
D-980	DSU	Hydrotreater	P-16192	V	N	0.25	JT	Jet	L	N	G	73.7	17	Y
D-981	DSU	Hydrotreater	P-2945	C	Flange	6	JT	Jet	L	N	G	351	15	NA
D-982	DSU	Hydrotreater	P-16192	C		0.5	JT	Jet	L	N	G	73.7	17	NA
D-983	DSU	Hydrotreater	P-2945	V	GT	0.75	JT	Jet	L	N	G	210	15	Y
D-984	DSU	Hydrotreater	P-16192	V	N	0.5	JT	Jet	L	N	G	73.7	17	Y
D-985	DSU	Hydrotreater	P-2945	C		0.75	JT	Jet	L	N	G	152	15	NA
D-986	DSU	Hydrotreater	P-16192	C		0.5	JT	Jet	L	N	G	73.7	17	NA
D-987	DSU	Hydrotreater	P-2945	C	Flange	0.75	JT	Jet	L	N	G	245	225	NA
D-988	DSU	Hydrotreater	P-16192	V	N	0.5	JT	Jet	L	N	G	73.7	17	Y
D-989	DSU	Hydrotreater	P-2945	V	GT	0.75	JT	Jet	L	N	G	168	225	Y
D-990	DSU	Hydrotreater	P-16192	C		0.5	JT	Jet	L	N	G	73.7	17	NA
D-991	DSU	Hydrotreater	P-2945	C		0.75	JT	Jet	L	N	G	104	225	NA
D-992	DSU	Hydrotreater	P-16192	V	GT	6	JT	Jet	L	N	G	73.7	17	Y
D-993	DSU	Hydrotreater	P-2945	C		0.75	JT	Jet	L	N	G	85	225	NA
D-994	DSU	Hydrotreater	P-16192	C	Flange	4	JT	Jet	L	N	G	71.6	17	NA
D-995	DSU	Hydrotreater	F-30	V	GT	2	JT	Jet	L	N	G	104	10	Y
D-996	DSU	Hydrotreater	P-16192	V	GT	1	JT	Jet	L	N	G	71.6	17	Y
D-997	DSU	Hydrotreater	F-30	C	Flange	2	JT	Jet	L	N	G	75	10	NA
D-998	DSU	Hydrotreater	P-16192	C	Flange	2	JT	Jet	L	N	G	71.6	17	NA
D-999	DSU	Hydrotreater	F-30	C	Flange	2	JT	Jet	L	N	G	201	10	NA
D-1000	DSU	Hydrotreater	P-16192	C	Flange	6	JT	Jet	L	N	G	71.6	17	NA
D-1001	DSU	Hydrotreater	F-30	V	GT	2	JT	Jet	L	N	G	130	10	Y
D-1003	DSU	Hydrotreater	F-30	C	Flange	2	JT	Jet	L	N	G	86	10	NA
D-1005	DSU	Hydrotreater	F-30	C	Flange	2	JT	Jet	L	N	G	403	10	NA
D-1007	DSU	Hydrotreater	P-16192	V	GT	0.75	JT	Jet	L	N	G	71	20	Y
D-1009	DSU	Hydrotreater	P-16192	C	BP	0.75	JT	Jet	L	N	G	67	20	NA
D-1011	DSU	Hydrotreater	P-2944	P	C	3	JT	Jet	N	Blank	G	57.1	10	NA
D-1013	DSU	Hydrotreater	P-2944	P	C	3	JT	Jet	N	Blank	G	54.6	10	NA
D-1015	DSU	Hydrotreater	P-2944	C		40	JT	Jet	N	Blank	G	55.5	10	NA
D-1017	DSU	Hydrotreater	P-2947	P	Seal	1.5	JT	Jet	L	N	G	161	10	NA
D-1019	DSU	Hydrotreater	P-2947	C		12	JT	Jet	L	N	G	315	10	NA
D-1021	DSU	Hydrotreater	P-2945	P	C	2	JT	Jet	L	N	G	178	225	NA
D-1023	DSU	Hydrotreater	P-2945	C		18	JT	Jet	L	N	G	362	225	NA
D-1025	FLS	Fuel Gas Treatment	P-17037	P	C	1.5	RS	Resid	L	N	G	72.1	52	NA
D-1027	FLS	Fuel Gas Treatment	P-17037	C		12	RS	Resid	L	N	G	84.7	52	NA
D-1029	FLS	Fuel Gas Treatment	P-17038	P	C	1.5	RS	Resid	L	N	G	92.2	113	NA
D-1031	FLS	Fuel Gas Treatment	P-17038	C		12	RS	Resid	L	N	G	88.7	113	NA
D-1033	FLS	Fuel Gas Treatment	P-16316	P	C	2	RS	Resid	N	Blank	G	57.1	27	NA
D-1035	FLS	Fuel Gas Treatment	P-16316	C		12	RS	Resid	N	Blank	G	59.8	27	NA
D-1037	FLS	Fuel Gas Treatment	P-16317	P	C	2	RS	Resid	N	Blank	G	83.4	104	NA
D-1039	FLS	Fuel Gas Treatment	P-16317	C		12	RS	Resid	N	Blank	G	104.4	104	NA
D-1041	FLS	Fuel Gas Treatment	P-17102	P	C	3	RS	Resid	N	Blank	G	59.8	6	NA
D-1043	FLS	Fuel Gas Treatment	P-17102	C		6	RS	Resid	N	Blank	G	59.6	6	NA
D-1045	FXU	Coker	P-17118	P	C	3	HGO	Gas Oil	N	Blank	G	136	49	NA
D-1047	FXU	Coker	P-17118	C		18	HGO	Gas Oil	N	Blank	G	257	49	NA
D-1049	FXU	Coker	P-17117	P	C	3	HGO	Gas Oil	L	Blank	G	131	181	NA

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D-1051	FXU	Coker	P-17117	C		18	HGO	Gas Oil	L	Blank	G	216	181	NA
D-1053	FXU	Coker	P-5076	P	C	1.5	CR	Crude	L	Blank	G	207	157	NA
D-1055	FXU	Coker	P-5076	C		12	CR	Crude	L	Blank	G	483	157	NA
D-1057	FXU	Coker	P-5075	P	C	1.5	CR	Crude	L	Blank	G	201	138	NA
D-1059	FXU	Coker	P-5075	C	Pump Housing	12	CR	Crude	L	Blank	G	500	138	NA
D-1061	FXU	Coker	P-5078	P	C	3	HGO	Gas Oil	N	Blank	G	205	255	NA
D-1063	FXU	Coker	P-5078	C		18	HGO	Gas Oil	N	Blank	G	147	255	NA
D-1065	FXU	Coker	P-5077	P	C	3	HGO	Gas Oil	H	N	G	197	267	NA
D-1067	FXU	Coker	P-5077	C		18	HGO	Gas Oil	H	N	G	362	267	NA
D-1069	FXU	Coker	P-5021	P	C	3	CR	Crude	N	Blank	G	176	44	NA
D-1071	FXU	Coker	P-5021	C		18	CR	Crude	N	Blank	G	379	44	NA
D-1073	FXU	Coker	P-5020	P	C	3	CR	Crude	N	Blank	G	195	44	NA
D-1075	FXU	Coker	P-5020	C		18	CR	Crude	N	Blank	G	364	44	NA
D-1077	FXU	Coker	P-17827	P	C	3	HGO	Gas Oil	N	Blank	G	176	130	NA
D-1079	FXU	Coker	P-17827	C		18	HGO	Gas Oil	N	Blank	G	137	130	NA
D-1081	FXU	Coker	P-17828	P	C	3	HGO	Gas Oil	N	Blank	G	174	26	NA
D-1083	FXU	Coker	P-17828	C		18	HGO	Gas Oil	N	Blank	G	172	118	NA
D-1085	FXU	Coker	P-5024	P	C	3	CR	Crude	N	Blank	G	210	104	NA
D-1087	FXU	Coker	P-5024	C		18	CR	Crude	N	Blank	G	413	104	NA
D-1089	FXU	Coker	P-5025	P	C	3	CR	Crude	L	N	G	183	80	NA
D-1091	FXU	Coker	P-5025	C		18	CR	Crude	L	N	G	454	80	NA
D-1093	FXU	Coker	P-5029	P	C	1.5	RS	Resid	L	N	G	93.3	90	NA
D-1095	FXU	Coker	P-5029	C		10	RS	Resid	L	N	G	124.4	90	NA
D-1097	FXU	Coker	P-5028	P	C	1.5	RS	Resid	L	N	G	78	32	NA
D-1099	FXU	Coker	P-5028	C		10	RS	Resid	L	N	G	81	32	NA
D-1101	FXU	Coker	P-4297	P	C	1.5	RS	Resid	L	N	G	73.4	29	NA
D-1103	FXU	Coker	P-4297	C		10	RS	Resid	L	N	G	78.2	29	NA
D-1105	FXU	Coker	P-4296	P	C	2	RS	Resid	L	N	G	170	117	NA
D-1107	FXU	Coker	P-4296	C		10	RS	Resid	L	N	G	205	117	NA
D-1109	FXU	Coker	P-5035	P	C	1.5	RS	Resid	N	Blank	G	59.3	0	NA
D-1111	FXU	Coker	P-5035	C		10	RS	Resid	N	Blank	G	60.7	0	NA
D-1113	FXU	Coker	P-5034	P	C	1.5	RS	Resid	N	Blank	G	58.9	0	NA
D-1115	FXU	Coker	P-5034	C		10	RS	Resid	N	Blank	G	60.6	0	NA
D-1117	FXU	Coker	P-13249	P	C	3	CR	Crude	N	Blank	G	177	0	NA
D-1119	FXU	Coker	P-13249	C		12	CR	Crude	N	Blank	G	234	0	NA
D-1121	FXU	Coker	P-13248	P	C	3	CR	Crude	N	Blank	G	222	0	NA
D-1123	FXU	Coker	P-13248	C		12	CR	Crude	N	Blank	G	246	0	NA
D-1125	FXU	Coker	P-8368	P	C	1.5	CR	Crude	N	Blank	G	287	250	NA
D-1127	FXU	Coker	P-8368	C		10	CR	Crude	N	Blank	G	220	250	NA
D-1129	FXU	Coker	P-8356	P	C	1.5	CR	Crude	N	Blank	G	164	475	NA
D-1131	FXU	Coker	P-8356	C		10	CR	Crude	N	Blank	G	130	475	NA
D-1002	DSU	Hydrotreater	P-16189	P	C	3	JT	Jet	L	N	G	65.4	1150	NA
D-1004	DSU	Hydrotreater	P-16189	C		40	JT	Jet	L	N	G	65.4	1150	NA
D-1006	DSU	Hydrotreater	P-16189	P	C	3	JT	Jet	L	N	G	65.4	1150	NA
D-1008	DSU	Hydrotreater	P-15109	P	Seal	3	JT	Jet	L	N	G	215.8	200	NA
D-1010	DSU	Hydrotreater	P-15109	C		10	JT	Jet	L	N	G	362.3	200	NA
D-1012	DSU	Hydrotreater	P-16192	P	C	3	JT	Jet	L	N	G	105.8	5	NA
D-1014	DSU	Hydrotreater	P-16192	C		10	JT	Jet	L	N	G	104.1	5	NA
D-1016	DSU	Hydrotreater	P-2946	P	Seal	2	JT	Jet	L	N	G	246.8	600	NA
D-1018	DSU	Hydrotreater	P-2946	C		18	JT	Jet	L	N	G	320.2	600	NA
D-1020	DSU	Hydrotreater	P-19164	P	C	3	JT	Jet	L	N	G	130.6	950	NA
D-1022	DSU	Hydrotreater	P-19164	C		20	JT	Jet	L	N	G	113.7	950	NA
D-1024	DSU	Hydrotreater	P-19164	C	Pump Housing	20	JT	Jet	L	N	G	113.7	950	NA
D-1026	DSU	Hydrotreater	P-19164	P	C	3	JT	Jet	L	N	G	157.2	950	NA
D-1028	FLS	Fuel Gas Treatment	P-16307	P	C	3	RS	Resid	L	N	G	72.2	170	NA
D-1030	FLS	Fuel Gas Treatment	P-16307	C		20	RS	Resid	L	N	G	84.3	170	NA
D-1032	FLS	Fuel Gas Treatment	P-16308	P	C	3	RS	Resid	L	N	G	65.4	6	NA
D-1034	FLS	Fuel Gas Treatment	P-16308	C		20	RS	Resid	L	N	G	85.7	6	NA
D-1036	FLS	Fuel Gas Treatment	P-17103	P	C	1	RS	Resid	L	N	G	54.1	5	NA
D-1038	FLS	Fuel Gas Treatment	P-17103	C		20	RS	Resid	L	N	G	57.7	5	NA
D-1040	FLS	Fuel Gas Treatment	P-17139	P	C	2	RS	Resid	L	N	G	87.6	47	NA
D-1042	FLS	Fuel Gas Treatment	P-17139	C		20	RS	Resid	L	N	G	194.1	47	NA
D-1044	FLS	Fuel Gas Treatment	P-17040	P	C	2	RS	Resid	L	N	G	81.1	50	NA
D-1046	FLS	Fuel Gas Treatment	P-17040	C		20	RS	Resid	L	N	G	193.3	50	NA
D-1048	FXU	Coker	P-5070	P	C	2	RS	Resid	L	N	G	132.8	50	NA
D-1050	FXU	Coker	P-5070	C		20	RS	Resid	L	N	G	334.8	50	NA
D-1052	FXU	Coker	P-5069	P	C	2	RS	Resid	L	N	G	142.4	60	NA
D-1054	FXU	Coker	P-5069	C		20	RS	Resid	L	N	G	295.4	60	NA
D-1056	FXU	Coker	P-5080	P	C	2	HGO	Gas Oil	L	N	G	177.5	70	NA
D-1058	FXU	Coker	P-5080	C		20	HGO	Gas Oil	L	N	G	285	70	NA
D-1060	FXU	Coker	P-5079	P	C	2	HGO	Gas Oil	L	N	G	188.6	200	NA
D-1062	FXU	Coker	P-5079	C		20	HGO	Gas Oil	L	N	G	355.2	200	NA
D-1064	FXU	Coker	P-5068	P	C	2	LGO	Gas Oil	L	N	G	119	275	NA

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D-1066	FXU	Coker	P-5068	C		20	LGO	Gas Oil	L	N	G	119	275	NA
D-1068	FXU	Coker	P-5033	P	C	2	HGO	Gas Oil	L	N	G	131.8	4	NA
D-1070	FXU	Coker	P-5033	C		20	HGO	Gas Oil	L	N	G	118.7	4	NA
D-1072	FXU	Coker	P-5033	P	C	2	HGO	Gas Oil	L	N	G	118.7	4	NA
D-1074	FXU	Coker	P-5033	C		20	HGO	Gas Oil	L	N	G	118.7	4	NA
D-1076	FXU	Coker	P-5022	P	C	2	CR	Crude	L	N	G	195.7	150	NA
D-1078	FXU	Coker	P-5022	C		20	CR	Crude	L	N	G	327.5	150	NA
D-1080	FXU	Coker	P-5023	P	C	2	CR	Crude	L	N	G	178.9	150	NA
D-1082	FXU	Coker	P-5023	C		20	CR	Crude	L	N	G	306.5	150	NA
D-1084	FXU	Coker	P-5026	P	C	3	RS	Resid	L	N	G	81.4	42	NA
D-1086	FXU	Coker	P-5026	C		16	RS	Resid	L	N	G	85.6	42	NA
D-1088	FXU	Coker	P-5027	P	C	3	RS	Resid	L	N	G	98.7	50	NA
D-1090	FXU	Coker	P-5027	C		16	RS	Resid	L	N	G	181.3	50	NA
D-1092	FXU	Coker	P-4320	P	C	2	RS	Resid	L	N	G	94.1	45	NA
D-1094	FXU	Coker	P-4320	C		12	RS	Resid	L	N	G	122.1	45	NA
D-1096	FXU	Coker	P-4319	P	C	2	RS	Resid	L	N	G	75	12	NA
D-1098	FXU	Coker	P-4319	C		12	RS	Resid	L	N	G	72.6	12	NA
D-1100	FXU	Coker	P-17932	P	C	2	RS	Resid	L	N	G	72.4	20	NA
D-1102	FXU	Coker	P-17932	C		20	RS	Resid	L	N	G	68.2	20	NA
D-1104	FXU	Coker	P-17933	P	C	2	RS	Resid	L	N	G	84.2	20	NA
D-1106	FXU	Coker	P-17933	C		20	RS	Resid	L	N	G	81.5	20	NA
D-1108	FXU	Coker	P-5037	P	C	2	RS	Resid	L	N	G	68.8	15	NA
D-1110	FXU	Coker	P-5037	C		10	RS	Resid	L	N	G	68.7	15	NA
D-1112	FXU	Coker	P-5036	P	C	2	RS	Resid	L	N	G	65.2	8	NA
D-1114	FXU	Coker	P-5036	C		10	RS	Resid	L	N	G	65.2	8	NA
D-1116	FXU	Coker	P-5032	P	C	2	HGO	Gas Oil	L	N	G	118.2	6	NA
D-1118	FXU	Coker	P-5032	C		20	HGO	Gas Oil	L	N	G	118.2	6	NA
D-1120	FXU	Coker	P-5067	P	C	2	LGO	Gas Oil	L	N	G	121.6	200	NA
D-1122	FXU	Coker	P-5067	C		20	LGO	Gas Oil	L	N	G	121.6	200	NA
D-1124	FXU	Coker	P-8349	P	C	2	CR	Crude	L	N	G	234.5	100	NA
D-1226-1	FXU	Coker	P-8349	C		10	CR	Crude	L	N	G	279	100	NA
D-1128	FXU	Coker	P-8350	P	C	2	CR	Crude	L	N	G	67	0	NA
D-1130	FXU	Coker	P-8350	C		10	CR	Crude	L	N	G	67	0	NA
D-1132-1	FXU	Coker	P-8351	P	C	2	CR	Crude	L	N	G	121.3	70	NA
D-1132-2	FXU	Coker	P-8351	C		10	CR	Crude	L	N	G	121.3	70	NA
D-1134	FXU	Coker	P-8352	P	C	2	CR	Crude	L	N	G	298.2	150	NA
D-1136	FXU	Coker	P-8352	C		12	CR	Crude	L	N	G	298.2	150	NA
D-1133	SR-4	Sulfur Recovery	P-14686	P	C	1.5	RS	Resid	N	Blank	G	54.1	0	NA
D-1135	SR-4	Sulfur Recovery	P-14686	C		18	RS	Resid	N	Blank	G	54.1	0	NA
D-1137	SR-4	Sulfur Recovery	P-14508	P	C	1	RS	Resid	N	Blank	G	59.9	20	NA
D-1138	SR-3	Sulfur Recovery	P-5302	P	C	2	RS	Resid	N	N	G	52.3	3	NA
D-1139	SR-4	Sulfur Recovery	P-14508	C		8	RS	Resid	N	Blank	G	69.1	20	NA
D-1140	SR-3	Sulfur Recovery	P-5302	C		10	RS	Resid	N	N	G	52.7	3	NA
D-1141	SR-4	Sulfur Recovery	P-14507	P	C	1	RS	Resid	N	Blank	G	99	110	NA
D-1142	SR-3	Sulfur Recovery	P-4294	P	C	2	RS	Resid	N	N	G	144.9	400	NA
D-1143	SR-4	Sulfur Recovery	P-14507	C		8	RS	Resid	N	Blank	G	69.9	110	NA
D-1144	SR-3	Sulfur Recovery	P-4294	C		20	RS	Resid	N	N	G	140.3	400	NA
D-1145	SR-4	Sulfur Recovery	P-14512	P	C	1.5	RS	Resid	L	N	G	181	100	NA
D-1146	SR-3	Sulfur Recovery	P-5303	P	C	2	RS	Resid	L	N	G	55.4	175	NA
D-1147	SR-4	Sulfur Recovery	P-14512	C		12	RS	Resid	L	N	G	170	100	NA
D-1148	SR-3	Sulfur Recovery	P-5303	C		20	RS	Resid	L	N	G	54.8	175	NA
D-1149	SR-4	Sulfur Recovery	P-14511	P	C	1.5	RS	Resid	L	N	G	100	40	NA
D-1150	SR-3	Sulfur Recovery	P-5301	P	C	2	RS	Resid	N	N	G	70.7	15	NA
D-1151	SR-4	Sulfur Recovery	P-14511	C		18	RS	Resid	L	N	G	142.1	40	NA
D-1152	SR-3	Sulfur Recovery	P-5301	C		10	RS	Resid	N	N	G	68.6	15	NA
D-1153	SR-4	Sulfur Recovery	P-14591	P	C	1	RS	Resid	L	N	G	170.9	90	NA
D-1154	SR-3	Sulfur Recovery	P-5300	P	C	2	RS	Resid	L	N	G	93.6	115	NA
D-1155	SR-4	Sulfur Recovery	P-14591	C		18	RS	Resid	L	N	G	139.6	90	NA
D-1156	SR-3	Sulfur Recovery	P-5300	C		10	RS	Resid	L	N	G	77.5	115	NA
D-1157	SR-4	Sulfur Recovery	P-14590	P	C	1	RS	Resid	L	N	G	120.8	200	NA
D-1158	SR-3	Sulfur Recovery	P-5310	P	C	1	RS	Resid	L	N	G	69.7	28	NA
D-1159	SR-4	Sulfur Recovery	P-14590	C		12	RS	Resid	L	N	G	181.5	200	NA
D-1160	SR-3	Sulfur Recovery	P-5310	C		10	RS	Resid	L	N	G	71.2	28	NA
D-1161	SR-4	Sulfur Recovery	P-14594	P	C	1.5	RS	Resid	L	N	G	107.6	180	NA
D-1162	SR-3	Sulfur Recovery	P-17060	P	C	1	RS	Resid	L	N	G	91.2	92	NA
D-1163	SR-4	Sulfur Recovery	P-14593	C		12	RS	Resid	L	N	G	90.9	180	NA
D-1164	SR-3	Sulfur Recovery	P-17060	C		10	RS	Resid	L	N	G	84.7	92	NA
D-1165	SR-4	Sulfur Recovery	P-14593	P	C	1	RS	Resid	N	Blank	G	219	40	NA
D-1166	SR-3	Sulfur Recovery	P-17058	P	C	2	RS	Resid	L	N	G	55	24	NA
D-1167	SR-4	Sulfur Recovery	P-14593	C		12	RS	Resid	N	Blank	G	174.6	40	NA
D-1168	SR-3	Sulfur Recovery	P-17058	C		18	RS	Resid	L	N	G	54.9	24	NA
D-1169	SR-4	Sulfur Recovery	P-14522	P	C	1	RS	Resid	N	Blank	G	58.3	10	NA
D-1170	SR-3	Sulfur Recovery	P-17188	P	C	2	RS	Resid	L	N	G	140.5	116	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1171	SR-4	Sulfur Recovery	P-14522	C		8	RS	Resid	N	Blank	G	57.9	10	NA
D-1172	SR-3	Sulfur Recovery	P-17188	C		18	RS	Resid	L	N	G	193.6	116	NA
D-1173	SR-4	Sulfur Recovery	P-14521	P	C	1	RS	Resid	N	Blank	G	57.9	0	NA
D-1174	SR-3	Sulfur Recovery	P-4303	P	C	2	RS	Resid	L	N	G	139.9	106	NA
D-1175	SR-4	Sulfur Recovery	P-14521	C		8	RS	Resid	N	Blank	G	58.1	0	NA
D-1176	SR-3	Sulfur Recovery	P-4303	C		18	RS	Resid	L	N	G	75.7	106	NA
D-1177	SR-4	Sulfur Recovery	P-14694	P	C	1	RS	Resid	N	Blank	G	54	12	NA
D-1178	SR-3	Sulfur Recovery	P-17059	P	C	2	RS	Resid	L	N	G	54.9	6	NA
D-1179	SR-4	Sulfur Recovery	P-14694	C		12	RS	Resid	N	Blank	G	57.5	12	NA
D-1180	SR-3	Sulfur Recovery	P-17059	C		18	RS	Resid	L	N	G	55.7	6	NA
D-1181	SR-4	Sulfur Recovery	P-14695	P	C	1	RS	Resid	L	N	G	83.5	130	NA
D-1182	SR-3	Sulfur Recovery	P -5312	P	C	1	RS	Resid	N	N	G	52.3	0	NA
D-1183	SR-4	Sulfur Recovery	P-14695	C		12	RS	Resid	L	N	G	88.5	130	NA
D-1184	SR-3	Sulfur Recovery	P -5312	C		10	RS	Resid	N	N	G	52	0	NA
D-1185	SR-4	Sulfur Recovery	P-14581	P	C	1	RS	Resid	N	Blank	G	54.9	10	NA
D-1186	SR-3	Sulfur Recovery	P-5311	P	C	1	RS	Resid	N	N	G	52	0	NA
D-1187	SR-4	Sulfur Recovery	P-14581	C		12	RS	Resid	N	Blank	G	54.8	10	NA
D-1188	SR-3	Sulfur Recovery	P-5311	C		8	RS	Resid	N	N	G	52.4	0	NA
D-1189	SR-4	Sulfur Recovery	P-14580	P	C	1	RS	Resid	N	Blank	G	55.2	10	NA
D-1190	SR-3	Sulfur Recovery	P-17042	P	C	1	RS	Resid	N	N	G	128.3	66	NA
D-1191	SR-4	Sulfur Recovery	P-14580	C		10	RS	Resid	N	Blank	G	54.9	10	NA
D-1192	SR-3	Sulfur Recovery	P-17042	C		8	RS	Resid	N	N	G	111.2	66	NA
D-1193-1	SR-4	Sulfur Recovery	P-14526	P	C	1.5	RS	Resid	N	Blank	G	96.6	60	NA
D-1193-2	SR-4	Sulfur Recovery	P-14526	C		12	RS	Resid	N	Blank	G	92.4	60	NA
D-1194	SR-3	Sulfur Recovery	P-17045	P	C	1	RS	Resid	N	N	G	50.3	52	NA
D-1195	SR-4	Sulfur Recovery	P-14525	P	C	1.5	RS	Resid	N	Blank	G	131.5	120	NA
D-1196	SR-3	Sulfur Recovery	P-17045	C		8	RS	Resid	N	N	G	49.7	52	NA
D-1197	SR-4	Sulfur Recovery	P-14525	C		18	RS	Resid	N	Blank	G	111.7	120	NA
D-1198	SR-3	Sulfur Recovery	P-5304	P	C	2	RS	Resid	N	N	G	66.2	100	NA
D-1199	SR-4	Sulfur Recovery	P-14624	P	C	2	RS	Resid	H	N	G	68.1	10	NA
D-1200	SR-3	Sulfur Recovery	P-5304	C		20	RS	Resid	N	N	G	144.2	100	NA
D-1201	SR-4	Sulfur Recovery	P-14624	C		18	RS	Resid	H	N	G	68.4	10	NA
D-1202	SR-3	Sulfur Recovery	P-17046	P	C	1	RS	Resid	N	N	G	50.2	38	NA
D-1203	SR-4	Sulfur Recovery	P-14625	P	C	2	RS	Resid	L	N	G	70.1	10	NA
D-1204	SR-3	Sulfur Recovery	P-17046	C		8	RS	Resid	N	N	G	52.4	38	NA
D-1205	SR-4	Sulfur Recovery	P-14625	C		18	RS	Resid	L	N	G	69.3	10	NA
D-1206	SR-4	Sulfur Recovery	P-14547	P	C	2	RS	Resid	L	N	G	190.7	164	NA
D-1207	SR-4	Sulfur Recovery	P-14646	P	C	1.5	RS	Resid	L	N	G	102.8	107	NA
D-1208	SR-4	Sulfur Recovery	P-14547	C		10	RS	Resid	L	N	G	210.7	164	NA
D-1210	SR-4	Sulfur Recovery	P-14546	P	C	2	RS	Resid	L	N	G	231.5	160	NA
D-1212	SR-4	Sulfur Recovery	P-14546	C		10	RS	Resid	L	N	G	290.7	160	NA
D-1209	SR-4	Sulfur Recovery	P-14646	C		8	RS	Resid	L	N	G	76.2	105	NA
D-1211	SR-4	Sulfur Recovery	P-14647	P	C	1	RS	Resid	L	N	G	63.4	10	NA
D-1213	SR-4	Sulfur Recovery	P-14647	C		8	RS	Resid	L	N	G	70.4	10	NA
D-1214	SR4	Sulfur Recovery	P-14655	P	C	2	RS	Resid	L	N	G	66.8	22	NA
D-1215	SR-4	Sulfur Recovery	P-14656	P	C	1.5	RS	Resid	L	N	G	110	30	NA
D-1216	SR4	Sulfur Recovery	P-14655	C		10	RS	Resid	L	N	G	83.6	22	NA
D-1217	SR-4	Sulfur Recovery	P-14656	C		18	RS	Resid	L	N	G	184	30	NA
D-1218	SR4	Sulfur Recovery	P-14654	P	Seal	2	RS	Resid	L	N	G	98	90	NA
D-1219	SR4	Sulfur Recovery	P-14657	P	C	1.5	RS	Resid	L	N	G	139	105	NA
D-1220	SR4	Sulfur Recovery	P-14654	C		10	RS	Resid	L	N	G	83.6	90	NA
D-1221	SR4	Sulfur Recovery	P-14657	C		18	RS	Resid	L	N	G	217	105	NA
D-1222	SR4	Sulfur Recovery	P-14556	P	C	2	RS	Resid	N	N	G	52.3	4	NA
D-1223	SR4	Sulfur Recovery	P-16184	P	C	1.5	RS	Resid	N	Blank	G	51.2	23	NA
D-1224	SR4	Sulfur Recovery	P-14556	C		10	RS	Resid	N	Y	G	52.3	4	NA
D-1226-2	SR4	Sulfur Recovery	P-14557	P	C	2	RS	Resid	N	Y	G	53.1	4	NA
D-1227	SR4	Sulfur Recovery	P-16184	C		10	RS	Resid	N	Blank	G	50.3	23	NA
D-1228	SR4	Sulfur Recovery	P-14557	C		10	RS	Resid	N	Y	G	53.1	4	NA
D-1229	SR4	Sulfur Recovery	P-14536	P	C	1.5	RS	Resid	N	Blank	G	50.1	5	NA
D-1230	DIMR	Polymerization	P-5288	C		6	RS	Resid	N	Y	G	68.3	345	NA
D-1231	SR4	Sulfur Recovery	P-14536	C		10	RS	Resid	N	Blank	G	51.2	5	NA
D-1232	DIMR	Polymerization	P-5287	C		6	RS	Resid	N	Y	G	54.7	300	NA
D-1233	SR4	Sulfur Recovery	P-14535	P	C	1.5	RS	Resid	N	Blank	G	50	26	NA
D-1234	HP2	Hydrogen Production	P-5157	P	C	2	RS	Resid	L	Y	G	156.7	680	NA
D-1235	SR4	Sulfur Recovery	P-14537	C		10	RS	Resid	N	Blank	G	50.4	26	NA
D-1236	HP2	Hydrogen Production	P-5157	C		24	RS	Resid	L	Y	G	329.5	680	NA
D-1237	SR4	Sulfur Recovery	P-14519	P	C	3	RS	Resid	L	N	G	105	53.4	NA
D-1238	HP2	Hydrogen Production	P-5150	P	C	2	RS	Resid	L	Y	G	105.2	680	NA
D-1239	SR4	Sulfur Recovery	P-14519	P	C	3	RS	Resid	L	N	G	105	54.6	NA
D-1240	HP2	Hydrogen Production	P-5150	C		24	RS	Resid	L	Y	G	281.2	680	NA
D-1241	SR4	Sulfur Recovery	P-14519	C		20	RS	Resid	N	Blank	G	53.4	105	NA
D-1242	CU/VF	Crude Unit	P-2019	P	C	2	CR	Crude	L	N	G	183.3	50	NA
D-1243	SR4	Sulfur Recovery	P-14518	P	C	3	RS	Resid	L	N	G	108	470	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1244	CU/VF	Crude Unit	P-2019	C		12	CR	Crude	L	N	G	312.7	50	NA
D-1245	SR4	Sulfur Recovery	P-14518	P	C	3	RS	Resid	L	N	G	108	470	NA
D-1246	CU/VF	Crude Unit	P-2019	P	C	2	CR	Crude	L	N	G	125.8	50	NA
D-1247	SR4	Sulfur Recovery	P-14518	C		20	RS	Resid	L	N	G	118	470	NA
D-1248	CU/VF	Crude Unit	P-2017	P	C	2	CR	Crude	L	N	G	110.6	190	NA
D-1249	HP2	Hydrogen Production	P-5162	P	C	1.5	RS	Resid	L	N	G	116	70	NA
D-1250	CU/VF	Crude Unit	P-2017	C		12	CR	Crude	L	N	G	269.1	190	NA
D-1251	HP2	Hydrogen Production	P-5162	C		8	RS	Resid	L	N	G	140	70	NA
D-1252	CU/VF	Crude Unit	P-2028	P	C	2	CR	Crude	L	N	G	191.8	600	NA
D-1253	HP2	Hydrogen Production	P-5163	P	C	1.5	RS	Resid	L	N	G	72.2	3	NA
D-1254	CU/VF	Crude Unit	P-2028	C		12	CR	Crude	L	N	G	414.7	600	NA
D-1255	HP2	Hydrogen Production	P-5163	C		8	RS	Resid	L	N	G	76.3	3	NA
D-1256	CU/VF	Crude Unit	P-2065	P	C	2	CR	Crude	L	N	G	191.8	575	NA
D-1257	HP2	Hydrogen Production	P-5161	P	C	3	RS	Resid	L	N	G	122	30	NA
D-1258	CU/VF	Crude Unit	P-2065	C		12	CR	Crude	L	N	G	473.2	575	NA
D-1259	HP2	Hydrogen Production	P-5161	P	C	3	RS	Resid	L	N	G	99.3	30	NA
D-1260	CU/VF	Crude Unit	P-2006	P	C	2	CR	Crude	L	N	G	170.2	464	NA
D-1261	HP2	Hydrogen Production	P-5161	C		20	RS	Resid	L	N	G	183	30	NA
D-1262	CU/VF	Crude Unit	P-2006	C		12	CR	Crude	L	N	G	413.7	464	NA
D-1263	HP2	Hydrogen Production	P-5161	C		20	RS	Resid	L	N	G	187	30	NA
D-1264	CU/VF	Crude Unit	P-4317	P	C	2	HGO	Gas Oil	L	N	G	103.2	300	NA
D-1265	HP2	Hydrogen Production	P-5160	P	C	3	RS	Resid	L	N	G	125	490	NA
D-1266	CU/VF	Crude Unit	P-4317	C		12	HGO	Gas Oil	L	N	G	140.5	300	NA
D-1267	HP2	Hydrogen Production	P-5160	C		20	RS	Resid	L	N	G	161	490	NA
D-1268	CU/VF	Crude Unit	P-4318	P	C	2	HGO	Gas Oil	L	N	G	78.4	40	NA
D-1269	HP2	Hydrogen Production	P-5160	P	C	3	RS	Resid	L	N	G	111	490	NA
D-1270	CU/VF	Crude Unit	P-4318	C		12	HGO	Gas Oil	L	N	G	139.2	40	NA
D-1271	CU	Crude Unit	P-2012	P	C	1.5	HGO	Gas Oil	L	N	G	191	250	NA
D-1272	CU/VF	Crude Unit	P-2841	P	C	2	CR	Crude	N	N	G	66.8	5	NA
D-1273	CU	Crude Unit	P-2012	C		12	HGO	Gas Oil	L	N	G	476	250	NA
D-1274	CU/VF	Crude Unit	P-2018	P	C	2	CR	Crude	N	N	G	61.8	0	NA
D-1275	CU	Crude Unit	P-2035	P	C	3	HGO	Gas Oil	L	N	G	199	210	NA
D-1276	CU/VF	Crude Unit	P-2018	C		12	CR	Crude	N	N	G	61.8	0	NA
D-1277	CU	Crude Unit	P-2035	C		16	HGO	Gas Oil	L	N	G	427	210	NA
D-1278	CU/VF	Crude Unit	P-2018	P	C	2	CR	Crude	N	N	G	61.8	0	NA
D-1279	CU	Crude Unit	P-2013	P	C	3	HGO	Gas Oil	L	N	G	208	285	NA
D-1280	SRHT	Hydrotreater	P-2049	P	C	2	KS	Kerosene	L	N	G	128.2	100	NA
D-1281	CU	Crude Unit	P-2013	C		16	HGO	Gas Oil	L	N	G	548	285	NA
D-1282	SRHT	Hydrotreater	P-2049	C		12	KS	Kerosene	L	N	G	351	100	NA
D-1283	CU	Crude Unit	P-2005	P	C	3	CR	Crude	L	N	G	186	240	NA
D-1284	SRHT	Hydrotreater	P-2055	P	C	2	KS	Kerosene	L	N	G	161.3	160	NA
D-1285	SRHT	Hydrotreater	P-2052	P	Seal	2	GO	Gas Oil	N	Blank	G	251	800	NA
D-1286	SRHT	Hydrotreater	P-2055	C		12	KS	Kerosene	L	N	G	361.2	160	NA
D-1287	SRHT	Hydrotreater	P-2052	C	Pump Housing	14	GO	Gas Oil	N	Blank	G	368	800	NA
D-1288	SRHT	Hydrotreater	P-2050	P	C	2	KS	Kerosene	L	N	G	152.6	40	NA
D-1289	CU	Crude Unit	P-2004	P	C	1.5	CR	Crude	N	Blank	G	169	45	NA
D-1290	SRHT	Hydrotreater	P-2050	C		12	KS	Kerosene	L	N	G	218.9	40	NA
D-1291	CU	Crude Unit	P-2004	C		12	CR	Crude	N	N	G	126	45	NA
D-1292	SRHT	Hydrotreater	P-17481	P	C	2	GO	Gas Oil	L	N	G	107.3	20	NA
D-1293	CU	Crude Unit	P-2030	P	C	3	CR	Crude	L	N	G	171	80	NA
D-1294	SRHT	Hydrotreater	P-17481	C		16	GO	Gas Oil	L	N	G	214.8	20	NA
D-1295	CU	Crude Unit	P-2030	C		20	CR	Crude	L	N	G	560	80	NA
D-1296	SRHT	Hydrotreater	P-2048	P	C	2	JT	Jet	L	N	G	64.9	5	NA
D-1297	CU	Crude Unit	P-2015	P	C	3	CR	Crude	L	N	G	201	20	NA
D-1298	SRHT	Hydrotreater	P-2048	C		16	JT	Jet	L	N	G	66.2	5	NA
D-1299	CU	Crude Unit	P-2015	C		24	CR	Crude	L	N	G	297	20	NA
D-1300	SRHT	Hydrotreater	P-2058	P	C	2	DSL	Diesel	L	N	G	143.5	5	NA
D-1301	CU	Crude Unit	P-2016	P	C	4	CR	Crude	L	N	G	259	100	NA
D-1302	SRHT	Hydrotreater	P-2058	C		16	DSL	Diesel	L	N	G	359.7	5	NA
D-1303	CU	Crude Unit	P-2016	C		24	CR	Crude	L	N	G	308	100	NA
D-1304	SRHT	Hydrotreater	P-2051	P	C	2	JT	Jet	L	N	G	63.2	0	NA
D-1305	HCU	Hydrocracker	P-2117	C	Pump Housing	30	GO	Gas Oil	H	N	G	497	2140	NA
D-1306	SRHT	Hydrotreater	P-2040	P	Seal	2	DSL	Diesel	L	N	G	143.2	125	NA
D-1307	CU	Crude Unit	P-2014	P	C	3	CR	Crude	L	N	G	205	130	NA
D-1308	SGP	Separation	P-2112	P	C	2	DEA	Amine	L	N	G	78.6	0	NA
D-1309	CU	Crude Unit	P-2014	C		16	CR	Crude	L	N	G	574	130	NA
D-1310	SGP	Separation	P-2112	C		24	DEA	Amine	L	N	G	78.8	0	NA
D-1311	CU	Crude Unit	P-8615	P	C	3	CR	Crude	N	Blank	G	180	110	NA
D-1312	HCU	Hydrocracker	P-2967	P	C	2	DSL	Diesel	L	N	G	197	50	NA
D-1313	CU	Crude Unit	P-8615	C		20	CR	Crude	N	Blank	G	467	110	NA
D-1314	HCU	Hydrocracker	P-2967	C		14	DSL	Diesel	L	N	G	556.2	50	NA
D-1315	SRHT	Hydrotreater	P-2041	P	C	3	GO	Gas Oil	L	N	G	171	725	NA
D-1316	HCU	Hydrocracker	P-2128	P	C	2	GO	Gas Oil	L	N	G	217.2	130	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1317	SRHT	Hydrotreater	P-2041	C		20	GO	Gas Oil	L	N	G	392	725	NA
D-1318	HCU	Hydrocracker	P-2128	C		16	GO	Gas Oil	L	N	G	579.6	130	NA
D-1319	CU	Crude Unit	P-2005	C		20	CR	Crude	L	Blank	G	432	240	NA
D-1320	HCU	Hydrocracker	P-2121	P	C	2	DSL	Diesel	L	N	G	166.3	140	NA
D-1322	HCU	Hydrocracker	P-2121	C		16	DSL	Diesel	L	N	G	548.8	140	NA
D-1323	SRHT	Hydrotreater	P-2040	C		14	GO	Gas Oil	N	Blank	G	514	125	NA
D-1324	HCU	Hydrocracker	P-2121	P	Seal	2	DSL	Diesel	L	N	G	309.1	140	NA
D-1325	SGP	Separation	P-4251	P	C	4	RS	Resid	N	Blank	G	230	50	NA
D-1326	HCU	Hydrocracker	P-2120	P	C	2	DSL	Diesel	L	N	G	180.9	150	NA
D-1327	SGP	Separation	P-4251	C		20	RS	Resid	N	Blank	G	492	50	NA
D-1328	HCU	Hydrocracker	P-2120	C		16	DSL	Diesel	L	N	G	569.4	150	NA
D-1329	SGP	Separation	P-4251	P	C	4	RS	Resid	N	Blank	G	222	50	NA
D-1330	HCU	Hydrocracker	P-2120	P	Seal	2	DSL	Diesel	L	N	G	434.7	150	NA
D-1331	SGP	Separation	P-4250	P	C	3	RS	Resid	L	N	G	240	150	NA
D-1333	SGP	Separation	P-4250	P	C	3	RS	Resid	L	N	G	253	150	NA
D-1335	SGP	Separation	P-4250	C		20	RS	Resid	L	N	G	433	150	NA
D-1337	HCU	Hydrocracker	P-2117	P	C	4	GO	Gas Oil	H	N	G	188	2140	NA
D-1339	HCU	Hydrocracker	P-2117	P	C	4	GO	Gas Oil	H	N	G	238	2140	NA
D-1341	CCU	Catalytic Cracking	P-2257	P	C	1.5	HGO	Gas Oil	L	N	G	263.2	430	NA
D-1343	CCU	Catalytic Cracking	P-2257	C		18	HGO	Gas Oil	L	N	G	375.5	430	NA
D-1345	CCU	Catalytic Cracking	P-2245	P	C	1.5	LGO	Gas Oil	L	N	G	246.9	40	NA
D-1347	CCU	Catalytic Cracking	P-2247	C		18	LGO	Gas Oil	L	N	G	349.2	40	NA
D-1349	CCU	Catalytic Cracking	P-2244	P	C	1.5	LGO	Gas Oil	L	N	G	212.1	230	NA
D-1351	CCU	Catalytic Cracking	P-2244	C		18	LGO	Gas Oil	L	N	G	476	230	NA
D-1353	CCU	Catalytic Cracking	P-2242	P	C	1.5	LGO	Gas Oil	H	N	G	253.9	168	NA
D-1355	CCU	Catalytic Cracking	P-2242	C		18	LGO	Gas Oil	H	N	G	459.9	168	NA
D-1357	CCU	Catalytic Cracking	P-2243	P	C	1.5	LGO	Gas Oil	L	N	G	193.1	200	NA
D-1359	CCU	Catalytic Cracking	P-2243	C		18	LGO	Gas Oil	L	N	G	254.7	200	NA
D-1361	CCU	Catalytic Cracking	P-2237	P	C	1.5	AS	Resid	L	N	G	149.2	110	NA
D-1363	CCU	Catalytic Cracking	P-2237	C		18	AS	Resid	L	N	G	645.5	110	NA
D-1365	CCU	Catalytic Cracking	P-2238	P	C	1.5	HGO	Gas Oil	L	N	G	219.1	130	NA
D-1367	CCU	Catalytic Cracking	P-2238	C	Pump Housing	18	HGO	Gas Oil	L	N	G	525.7	130	NA
D-1369	CCU	Catalytic Cracking	P-8655	P	C	1.5	HGO	Gas Oil	L	N	G	230.5	30	NA
D-1371	CCU	Catalytic Cracking	P-8655	C	-	18	HGO	Gas Oil	L	N	G	283.2	30	NA
D-1373	CFH	Hydrotreater	P-2225	P	C	1.5	HGO	Gas Oil	H	N	G	136.5	50	NA
D-1375	CFH	Hydrotreater	P-2225	P	C	1.5	HGO	Gas Oil	H	N	G	137.1	50	NA
D-1377	CFH	Hydrotreater	P-2225	C	-	20	HGO	Gas Oil	H	N	G	264.4	50	NA
D-1379	DCU	Coker	P-13444	P	C	1.5	AS	Resid	L	N	G	305.6	800	NA
D-1381	DCU	Coker	P-13444	P	C	1.5	AS	Resid	L	N	G	303.1	800	NA
D-1383	DCU	Coker	P-13444	C	-	18	AS	Resid	L	N	G	500.9	800	NA
D-1385	DCU	Coker	P-13444	C	-	18	AS	Resid	L	N	G	545.6	800	NA
D-1387	DCU	Coker	P-13443	P	C	2	AS	Resid	L	N	G	176.3	25	NA
D-1389	DCU	Coker	P-13443	C	-	20	AS	Resid	L	N	G	139.7	25	NA
D-1391	DCU	Coker	P-13443	P	C	2	AS	Resid	L	N	G	127.6	25	NA
D-1393	DCU	Coker	P-13443	C	-	20	AS	Resid	L	N	G	104.9	25	NA
D-1395	DCU	Coker	P-13452	P	C	1.5	LGO	Gas Oil	L	N	G	55.4	200	NA
D-1397	DCU	Coker	P-13452	C	-	18	LGO	Gas Oil	L	N	G	55.4	200	NA
D-1362	CCU	Catalytic Cracking	P-2255	C		12	LGO	Gas Oil	L	N	G	84.9	600	NA
D-1364	CCU	Catalytic Cracking	P-4104	P	C	2	LGO	Gas Oil	L	N	G	252.8	160	NA
D-1366	CCU	Catalytic Cracking	P-4104	C		20	LGO	Gas Oil	L	N	G	320.7	160	NA
D-1368	CCU	Catalytic Cracking	P-4108	P	C	2	LGO	Gas Oil	L	N	G	204.6	65	NA
D-1370	CCU	Catalytic Cracking	P-4108	C		20	LGO	Gas Oil	L	N	G	136.6	65	NA
D-1372	CGP	Separation	P-2265	P	C	1	GO	Gas Oil	L	N	G	198.7	22.5	NA
D-1374	CGP	Separation	P-2265	C		12	GO	Gas Oil	L	N	G	366.2	22.5	NA
D-1376	DCU	Coker	P-13445	P		2	HGO	Gas Oil	L	N	G	242.2	0	NA
D-1378	DCU	Coker	P-13445	C		18	HGO	Gas Oil	L	N	G	478.3	0	NA
D-1380	DCU	Coker	P-13446	P	C	2	HGO	Gas Oil	L	N	G	163.8	40	NA
D-1382	DCU	Coker	P-13446	C		18	HGO	Gas Oil	L	N	G	421.4	40	NA
D-1384	DCU	Coker	P-13454	P	C	1	HGO	Gas Oil	L	N	G	279.2	170	NA
D-1386	DCU	Coker	P-13454	C		18	HGO	Gas Oil	L	N	G	480	170	NA
D-1388	DCU	Coker	P-13455	P	C	1	HGO	Gas Oil	L	N	G	292.3	45	NA
D-1390	DCU	Coker	P-13455	C		18	HGO	Gas Oil	L	N	G	432.1	45	NA
D-1392	DCU	Coker	P-13462	P	C	2	LGO	Gas Oil	L	N	G	103.2	60	NA
D-1394	DCU	Coker	P-13462	C		10	LGO	Gas Oil	L	N	G	102.1	60	NA
D-1396	DCU	Coker	P-13463	P	C	2	LGO	Gas Oil	L	N	G	53.2	40	NA
D-1398	DCU	Coker	P-13463	C		10	LGO	Gas Oil	L	N	G	54.2	40	NA
D-1400	DHT	Hydrotreater	P-13925	P	C	2	HGO	Gas Oil	L	N	G	173.2	2800	NA
D-1402	DHT	Hydrotreater	P-13925	C		18	HGO	Gas Oil	L	N	G	183.6	2800	NA
D-1404	DHT	Hydrotreater	P-13925	P	C	2	HGO	Gas Oil	L	N	G	156.7	2800	NA
D-1406	DHT	Hydrotreater	P-13925	C		18	HGO	Gas Oil	L	N	G	338.9	2800	NA
D-1408	VGT	Fuel Gas Treatment	P-14489	P	C	Blank	RS	Resid	L	N	G	338.9	160	NA
D-1410	VGT	Fuel Gas Treatment	P-14489	C		10	RS	Resid	L	N	G	62	160	NA
D-1412	VGT	Fuel Gas Treatment	P-14488	P	C	Blank	RS	Resid	L	N	G	61.9	125	NA

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D-1414	VGT	Fuel Gas Treatment	P-14488	C		10	RS	Resid	L	N	G	107	125	NA
D-1416	LOG	Tank Farm	P-17272	P	C	2	GO	Gas Oil	L	N	G	171.8	20	NA
D-1418	LOG	Tank Farm	P-17272	C		12	GO	Gas Oil	N	N	G	124.8	20	NA
D-1399	DCU	Coker	P-13453	P	C	1.5	LGO	Gas Oil	L	N	G	131.3	160	NA
D-1401	DCU	Coker	P-13453	C	-	12	LGO	Gas Oil	L	N	G	249.4	160	NA
D-1403	DCU	Coker	P-13495	P	C	1.5	RS	Resid	N	N	G	57.4	305	NA
D-1405	DCU	Coker	P-13495	C	-	8	RS	Resid	N	N	G	53.9	305	NA
D-1407	DCU	Coker	P-13496	P	C	1	RS	Resid	L	N	G	84.8	400	NA
D-1409	DCU	Coker	P-13496	C	-	8	RS	Resid	L	N	G	85.8	400	NA
D-1411	DCU	Coker	P-13447	P	C	1	AS	Resid	L	N	G	176.6	25	NA
D-1413	DCU	Coker	P-13447	C	-	10	AS	Resid	L	N	G	437.5	25	NA
D-1415	DHT	Hydrotreater	P-13933	P	C	2	HGO	Gas Oil	N	N	G	140.1	80	NA
D-1417	DHT	Hydrotreater	P-13933	C	-	18	HGO	Gas Oil	N	N	G	403	80	NA
D-1419	DHT	Hydrotreater	P-13932	P	C	2	HGO	Gas Oil	L	N	G	200.6	800	NA
D-1421	DHT	Hydrotreater	P-13932	C	-	18	HGO	Gas Oil	L	N	G	470.2	800	NA
D-1423	VGT	Fuel Gas Treatment	P-14500	P	C	1	RS	Resid	N	N	G	65.4	0	NA
D-1425	VGT	Fuel Gas Treatment	P-14500	C	-	12	RS	Resid	N	N	G	62.2	0	NA
D-1427	VGT	Fuel Gas Treatment	P-14487	P	C	2	RS	Resid	N	N	G	71.1	150	NA
D-1429	VGT	Fuel Gas Treatment	P-14487	C	-	14	RS	Resid	N	N	G	105.8	150	NA
D-1431	LOG	Tank Farm	P-8329	P	C	2	GO	Gas Oil	N	N	G	67.2	0	NA
D-1433	LOG	Tank Farm	P-8329	C	-	18	GO	Gas Oil	N	N	G	65.4	0	NA
D-1435	LOG	Tank Farm	P-2591	P	C	2	GO	Gas Oil	N	N	G	70.8	0	NA
D-1437	LOG	Tank Farm	P-2591	C	-	14	GO	Gas Oil	N	N	G	71	0	NA
D-1439	LOG	Tank Farm	P-2405	P	C	1	HGO	Gas Oil	N	N	G	82.5	0	NA
D-1441	LOG	Tank Farm	P-2405	C	-	16	HGO	Gas Oil	N	N	G	82.1	0	NA
D-1443	LOG	Tank Farm	P-2854	P	C	1	HGO	Gas Oil	N	N	G	79.1	20	NA
D-1445	LOG	Tank Farm	P-2854	C	-	12	HGO	Gas Oil	N	N	G	79.5	20	NA
D-1332	CCU	Catalytic Cracking	P-12627	P	C	2	AS	Resid	N	N	G	131.7	50	NA
D-1334	CCU	Catalytic Cracking	P-12627	C	Pump Housing	24	AS	Resid	N	N	G	407.8	50	NA
D-1336	CCU	Catalytic Cracking	P-2235	P	C	2	HGO	Gas Oil	L	N	G	229.5	150	NA
D-1338	CCU	Catalytic Cracking	P-2235	C		20	HGO	Gas Oil	L	N	G	308.6	150	NA
D-1340	CCU	Catalytic Cracking	P-2234	P	C	2	HGO	Gas Oil	N	N	G	92.2	50	NA
D-1342	CCU	Catalytic Cracking	P-2234	C		20	HGO	Gas Oil	N	N	G	228.5	50	NA
D-1344	CCU	Catalytic Cracking	P-8654	P	C	1	LGO	Gas Oil	N	N	G	55.2	25	NA
D-1346	CCU	Catalytic Cracking	P-8654	C		12	LGO	Gas Oil	N	N	G	55.4	25	NA
D-1348	CCU	Catalytic Cracking	P-8654	P	C	1	LGO	Gas Oil	N	N	G	56.4	25	NA
D-1350	CCU	Catalytic Cracking	P-8654	C		12	LGO	Gas Oil	N	N	G	56.4	25	NA
D-1352	CCU	Catalytic Cracking	P-2236	P	C	2	AS	Resid	L	N	G	206.2	90	NA
D-1354	CCU	Catalytic Cracking	P-2236	C		18	AS	Resid	L	N	G	206.2	90	NA
D-1356	CCU	Catalytic Cracking	P-2256	P	C	1	LGO	Gas Oil	L	N	G	121.8	325	NA
D-1358	CCU	Catalytic Cracking	P-2256	C		12	LGO	Gas Oil	L	N	G	99.4	325	NA
D-1360	CCU	Catalytic Cracking	P-2255	P	C	1	LGO	Gas Oil	L	N	G	78.5	600	NA
D-1420	LOG	Tank Farm	P-2407	P	C	2	HGO	Gas Oil	L	N	G	139.5	185	NA
D-1422	LOG	Tank Farm	P-2407	C		8	HGO	Gas Oil	L	N	G	115.4	185	NA
D-1424	LOG	Tank Farm	P-2437	P	C	2	HGO	Gas Oil	L	N	G	79.2	400	NA
D-1426	LOG	Tank Farm	P-2437	C		8	HGO	Gas Oil	L	N	G	80.9	400	NA
D-1428	LOG	Tank Farm	P-2855	P	C	2	HGO	Gas Oil	L	N	G	78.5	15	NA
D-1430	LOG	Tank Farm	P-2855	C		12	HGO	Gas Oil	L	N	G	77.1	15	NA
D-1432	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	L	N	P	276.2	1375	NA
D-1434	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	412.8	1375	NA
D-1436	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	463.3	1375	NA
D-1438	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	483.4	1375	NA
D-1440	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	484.5	1375	NA
D-1442	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	483.9	1375	NA
D-1444	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	L	N	P	613.1	1375	NA
D-1446	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	522.4	1375	NA
D-1448	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	L	N	P	252.3	1375	NA
D-1450	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	621.3	1375	NA
D-1452	CFH	Hydrotreater	F-63	C	Flange	6	HGO	Gas Oil	L	N	P	451.9	1375	NA
D-1454	CFH	Hydrotreater	F-63	V		3	HGO	Gas Oil	L	N	P	128.4	1375	Y
D-1456	CFH	Hydrotreater	F-63	C	Flange	3	HGO	Gas Oil	L	N	P	152.6	1375	NA
D-1458	CFH	Hydrotreater	F-63	V		3	HGO	Gas Oil	L	N	P	158.4	1375	Y
D-1460	CFH	Hydrotreater	F-63	C	Flange	3	HGO	Gas Oil	L	N	P	116.8	1375	NA
D-1462	CFH	Hydrotreater	F-63	V		3	HGO	Gas Oil	N	N	P	113.9	1375	Y
D-1464	CFH	Hydrotreater	F-63	C	Flange	3	HGO	Gas Oil	N	N	P	139.9	1375	NA
D-1466	CFH	Hydrotreater	F-63	V		3	HGO	Gas Oil	N	N	P	136.8	1375	Y
D-1468	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	L	N	G	85.3	1375	Y
D-1470	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	85.3	1375	NA
D-1472	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	L	N	G	85.3	1375	Y
D-1474	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	L	N	G	438.1	1375	NA
D-1476	CFH	Hydrotreater	F-63	V		2	HGO	Gas Oil	L	N	G	438.4	1375	Y
D-1478	CFH	Hydrotreater	F-63	C	Flange	4	HGO	Gas Oil	L	N	G	370.1	1375	NA
D-1480	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	187.6	1375	Y

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D-1482	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	187.9	1376	NA
D-1484	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	147.6	1376	Y
D-1486	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	147.1	1375	NA
D-1488	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	80.2	1375	Y
D-1490	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	80.2	1375	NA
D-1447	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	P	501	1375	NA
D-1449	CFH	Hydrotreater	F-63	C	Flange	4	HGO	Gas Oil	N	Blank	P	621	1375	NA
D-1451	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	N	Blank	P	261	1375	NA
D-1453	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	P	549	1375	NA
D-1455	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	P	538	1375	NA
D-1457	CFH	Hydrotreater	F-63	C	Flange	4	HGO	Gas Oil	N	Blank	P	531	1375	NA
D-1459	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	P	438	1375	NA
D-1461	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	P	536	1375	NA
D-1463	CFH	Hydrotreater	F-63	C	Flange	4	HGO	Gas Oil	N	Blank	P	425	1375	NA
D-1465	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	N	Blank	P	230	1375	NA
D-1467	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	P	533	1375	NA
D-1469	CFH	Hydrotreater	F-63	C	Flange	4	HGO	Gas Oil	N	Blank	P	531	1375	NA
D-1471	CFH	Hydrotreater	F-63	C	Flange	12	HGO	Gas Oil	N	Blank	P	415	1375	NA
D-1473	CFH	Hydrotreater	F-63	C	Flange	1	HGO	Gas Oil	N	Blank	P	358	1375	NA
D-1475	CFH	Hydrotreater	F-63	C	Flange	3	HGO	Gas Oil	N	Blank	P	229	1375	NA
D-1477	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	82	1375	Y
D-1479	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	251	1375	Y
D-1481	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	G	465	1375	NA
D-1483	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	G	487	1375	NA
D-1485	CFH	Hydrotreater	F-63	V	CV	2	HGO	Gas Oil	N	Blank	G	466	1375	Y
D-1487	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	N	Blank	G	274	1375	NA
D-1489	CFH	Hydrotreater	F-63	V	GT	1	HGO	Gas Oil	N	Blank	G	198	1375	Y
D-1491	CFH	Hydrotreater	F-63	V	GT	1	HGO	Gas Oil	N	Blank	G	141	1375	Y
D-1493	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	91	1375	NA
D-1495	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	78	1375	NA
D-1497	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	81	1375	NA
D-1499	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	77	1375	Y
D-1501	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	76	1375	Y
D-1503	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	81	1375	Y
D-1505	CFH	Hydrotreater	F-63	V	GT	1	HGO	Gas Oil	N	Blank	G	265	1375	Y
D-1507	CFH	Hydrotreater	F-63	V	GT	1	HGO	Gas Oil	N	Blank	G	265	1375	Y
D-1509	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	104	1375	NA
D-1511	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	80	1375	NA
D-1513	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	83	1375	NA
D-1515	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	84	1375	Y
D-1517	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	83	1375	Y
D-1519	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	82	1375	Y
D-1521	CFH	Hydrotreater	F-63	C	Flange	3	HGO	Gas Oil	N	Blank	G	484	1375	NA
D-1523	CFH	Hydrotreater	F-63	V	CV	3	HGO	Gas Oil	N	Blank	G	484	1375	Y
D-1525	CFH	Hydrotreater	F-63	C	Flange	3	HGO	Gas Oil	N	Blank	G	495	1375	NA
D-1527	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	215	1375	Y
D-1529	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	104	1375	Y
D-1531	CFH	Hydrotreater	F-63	C	BP	0.5	HGO	Gas Oil	N	Blank	G	83	1375	NA
D-1533	CFH	Hydrotreater	F-63	V	GT	1	HGO	Gas Oil	N	Blank	G	200	1375	Y
D-1535	CFH	Hydrotreater	F-63	V	GT	1	HGO	Gas Oil	N	Blank	G	228	1375	Y
D-1537	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	196	1375	NA
D-1539	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	235	1375	NA
D-1541	CFH	Hydrotreater	F-63	C		0.25	HGO	Gas Oil	N	Blank	G	94	1375	NA
D-1543	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	84	1375	Y
D-1545	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	81	1375	Y
D-1547	CFH	Hydrotreater	F-63	V	N	0.25	HGO	Gas Oil	N	Blank	G	87	1375	Y
D-1549	CFH	Hydrotreater	F-63	C	Flange	3	HGO	Gas Oil	N	Blank	G	471	1375	NA
D-1551	CFH	Hydrotreater	F-63	V	CU	3	HGO	Gas Oil	N	Blank	G	446	1375	Y
D-1553	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	221	1375	Y
D-1555	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	84	1375	Y
D-1557	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	N	Blank	G	81	1375	NA
D-1559	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	80	1375	Y
D-1561	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	N	Blank	G	219	1375	Y
D-1563	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	N	Blank	G	77	1375	NA
D-1565	CFH	Hydrotreater	F-63	V	CU	3	HGO	Gas Oil	N	Blank	G	384	1375	Y
D-1567	CFH	Hydrotreater	E-728	C	Flange	2	HGO	Gas Oil	N	N	G	367	1375	NA
D-1569	CFH	Hydrotreater	E-728	V	CU	4	HGO	Gas Oil	N	Blank	G	256	1375	Y
D-1571	CFH	Hydrotreater	E-728	C	Flange	6	HGO	Gas Oil	N	Blank	G	469	1375	NA
D-1573	CFH	Hydrotreater	E-728	V	CV	4	HGO	Gas Oil	N	Blank	G	191	1375	Y
D-1575	CFH	Hydrotreater	E-728	C	Flange	2	HGO	Gas Oil	N	Blank	G	280	1375	NA
D-1577	CFH	Hydrotreater	E-728	C	Flange	10	HGO	Gas Oil	N	Blank	G	587	1375	NA
D-1579	CFH	Hydrotreater	PS-22	V	N	0.5	HGO	Gas Oil	N	Blank	G	89	185	Y
D-1581	CFH	Hydrotreater	PS-22	C		0.5	HGO	Gas Oil	N	Blank	G	94	185	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1583	CFH	Hydrotreater	PS-22	V	N	0.5	HGO	Gas Oil	N	Blank	G	93	185	Y
D-1585	CFH	Hydrotreater	PS-22	C	Flange	6	HGO	Gas Oil	N	Blank	G	85	185	NA
D-1587	CFH	Hydrotreater	PS-22	V	GT	6	HGO	Gas Oil	N	Blank	G	85	185	Y
D-1589	CFH	Hydrotreater	PS-22	V	GT	6	HGO	Gas Oil	N	Blank	G	83	185	Y
D-1591	CFH	Hydrotreater	PS-22	C	Flange	6	HGO	Gas Oil	N	Blank	G	80	185	NA
D-1593	CFH	Hydrotreater	PS-22	V	N	0.5	HGO	Gas Oil	N	Blank	G	81	60	Y
D-1595	CFH	Hydrotreater	PS-22	C		0.5	HGO	Gas Oil	N	Blank	G	79	60	NA
D-1597	CFH	Hydrotreater	PS-22	V	N	0.5	HGO	Gas Oil	L	N	G	80	60	Y
D-1599	CFH	Hydrotreater	PS-22	V	GT	0.5	HGO	Gas Oil	L	N	G	76	60	Y
D-1601	CFH	Hydrotreater	PS-22	C		0.5	HGO	Gas Oil	L	N	G	67	60	NA
D-1603	CFH	Hydrotreater	PS-22	C	Flange	3	HGO	Gas Oil	L	N	G	79	60	NA
D-1605	CFH	Hydrotreater	PS-22	V	CU	3	HGO	Gas Oil	L	N	G	80	60	Y
D-1607	CFH	Hydrotreater	PS-22	V	GT	0.5	HGO	Gas Oil	L	N	G	81	60	Y
D-1609	CFH	Hydrotreater	PS-22	V	GT	0.5	HGO	Gas Oil	L	N	G	77	60	Y
D-1611	CFH	Hydrotreater	PS-22	C		0.5	HGO	Gas Oil	L	N	G	77	60	NA
D-1613	CFH	Hydrotreater	PS-22	C		0.5	HGO	Gas Oil	L	N	G	77	60	NA
D-1615	CFH	Hydrotreater	PS-22	C	Flange	10	HGO	Gas Oil	L	N	G	193	60	NA
D-1617	CFH	Hydrotreater	PS-22	V	GT	0.75	HGO	Gas Oil	L	N	G	78	60	Y
D-1619	CFH	Hydrotreater	PS-22	V	GT	0.75	HGO	Gas Oil	L	N	G	77	60	Y
D-1621	CFH	Hydrotreater	PS-22	C	Flange	0.75	HGO	Gas Oil	L	N	G	85	60	NA
D-1623	CFH	Hydrotreater	PS-22	C		0.5	HGO	Gas Oil	L	N	G	82	60	NA
D-1625	CFH	Hydrotreater	PS-22	V	GT	0.75	HGO	Gas Oil	L	N	G	84	60	Y
D-1627	CFH	Hydrotreater	PS-22	C	Flange	0.75	HGO	Gas Oil	L	N	G	81	60	NA
D-1629	CFH	Hydrotreater	PS-22	V	GT	0.75	HGO	Gas Oil	L	N	G	80	60	Y
D-1631	CFH	Hydrotreater	PS-22	C		0.25	HGO	Gas Oil	L	N	G	76	60	NA
D-1633	CFH	Hydrotreater	PS-22	V	N	0.25	HGO	Gas Oil	L	N	G	73	60	Y
D-1635	CFH	Hydrotreater	PS-22	V	CV	10	HGO	Gas Oil	L	N	G	228	60	Y
D-1637	CFH	Hydrotreater	PS-22	V	GT	10	HGO	Gas Oil	L	N	G	509	60	Y
D-1639	CFH	Hydrotreater	PS-22	C	Flange	0.75	HGO	Gas Oil	L	N	G	87	60	NA
D-1641	CFH	Hydrotreater	PS-22	V	GT	0.75	HGO	Gas Oil	L	N	G	104	60	Y
D-1643	CFH	Hydrotreater	PS-22	V	GT	0.75	HGO	Gas Oil	L	N	G	101	60	Y
D-1645	CFH	Hydrotreater	PS-22	C	Flange	0.75	HGO	Gas Oil	L	N	G	93	60	NA
D-1647	CFH	Hydrotreater	PS-22	C	Flange	10	HGO	Gas Oil	L	N	G	540	60	NA
D-1649	CFH	Hydrotreater	PS-22	V	GT	10	HGO	Gas Oil	L	N	G	501	60	Y
D-1651	CFH	Hydrotreater	PS-22	C	Flange	10	HGO	Gas Oil	L	N	G	530	60	NA
D-1653	CFH	Hydrotreater	PS-22	V	GT	0.5	HGO	Gas Oil	L	N	G	241	60	Y
D-1655	CFH	Hydrotreater	PS-22	C		0.5	HGO	Gas Oil	L	N	G	233	60	NA
D-1657	CFH	Hydrotreater	PS-22	V	GT	6	HGO	Gas Oil	N	Blank	G	430	60	Y
D-1659	CFH	Hydrotreater	PS-22	V	GT	6	HGO	Gas Oil	N	Blank	G	396	60	Y
D-1661	CFH	Hydrotreater	PS-22	C	Flange	6	HGO	Gas Oil	N	Blank	G	361	60	NA
D-1663	CFH	Hydrotreater	PS-22	V	GT	6	HGO	Gas Oil	N	Blank	G	540	60	Y
D-1665	CFH	Hydrotreater	PS-22	C	Flange	1	HGO	Gas Oil	N	Blank	G	207	60	NA
D-1667	CFH	Hydrotreater	PS-22	V	GT	1	HGO	Gas Oil	N	Blank	G	215	60	Y
D-1669	CFH	Hydrotreater	PS-22	V	CU	10	HGO	Gas Oil	N	Blank	G	364	60	Y
D-1671	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	Blank	G	123	50	NA
D-1673	CFH	Hydrotreater	P-2488	V	N	0.5	HGO	Gas Oil	N	Blank	G	116	50	Y
D-1675	CFH	Hydrotreater	P-2488	V	N	0.5	HGO	Gas Oil	N	Blank	G	122	50	Y
D-1677	CFH	Hydrotreater	P-2488	C	Flange	12	HGO	Gas Oil	N	Blank	G	349	50	NA
D-1679	CFH	Hydrotreater	P-2488	V	GT	0.5	HGO	Gas Oil	N	Blank	G	158	50	Y
D-1681	CFH	Hydrotreater	P-2488	C		0.25	HGO	Gas Oil	N	Blank	G	127	50	NA
D-1683	CFH	Hydrotreater	P-2488	V	GT	0.5	HGO	Gas Oil	N	Blank	G	114	50	Y
D-1685	CFH	Hydrotreater	P-2488	V	GT	12	HGO	Gas Oil	N	Blank	G	422	50	Y
D-1492	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	80.2	1375	Y
D-1494	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	80.2	1375	NA
D-1496	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	80.4	1375	Y
D-1498	CFH	Hydrotreater	F-63	C	BP	0.5	HGO	Gas Oil	L	N	G	80	1375	NA
D-1500	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	153.7	1375	Y
D-1502	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	153.7	1375	NA
D-1504	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	153.7	1375	Y
D-1506	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	153.7	1375	NA
D-1508	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	85.6	1375	Y
D-1510	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	85.6	1375	NA
D-1512	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	85.6	1375	Y
D-1514	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	85.6	1375	NA
D-1516	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	85.6	1375	Y
D-1518	CFH	Hydrotreater	F-63	C	BP	0.5	HGO	Gas Oil	L	N	G	85.6	1375	NA
D-1520	CFH	Hydrotreater	F-63	V		2	HGO	Gas Oil	L	N	G	486.5	1375	Y
D-1522	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	L	N	G	404.6	1375	NA
D-1524	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	232.5	1375	Y
D-1526	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	232.5	1375	NA
D-1528	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	L	N	G	232.5	1375	Y
D-1530	CFH	Hydrotreater	F-63	V	GT	0.5	HGO	Gas Oil	L	N	G	80.3	1375	Y
D-1532	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	80.3	1375	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1534	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	202	1375	Y
D-1536	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	L	N	G	376.1	1375	NA
D-1538	CFH	Hydrotreater	F-63	V		2	HGO	Gas Oil	L	N	G	456.8	1375	Y
D-1540	CFH	Hydrotreater	F-63	C	Flange	4	HGO	Gas Oil	L	N	G	401.3	1375	NA
D-1542	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	138.4	1375	Y
D-1544	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	138.4	1375	NA
D-1546	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	136.6	1375	Y
D-1548	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	136.3	1375	NA
D-1550	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	79.7	1375	Y
D-1552	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	82.1	1375	NA
D-1554	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	82.1	1375	Y
D-1556	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	82.1	1375	NA
D-1558	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	82.1	1375	Y
D-1560	CFH	Hydrotreater	F-63	C	BP	0.5	HGO	Gas Oil	L	N	G	82.1	1375	NA
D-1562	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	81.1	1375	Y
D-1564	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	81.1	1375	NA
D-1566	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	81.1	1375	Y
D-1568	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	81.1	1375	NA
D-1570	CFH	Hydrotreater	F-63	V	N	0.5	HGO	Gas Oil	L	N	G	81.1	1375	Y
D-1572	CFH	Hydrotreater	F-63	C	BP	0.5	HGO	Gas Oil	L	N	G	81.1	1375	NA
D-1574	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	188.3	1375	Y
D-1576	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	188.3	1375	NA
D-1578	CFH	Hydrotreater	F-63	V	GT	0.75	HGO	Gas Oil	L	N	G	149.4	1375	Y
D-1580	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	149.4	1375	NA
D-1582	CFH	Hydrotreater	F-63	C	Flange	2	HGO	Gas Oil	L	N	G	396.7	1375	NA
D-1584	CFH	Hydrotreater	F-63	V		2	HGO	Gas Oil	L	N	G	479.9	1375	Y
D-1586	CFH	Hydrotreater	F-63	C		0.5	HGO	Gas Oil	L	N	G	123.7	1375	NA
D-1588	CFH	Hydrotreater	F-60	V	GT	0.75	HGO	Gas Oil	L	N	G	228.9	1375	Y
D-1590	CFH	Hydrotreater	F-60	V	GT	0.5	HGO	Gas Oil	L	N	G	86.2	1375	Y
D-1592	CFH	Hydrotreater	E-729	C	Flange	2	HGO	Gas Oil	L	N	G	461.8	1375	NA
D-1594	CFH	Hydrotreater	E-729	V		4	HGO	Gas Oil	L	N	G	461.8	1375	Y
D-1596	CFH	Hydrotreater	E-729	C	Flange	2	HGO	Gas Oil	L	N	G	221.9	1375	NA
D-1598	CFH	Hydrotreater	E-729	C	Flange	12	HGO	Gas Oil	L	N	G	522.1	1375	NA
D-1600	CFH	Hydrotreater	E-729	C	Flange	2	HGO	Gas Oil	L	N	G	189.8	1375	NA
D-1602	CFH	Hydrotreater	V-576	V	GT	8	HGO	Gas Oil	L	N	G	123.2	20	Y
D-1604	CFH	Hydrotreater	V-576	C	Flange	2	HGO	Gas Oil	L	N	G	91.4	20	NA
D-1606	CFH	Hydrotreater	V-576	V	N	0.5	HGO	Gas Oil	L	N	G	91.4	20	Y
D-1608	CFH	Hydrotreater	V-576	C	BP	0.5	HGO	Gas Oil	L	N	G	91.4	20	NA
D-1610	CFH	Hydrotreater	V-576	V	GT	8	VGO	Gas Oil	N	N	G	76.8	20	Y
D-1612	CFH	Hydrotreater	V-576	C	Flange	8	VGO	Gas Oil	N	N	G	76.8	20	NA
D-1614	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	N	N	G	87.8	20	N
D-1616	CFH	Hydrotreater	V-576	V	GT	8	VGO	Gas Oil	N	N	G	88.1	20	N
D-1618	CFH	Hydrotreater	V-576	V	GT	8	VGO	Gas Oil	N	N	G	125.5	20	N
D-1620	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	L	N	G	86.8	20	Y
D-1622	CFH	Hydrotreater	V-576	C	Flange	0.75	VGO	Gas Oil	L	N	G	86.8	20	NA
D-1624	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	L	N	G	172.7	175	N
D-1626	CFH	Hydrotreater	V-576	V	N	0.25	VGO	Gas Oil	N	Y	G	213.5	175	Y
D-1628	CFH	Hydrotreater	V-576	C		0.5	VGO	Gas Oil	N	N	G	213.5	175	NA
D-1630	CFH	Hydrotreater	V-576	V	GT	6	VGO	Gas Oil	L	N	G	340.9	175	Y
D-1632	CFH	Hydrotreater	V-576	V	GT	8	VGO	Gas Oil	L	N	G	318.1	175	Y
D-1634	CFH	Hydrotreater	V-576	V	GT	6	VGO	Gas Oil	L	N	G	86.8	175	Y
D-1636	CFH	Hydrotreater	V-576	C	Flange	6	VGO	Gas Oil	L	N	G	87.3	175	NA
D-1638	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	L	N	G	87.3	175	N
D-1640	CFH	Hydrotreater	V-576	C		0.5	VGO	Gas Oil	L	N	G	86.1	175	NA
D-1642	CFH	Hydrotreater	V-576	V	GT	2	VGO	Gas Oil	L	N	G	154.6	175	Y
D-1644	CFH	Hydrotreater	V-576	V	N	0.5	VGO	Gas Oil	L	N	G	95.5	300	Y
D-1646	CFH	Hydrotreater	V-576	C	BP	0.5	VGO	Gas Oil	L	N	G	95.7	300	NA
D-1648	CFH	Hydrotreater	V-576	V	N	0.5	VGO	Gas Oil	L	N	G	95.7	300	Y
D-1650	CFH	Hydrotreater	V-576	V	GT	8	VGO	Gas Oil	L	N	G	192.8	300	Y
D-1652	CFH	Hydrotreater	V-576	C	BP	0.75	VGO	Gas Oil	L	N	G	114.6	300	NA
D-1654	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	L	N	G	114.6	300	Y
D-1656	CFH	Hydrotreater	V-576	V		8	VGO	Gas Oil	L	N	G	114.6	300	Y
D-1658	CFH	Hydrotreater	V-576	C	BP	0.75	VGO	Gas Oil	L	N	G	90	300	NA
D-1700	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	L	N	G	90	300	Y
D-1702	CFH	Hydrotreater	V-576	V	GT	8	VGO	Gas Oil	L	N	G	159.6	300	Y
D-1704	CFH	Hydrotreater	V-576	V	GT	6	VGO	Gas Oil	L	N	G	209.3	300	Y
D-1706	CFH	Hydrotreater	V-576	C	Flange	2	VGO	Gas Oil	L	N	G	260.9	300	NA
D-1708	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	L	N	G	105.5	175	Y
D-1710	CFH	Hydrotreater	V-576	C	Flange	0.75	VGO	Gas Oil	L	N	G	105.9	175	NA
D-1712	CFH	Hydrotreater	V-576	V	GT	2	VGO	Gas Oil	L	N	G	330.6	300	Y
D-1714	CFH	Hydrotreater	V-576	C	Flange	2	VGO	Gas Oil	L	N	G	330.6	300	NA
D-1716	CFH	Hydrotreater	V-576	V		3	VGO	Gas Oil	L	N	G	251.2	300	Y
D-1718	CFH	Hydrotreater	V-576	C	Flange	3	VGO	Gas Oil	L	N	G	197.3	300	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1720	CFH	Hydrotreater	V-576	V	GT	0.75	VGO	Gas Oil	L	N	G	101.2	300	Y
D-1722	CFH	Hydrotreater	V-576	C	Flange	0.75	VGO	Gas Oil	L	N	G	101.2	300	NA
D-1724	CFH	Hydrotreater	V-576	V	GT	6	VGO	Gas Oil	L	N	G	214.3	300	Y
D-1726	CFH	Hydrotreater	V-576	C	Flange	6	VGO	Gas Oil	L	N	G	222.1	300	NA
D-1687	CFH	Hydrotreater	P-2488	V	GT	2	HGO	Gas Oil	N	N	G	192.6	30	N
D-1689	CFH	Hydrotreater	P-2488	C		2	HGO	Gas Oil	N	N	G	118.3	30	NA
D-1691	CFH	Hydrotreater	P-2488	C		2	HGO	Gas Oil	N	N	G	89.1	30	NA
D-1693	CFH	Hydrotreater	P-2488	C		2	HGO	Gas Oil	N	N	G	75.9	30	NA
D-1695	CFH	Hydrotreater	P-2488	C		2	HGO	Gas Oil	N	N	G	65	30	NA
D-1697	CFH	Hydrotreater	P-2488	C		2	HGO	Gas Oil	N	N	G	84.5	30	NA
D-1699	CFH	Hydrotreater	P-2488	C		1	HGO	Gas Oil	N	N	G	85.6	30	NA
D-1701	CFH	Hydrotreater	P-2488	C		1	HGO	Gas Oil	N	N	G	83.8	30	NA
D-1703	CFH	Hydrotreater	P-2488	C	BP	1	HGO	Gas Oil	N	N	G	80.9	30	NA
D-1705	CFH	Hydrotreater	P-2488	V	GT	0.75	HGO	Gas Oil	N	N	G	81.5	30	Y
D-1707	CFH	Hydrotreater	P-2488	C		0.75	HGO	Gas Oil	N	N	G	95.4	30	NA
D-1709	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	160.8	30	NA
D-1711	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	103.6	30	NA
D-1713	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	85.7	30	NA
D-1715	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	84.4	30	NA
D-1717	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	84.6	30	NA
D-1719	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	83.4	30	NA
D-1721	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	84.7	30	NA
D-1723	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	84.3	30	NA
D-1725	CFH	Hydrotreater	P-2488	V	N	0.5	HGO	Gas Oil	N	N	G	83.8	30	Y
D-1727	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	89	30	NA
D-1729	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	82.5	30	NA
D-1731	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	109.6	30	NA
D-1733	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	109	30	NA
D-1735	CFH	Hydrotreater	P-2488	V	N	0.5	HGO	Gas Oil	N	N	G	91.1	30	Y
D-1737	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	307	30	NA
D-1739	CFH	Hydrotreater	P-2488	V	GT	0.75	HGO	Gas Oil	N	N	G	111.8	30	Y
D-1741	CFH	Hydrotreater	P-2488	C	BP	0.75	HGO	Gas Oil	N	N	G	106.3	30	NA
D-1743	CFH	Hydrotreater	P-2488	V	GT	0.75	HGO	Gas Oil	N	N	G	88.3	30	Y
D-1745	CFH	Hydrotreater	P-2488	C		0.75	HGO	Gas Oil	N	N	G	120.7	30	NA
D-1747	CFH	Hydrotreater	P-2488	V	GT	0.75	HGO	Gas Oil	N	N	G	98.4	30	Y
D-1749	CFH	Hydrotreater	P-2488	V	GT	12	HGO	Gas Oil	N	N	G	381.3	30	Y
D-1751	CFH	Hydrotreater	P-2488	C	Flange	12	HGO	Gas Oil	N	N	G	143.4	30	NA
D-1753	CFH	Hydrotreater	P-2488	V	GT	0.5	HGO	Gas Oil	N	N	G	185.6	30	Y
D-1755	CFH	Hydrotreater	P-2488	C		0.5	HGO	Gas Oil	N	N	G	183	30	NA
D-1757	CFH	Hydrotreater	P-2488	V	GT	10	HGO	Gas Oil	N	N	G	438.1	30	Y
D-1759	CFH	Hydrotreater	P-2488	C	Flange	10	HGO	Gas Oil	N	N	G	449.9	30	NA
D-1761	CFH	Hydrotreater	P-2488	C	Flange	3	HGO	Gas Oil	N	N	G	80.4	30	NA
D-1763	CFH	Hydrotreater	P-2488	V	GT	3	HGO	Gas Oil	N	N	G	83.4	30	Y
D-1765	CFH	Hydrotreater	P-2488	C		2	HGO	Gas Oil	N	N	G	83.4	30	NA
D-1767	CFH	Hydrotreater	P-2488	C		2	HGO	Gas Oil	N	N	G	83.6	30	NA
D-1769	CFH	Hydrotreater	P-2488	V	GT	2	HGO	Gas Oil	N	N	G	82.8	30	N
D-1771	CFH	Hydrotreater	P-2488	V	GT	2	HGO	Gas Oil	N	N	G	83.5	30	Y
D-1773	CFH	Hydrotreater	P-2488	C	BP	2	HGO	Gas Oil	N	N	G	82	30	NA
D-1775	CFH	Hydrotreater	P-4309	C	Flange	12	HGO	Gas Oil	L	N	G	514.2	200	NA
D-1777	CFH	Hydrotreater	P-4309	V	GT	12	HGO	Gas Oil	L	N	G	537.9	200	Y
D-1779	CFH	Hydrotreater	P-4309	V	GT	0.75	HGO	Gas Oil	L	N	G	220	200	N
D-1781	CFH	Hydrotreater	P-4309	C		0.75	HGO	Gas Oil	L	N	G	168.7	200	NA
D-1783	CFH	Hydrotreater	P-4309	C	Flange	0.75	HGO	Gas Oil	L	N	G	216.4	200	NA
D-1785	CFH	Hydrotreater	P-4309	V	GT	0.75	HGO	Gas Oil	L	N	G	262.4	200	Y
D-1787	CFH	Hydrotreater	P-4309	C	Flange	4	HGO	Gas Oil	L	N	G	547.5	200	NA
D-1789	CFH	Hydrotreater	P-4309	V	GT	0.75	HGO	Gas Oil	L	N	G	279.5	200	Y
D-1791	CFH	Hydrotreater	P-4309	V	GT	0.75	HGO	Gas Oil	L	N	G	102.8	200	Y
D-1793	CFH	Hydrotreater	P-4309	C	Flange	0.5	HGO	Gas Oil	L	N	G	99.9	200	NA
D-1795	CFH	Hydrotreater	P-4309	V	N	0.5	HGO	Gas Oil	L	N	G	101.8	200	Y
D-1797	CFH	Hydrotreater	P-4309	C		0.5	HGO	Gas Oil	L	N	G	307.5	200	NA
D-1799	CFH	Hydrotreater	P-4309	C	Flange	0.5	HGO	Gas Oil	L	N	G	420.3	200	NA
D-1801	CFH	Hydrotreater	P-4309	V	N	0.5	HGO	Gas Oil	L	N	G	236.6	200	Y
D-1803(1)	CFH	Hydrotreater	P-4309	V	N	0.5	HGO	Gas Oil	L	N	G	207.1	200	Y
D-1805(1)	CFH	Hydrotreater	P-4309	C	BP	0.5	HGO	Gas Oil	L	N	G	183.6	200	NA
D-1807(1)	CFH	Hydrotreater	P-4309	C		0.5	HGO	Gas Oil	L	N	G	167	200	NA
D-1809(1)	CFH	Hydrotreater	P-4309	V	GT	0.75	HGO	Gas Oil	L	N	G	501.9	200	Y
D-1811(1)	CFH	Hydrotreater	P-4309	C	Flange	10	HGO	Gas Oil	L	N	G	500	200	NA
D-1803(2)	CFH	Hydrotreater	P-4309	C		2	HGO	Gas Oil	L	N	G	83.1	200	NA
D-1805(2)	CFH	Hydrotreater	P-4309	C		2	HGO	Gas Oil	L	N	G	84	200	NA
D-1807(2)	CFH	Hydrotreater	P-4309	V	GT	2	HGO	Gas Oil	L	N	G	82.1	200	Y
D-1809(2)	CFH	Hydrotreater	P-4309	C	BP	2	HGO	Gas Oil	L	N	G	81.9	200	NA
D-1811(2)	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	75.8	850	NA
D-1813	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	73.4	850	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1815(1)	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	L	N	G	72.9	850	Y
D-1817(1)	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	76.1	850	NA
D-1819(1)	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	80.9	850	NA
D-1821(1)	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	L	N	G	80	850	Y
D-1823(1)	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	85.6	850	NA
D-1815(2)	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	85.6	850	NA
D-1817(2)	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	L	N	G	73.1	850	Y
D-1819(2)	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	L	N	G	82.9	850	Y
D-1821(2)	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	81.4	850	NA
D-1823(2)	CFH	Hydrotreater	P-2225	V	GT	0.75	HGO	Gas Oil	L	N	G	102.1	850	Y
D-1825	CFH	Hydrotreater	P-2225	V	GT	0.75	HGO	Gas Oil	L	N	G	130.5	850	Y
D-1827	CFH	Hydrotreater	P-2225	C	Flange	2	HGO	Gas Oil	L	N	G	179.7	850	NA
D-1829	CFH	Hydrotreater	P-2225	C	Flange	2	HGO	Gas Oil	L	N	G	346.1	850	NA
D-1831	CFH	Hydrotreater	P-17301	V	GT	0.75	HGO	Gas Oil	N	N	G	66.3	48	Y
D-1833	CFH	Hydrotreater	P-17301	C	Flange	2	HGO	Gas Oil	N	N	G	67.3	48	NA
D-1835	CFH	Hydrotreater	P-17301	V	GT	0.75	HGO	Gas Oil	N	N	G	67.7	48	Y
D-1837	CFH	Hydrotreater	P-17301	C	BP	0.75	HGO	Gas Oil	N	N	G	67.1	48	NA
D-1839	CFH	Hydrotreater	P-17301	V	GT	0.75	HGO	Gas Oil	N	N	G	69	48	Y
D-1841	CFH	Hydrotreater	SP-17333	C	Flange	0.75	HGO	Gas Oil	N	N	G	71.8	48	NA
D-1843	CFH	Hydrotreater	SP-17333	V	GT	0.5	HGO	Gas Oil	N	N	G	68.7	48	Y
D-1845	CFH	Hydrotreater	SP-17333	C		0.5	HGO	Gas Oil	N	N	G	71	48	NA
D-1847	CFH	Hydrotreater	SP-17333	V	BL	1	HGO	Gas Oil	N	N	G	68.6	48	Y
D-1849	CFH	Hydrotreater	SP-17333	V	N	0.5	HGO	Gas Oil	N	N	G	68.9	48	Y
D-1851	CFH	Hydrotreater	SP-17333	C		0.5	HGO	Gas Oil	N	N	G	69.6	48	NA
D-1853	CFH	Hydrotreater	SP-17333	V	BL	1	HGO	Gas Oil	N	N	G	71	48	Y
D-1855	CFH	Hydrotreater	SP-17333	V	BL	1	HGO	Gas Oil	N	N	G	70.1	48	Y
D-1857	CFH	Hydrotreater	SP-17333	V	GT	0.75	HGO	Gas Oil	N	N	G	70.6	48	Y
D-1859	CFH	Hydrotreater	SP-17333	V	GT	0.75	HGO	Gas Oil	N	N	G	70.1	48	Y
D-1861	LOG	Tank Farm	P-2858	P	C	2	RS	Resid	H	N	G	153.9	160	NA
D-1863	LOG	Tank Farm	P-2858	C		18	RS	Resid	H	N	G	213.5	160	NA
D-1865A	LOG	Tank Farm	P-8322	P	C	2	HGO	Gas Oil	L	N	G	115.6	120	NA
D-1865B	LOG	Tank Farm	P-8322	C		12	HGO	Gas Oil	H	N	G	97.1	120	NA
D-1867	LOG	Tank Farm	P-8323	P	C	2	HGO	Gas Oil	L	N	G	88	0	NA
D-1869	LOG	Tank Farm	P-8323	C		12	HGO	Gas Oil	L	N	G	87.6	0	NA
D-1871	LOG	Tank Farm	P-16261	P	C	1	HGO	Gas Oil	N	N	G	77.4	0	NA
D-1873	LOG	Tank Farm	P-16261	C		8	HGO	Gas Oil	N	N	G	78.2	0	NA
D-1875	LOG	Tank Farm	P-2986	P	C	1	RS	Resid	N	N	G	86.9	120	NA
D-1877	LOG	Tank Farm	P-2986	C		12	RS	Resid	N	N	G	85.8	120	NA
D-1879	LOG	Tank Farm	P-12965	P	C	1	RS	Resid	N	N	G	77.9	0	NA
D-1881	LOG	Tank Farm	P-12965	C		12	RS	Resid	N	N	G	78.3	0	NA
D-1883	LOG	Tank Farm	P-13196	P	C	1	RS	Resid	N	N	G	104	25	NA
D-1885	LOG	Tank Farm	P-13196	C		12	RS	Resid	N	N	G	77.9	25	NA
D-1887	LOG	Tank Farm	P-8303	P	C	1	HGO	Gas Oil	N	N	G	86.9	0	NA
D-1889	LOG	Tank Farm	P-8303	C		8	HGO	Gas Oil	N	N	G	100.5	0	NA
D-1891	LOG	Tank Farm	P-8304	P	C	Blank	HGO	Gas Oil	N	N	G	79.5	0	NA
D-1893	LOG	Tank Farm	P-8304	C		8	HGO	Gas Oil	N	N	G	108.6	0	NA
D-1728	CFH	Hydrotreater	E-1058	V	GT	10	HGO	Gas Oil	N	N	G	286.8	173	Y
D-1730	CFH	Hydrotreater	E-1058	C	BP	0.75	HGO	Gas Oil	N	N	G	216.8	173	NA
D-1732	CFH	Hydrotreater	E-1058	V	GT	0.75	HGO	Gas Oil	N	N	G	116.8	173	Y
D-1734	CFH	Hydrotreater	E-1058	C	Flange	10	HGO	Gas Oil	N	N	G	339.8	173	NA
D-1736	CFH	Hydrotreater	E-1058	V		10	HGO	Gas Oil	N	N	G	361.1	173	Y
D-1738	CFH	Hydrotreater	E-1058	C	Flange	10	HGO	Gas Oil	N	N	G	361.7	173	NA
D-1740	CFH	Hydrotreater	E-1058	V	GT	10	HGO	Gas Oil	N	N	G	378.6	173	Y
D-1742	CFH	Hydrotreater	E-1058	C	BP	0.75	HGO	Gas Oil	N	N	G	167.7	173	NA
D-1744	CFH	Hydrotreater	E-1058	V	GT	0.75	HGO	Gas Oil	N	N	G	167.7	173	Y
D-1746	CFH	Hydrotreater	E-1058	V	GT	8	HGO	Gas Oil	N	N	G	243.6	173	Y
D-1748	CFH	Hydrotreater	E-1058	C	Flange	8	HGO	Gas Oil	N	N	G	389.6	173	NA
D-1750	CFH	Hydrotreater	E-1058	V	GT	8	HGO	Gas Oil	N	N	G	388.7	173	Y
D-1752	CFH	Hydrotreater	E-1058	C	BP	0.75	HGO	Gas Oil	N	N	G	419.8	173	NA
D-1754	CFH	Hydrotreater	E-1058	V	GT	0.75	HGO	Gas Oil	N	N	G	419.8	173	Y
D-1756	CFH	Hydrotreater	E-1058	C	Flange	8	HGO	Gas Oil	N	N	G	464.8	173	NA
D-1758	CFH	Hydrotreater	E-1058	V		8	HGO	Gas Oil	N	N	G	398.2	173	Y
D-1760	CFH	Hydrotreater	E-1058	C	Flange	8	HGO	Gas Oil	N	N	G	458.9	173	NA
D-1762	CFH	Hydrotreater	E-1058	V	GT	8	HGO	Gas Oil	N	N	G	423.7	173	Y
D-1764	CFH	Hydrotreater	E-1058	C	BP	0.75	HGO	Gas Oil	N	N	G	189.8	173	NA
D-1766	CFH	Hydrotreater	E-1058	V	GT	0.75	HGO	Gas Oil	N	N	G	189.8	173	Y
D-1768	CFH	Hydrotreater	E-1058	C		0.75	HGO	Gas Oil	N	N	G	189.8	173	NA
D-1770	CFH	Hydrotreater	E-1058	V	GT	6	HGO	Gas Oil	N	N	G	330.3	173	Y
D-1772	CFH	Hydrotreater	E-1058	V	GT	6	HGO	Gas Oil	N	N	G	520.8	173	Y
D-1774	CFH	Hydrotreater	E-1058	C	Flange	6	HGO	Gas Oil	N	N	G	564.4	173	NA
D-1776	CFH	Hydrotreater	E-1058	V	GT	8	HGO	Gas Oil	N	N	G	564.4	173	Y
D-1778	CFH	Hydrotreater	E-1058	C	Flange	8	HGO	Gas Oil	N	N	G	524.6	173	NA
D-1780	CFH	Hydrotreater	E-1058	V		8	HGO	Gas Oil	N	N	G	457.3	173	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1782	CFH	Hydrotreater	E-1058	C		0.75	HGO	Gas Oil	N	N	G	186.6	173	NA
D-1784	CFH	Hydrotreater	E-1058	V	GT	0.75	HGO	Gas Oil	N	N	G	113.6	173	Y
D-1786	CFH	Hydrotreater	E-1058	C	BP	0.75	HGO	Gas Oil	N	N	G	113.6	173	NA
D-1788	CFH	Hydrotreater	E-1058	V	GT	8	HGO	Gas Oil	N	N	G	460.4	173	Y
D-1790	CFH	Hydrotreater	E-1058	C	Flange	8	HGO	Gas Oil	N	N	G	465.4	173	NA
D-1792	CFH	Hydrotreater	V-581	C	Flange	8	HGO	Gas Oil	N	N	T	469.4	100	NA
D-1794	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1796	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1798	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1800	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1802	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1804	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1806	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1808	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1810	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1812	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1814	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1816	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	68.8	20	NA
D-1818	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1820	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1822	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1824	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1826	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1828	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1830	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1832	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1834	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1836	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1838	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1840	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1842	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1844	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1846	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	70.1	20	NA
D-1848	CFH	Hydrotreater	E-742	V	GT	6	HGO	Gas Oil	N	N	T	81.9	20	Y
D-1850	CFH	Hydrotreater	E-742	C	Flange	6	HGO	Gas Oil	N	N	T	81.7	20	NA
D-1852	CFH	Hydrotreater	E-742	V	GT	6	HGO	Gas Oil	N	N	T	81.7	20	Y
D-1854	CFH	Hydrotreater	E-742	C	Flange	6	HGO	Gas Oil	N	N	T	81.7	20	NA
D-1856	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1858	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1860	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1862	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1864	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1866	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1868	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1870	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1872	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1874	CFH	Hydrotreater	E-742B	C	BP	1	HGO	Gas Oil	N	N	T	71.4	20	NA
D-1876	CFH	Hydrotreater	E-742B	V	GT	6	HGO	Gas Oil	N	N	T	63.3	20	Y
D-1878	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1880	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1882	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1884	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1886	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1888	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1890	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1892	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1894	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1896	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1898	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1900	CFH	Hydrotreater	E-742A	C	BP	1	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1902	CFH	Hydrotreater	E-742A	V	G	6	HGO	Gas Oil	N	N	T	73.6	20	Y
D-1904	CFH	Hydrotreater	E-742A	C	Flange	6	HGO	Gas Oil	N	N	T	73.6	20	NA
D-1906	CFH	Hydrotreater	E-742A	V	G	0.75	HGO	Gas Oil	N	N	T	70.6	20	Y
D-1908	CFH	Hydrotreater	E-742A	C	Flange	6	HGO	Gas Oil	N	N	T	76.7	50	NA
D-1910-1	CFH	Hydrotreater	E-742A	V	GT	8	HGO	Gas Oil	N	N	T	76.7	50	Y
D-1912	CFH	Hydrotreater	E-742A	C		0.5	HGO	Gas Oil	N	N	T	76.7	50	NA
D-1914	CFH	Hydrotreater	E-742A	V	GT	0.75	HGO	Gas Oil	N	N	T	80.1	50	Y
D-1916	CFH	Hydrotreater	E-742A	C	Flange	2	HGO	Gas Oil	N	N	T	80.1	50	NA
D-1918	CFH	Hydrotreater	E-742A	V	GT	0.75	HGO	Gas Oil	N	N	T	79.3	50	Y
D-1920	CFH	Hydrotreater	E-742A	C	BP	0.75	HGO	Gas Oil	N	N	T	79.3	50	NA
D-1922	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	L	N	G	153	27	Y
D-1924	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	153	27	NA
D-1926	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	L	N	G	153	27	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-1928	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	153	27	NA
D-1930	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	153	27	NA
D-1932	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	153	27	NA
D-1934	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	L	N	G	153	27	Y
D-1936	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	L	N	G	153	27	NA
D-1938	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	N	N	G	153	27	Y
D-1940	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	N	N	G	153	27	NA
D-1942	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	N	N	G	153	27	NA
D-1944	CFH	Hydrotreater	P-2225	V	N	0.5	HGO	Gas Oil	N	N	G	153	27	Y
D-1946	CFH	Hydrotreater	P-2225	C		0.5	HGO	Gas Oil	N	N	G	153	27	NA
D-1948	LOG	Tank Farm	P-20085	P	C	2	HGO	Gas Oil	N	N	G	75.6	0	NA
D-1950	LOG	Tank Farm	P-20085	C		12	HGO	Gas Oil	N	N	G	77.7	0	NA
D-1952	LOG	Tank Farm	P-574	P	Reciprocating	2	HGO	Gas Oil	N	N	G	75.3	25	NA
D-1954	LOG	Tank Farm	P-574	C		10	HGO	Gas Oil	N	N	G	75.3	25	NA
D-1956	LOG	Tank Farm	P-574	P	RC	2	HGO	Gas Oil	N	N	G	77.2	25	NA
D-1958	LOG	Tank Farm	P-574	C		10	HGO	Gas Oil	N	N	G	77.2	25	NA
D-1960	LOG	Tank Farm	P-1655	P	C	2	HGO	Gas Oil	N	N	G	72.3	15	NA
D-1962	LOG	Tank Farm	P-1655	C		10	HGO	Gas Oil	N	N	G	72.3	15	NA
D-1964	LOG	Tank Farm	P-8324	P	C	2	HGO	Gas Oil	N	N	G	77.5	0	NA
D-1966	LOG	Tank Farm	P-8324	C		16	HGO	Gas Oil	N	N	G	78.8	0	NA
D-1968	LOG	Tank Farm	P-1985	P	C	2	HGO	Gas Oil	N	N	G	82.3	0	NA
D-1970	LOG	Tank Farm	P-1985	C		24	HGO	Gas Oil	N	N	G	80.2	0	NA
D-1895	LOG	Tank Farm	P-2429	P	C	2	HGO	Gas Oil	H	N	G	115.9	400	NA
D-1897	LOG	Tank Farm	P-2429	C		12	HGO	Gas Oil	H	N	G	92.7	400	NA
D-1899	LOG	Tank Farm	P-2550	P	C	2	HGO	Gas Oil	H	N	G	97.5	200	NA
D-1901	LOG	Tank Farm	P-2550	C		12	HGO	Gas Oil	H	N	G	84.4	200	NA
D-1903	LOG	Tank Farm	P-13303	P	C	1	HGO	Gas Oil	N	N	G	81.6	50	NA
D-1905	LOG	Tank Farm	P-13303	C		6	HGO	Gas Oil	N	N	G	79.8	50	NA
D-1907	LOG	Tank Farm	P-13307	P	C	1	HGO	Gas Oil	N	N	G	74.8	30	NA
D-1909	LOG	Tank Farm	P-13307	C		6	HGO	Gas Oil	N	N	G	74.6	30	NA
D-1910-2	LOG	Tank Farm	P-4328	P	C	2	DSC	Diesel	N	N	G	75.6	120	NA
D-1911	LOG	Tank Farm	P-8328	P	C	1.5	HGO	Gas Oil	N	Blank	G	57.3	0	NA
D-1913	LOG	Tank Farm	P-8328	C		8	HGO	Gas Oil	N	Blank	G	58.9	0	NA
D-1915	LOG	Tank Farm	P-2577	P	C	2	DSL	Diesel	N	Blank	G	56.6	0	NA
D-1917	LOG	Tank Farm	P-2577	C		8	DSL	Diesel	N	Blank	G	62.4	0	NA
D-1919	LOG	Tank Farm	P-2576	P	C	2	DSL	Diesel	N	Blank	G	59.3	0	NA
D-1921	LOG	Tank Farm	P-2576	C		8	DSL	Diesel	N	Blank	G	56.6	0	NA
D-1923	LOG	Tank Farm	P-2709	C		18	DSL	Diesel	L	N	G	60.4	70	NA
D-1925	LOG	Tank Farm	P-2709	P	C	3	DSL	Diesel	L	N	G	63.1	70	NA
D-1927	LOG	Tank Farm	P-2422	C		12	DSL	Diesel	L	N	G	67.1	15	NA
D-1929	LOG	Tank Farm	P-2422	P	C	2	DSL	Diesel	L	N	G	67.7	15	NA
D-1931	LOG	Tank Farm	P-2564	C		8	DSL	Diesel	L	N	G	70	0	NA
D-1933	LOG	Tank Farm	P-2564	P	C	2	DSL	Diesel	L	N	G	87.2	0	NA
D-1935	LOG	Tank Farm	P-2434	C		20	DSL	Diesel	L	N	G	61.4	25	NA
D-1937	LOG	Tank Farm	P-2434	P	C	3	DSL	Diesel	L	N	G	71.1	25	NA
D-1939	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	237	75	NA
D-1969	DHT	Hydrotreater	P-13933	V	GT	0.5	HGO	Gas Oil	N	Blank	G	351	75	Y
D-1971	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	261	75	NA
D-1973	DHT	Hydrotreater	P-13933	V	N	0.5	HGO	Gas Oil	N	Blank	G	102	75	Y
D-1975	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	117	75	NA
D-1977	DHT	Hydrotreater	P-13933	V	GT	0.5	HGO	Gas Oil	N	Blank	G	153	75	Y
D-1979	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	91.4	75	NA
D-1981	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	96.6	75	NA
D-1983	DHT	Hydrotreater	P-13933	V	GT	6	HGO	Gas Oil	N	Blank	G	406	75	Y
D-1985	DHT	Hydrotreater	P-13933	C	Flange	6	HGO	Gas Oil	N	Blank	G	378	75	NA
D-1987	DHT	Hydrotreater	P-13933	V	GT	1	HGO	Gas Oil	N	Blank	G	139	75	Y
D-1989	DHT	Hydrotreater	P-13933	C	Flange	1	HGO	Gas Oil	N	Blank	G	195	75	NA
D-1991	DHT	Hydrotreater	P-13933	C	Flange	1	HGO	Gas Oil	N	Blank	G	152	75	NA
D-1993	DHT	Hydrotreater	P-13933	V	GT	1	HGO	Gas Oil	N	Blank	G	101	75	Y
D-1995	DHT	Hydrotreater	C-6	C	BP	0.75	GO	Gas Oil	N	Blank	G	69.8	70	NA
D-1997	DHT	Hydrotreater	C-6	V	GT	0.75	GO	Gas Oil	N	Blank	G	69.2	70	Y
D-1972	LOG	Tank Farm	P-8326	P	C	2	CR	Crude	N	N	G	72.4	0	NA
D-1974	LOG	Tank Farm	P-8326	C		16	CR	Crude	N	N	G	72.4	0	NA
D-1976	LOG	Tank Farm	P-8326	C		16	CR	Crude	N	N	G	72.4	0	NA
D-1978	LOG	Tank Farm	P-8326	P	C	2	CR	Crude	N	N	G	72.4	0	NA
D-1980	LOG	Tank Farm	P-8327	P	C	2	CR	Crude	N	N	G	82.1	300	NA
D-1982	LOG	Tank Farm	P-8327	C		16	CR	Crude	N	N	G	82.2	300	NA
D-1984	LOG	Tank Farm	P-8327	C		16	CR	Crude	N	N	G	82.2	300	NA
D-1986	LOG	Tank Farm	P-8327	P	C	2	CR	Crude	N	N	G	97.1	300	NA
D-1988	LOG	Tank Farm	P-8325	P	C	2	CR	Crude	N	N	G	98.2	69.1	NA
D-1990	LOG	Tank Farm	P-8325	C		16	CR	Crude	N	N	G	98.2	69.1	NA
D-1992	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	219.9	27	N
D-1994	DHT	Hydrotreater	P-13932	C	BP	0.75	GO	Gas Oil	L	N	G	219.9	27	NA

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D-1996	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	431.9	27	Y
D-1998	DHT	Hydrotreater	P-13932	C	Flange	0.75	GO	Gas Oil	L	N	G	431.9	27	NA
D-2000	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	475.1	27	Y
D-2002	DHT	Hydrotreater	P-13932	V	GT	0.5	GO	Gas Oil	L	N	G	146.1	600	Y
D-2004	DHT	Hydrotreater	P-13932	C	Flange	0.5	GO	Gas Oil	L	N	G	146.1	600	NA
D-2006	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	321.3	600	Y
D-2008	DHT	Hydrotreater	P-13932	C	Flange	0.75	GO	Gas Oil	L	N	G	321.3	600	NA
D-2010	DHT	Hydrotreater	P-13932	V	GT	6	GO	Gas Oil	L	N	G	517.3	600	Y
D-2012	DHT	Hydrotreater	P-13932	C	Flange	6	GO	Gas Oil	L	N	G	437.3	600	NA
D-2014	DHT	Hydrotreater	P-13932	V	GT	0.5	GO	Gas Oil	L	N	G	366.2	600	Y
D-2016	DHT	Hydrotreater	P-13932	C	BP	0.5	GO	Gas Oil	L	N	G	366.2	600	NA
D-2018	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	484.7	600	Y
D-2020	DHT	Hydrotreater	P-13932	C	Flange	0.75	GO	Gas Oil	L	N	G	439.7	600	NA
D-2022	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	229.3	600	Y
D-2024	DHT	Hydrotreater	P-13932	C	BP	0.75	GO	Gas Oil	L	N	G	221.7	600	NA
D-2026	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	158.3	600	Y
D-2028	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	183.5	600	Y
D-2030	DHT	Hydrotreater	P-13932	V	GT	8	GO	Gas Oil	L	N	G	523.1	600	Y
D-2152	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	L	N	G	90.8	200	Y
D-2154	DHT	Hydrotreater	V-13901	C	Flange	0.75	GO	Gas Oil	L	N	G	90.8	200	NA
D-2156	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	L	N	G	90.8	200	Y
D-2158	DHT	Hydrotreater	V-13901	C		0.75	GO	Gas Oil	L	N	G	94	200	NA
D-2160	DHT	Hydrotreater	V-13901	V	BL	0.75	GO	Gas Oil	L	N	G	92.4	200	Y
D-2162	DHT	Hydrotreater	V-13901	V	BL	0.75	GO	Gas Oil	L	N	G	90.3	200	Y
D-2164	DHT	Hydrotreater	V-13901	V	BL	0.75	GO	Gas Oil	L	N	G	90.3	200	Y
D-2166	DHT	Hydrotreater	V-13901	C	Flange	0.75	GO	Gas Oil	L	N	G	88.4	200	NA
D-2168	DHT	Hydrotreater	V-13901	V	BL	0.75	GO	Gas Oil	L	N	G	89.2	200	Y
D-2170	DHT	Hydrotreater	V-13901	C	Flange	2	GO	Gas Oil	L	N	G	85.2	200	NA
D-2172	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	L	N	G	88.6	200	NA
D-2174	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	L	N	G	89.7	200	NA
D-2176	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	L	N	G	84.4	200	NA
D-2178	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	L	N	G	84.6	200	NA
D-2180	DHT	Hydrotreater	V-13901	V	GT	0.5	GO	Gas Oil	L	N	G	83.9	200	N
D-2182	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	L	N	G	84.1	200	NA
D-2184	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	L	N	G	84.1	200	NA
D-2186	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	L	N	G	84.1	200	NA
D-2188	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	L	N	G	163.1	200	Y
D-2190	DHT	Hydrotreater	V-13901	C	Flange	0.75	GO	Gas Oil	L	N	G	163.2	200	NA
D-2192	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	L	N	G	163.2	200	Y
D-2194	DHT	Hydrotreater	V-13901	C	Flange	2	GO	Gas Oil	L	N	G	163.2	200	NA
D-2196	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	L	N	G	93.3	200	Y
D-2198	DHT	Hydrotreater	V-13901	C	BP	0.75	GO	Gas Oil	L	N	G	93.3	200	NA
D-2200	DHT	Hydrotreater	V-13901	V	GT	1.5	GO	Gas Oil	L	N	G	93.3	200	Y
D-2202	DHT	Hydrotreater	V-13901	C	Flange	1.5	GO	Gas Oil	L	N	G	95.7	200	NA
D-2204	DHT	Hydrotreater	BATLMT	V	GT	6	GO	Gas Oil	L	N	P	342.2	95	Y
D-2206	DHT	Hydrotreater	BATLMT	C	Flange	6	GO	Gas Oil	L	N	P	342.2	95	NA
D-2208	DHT	Hydrotreater	BATLMT	V	GT	0.75	GO	Gas Oil	L	N	P	342.2	95	N
D-2210	DHT	Hydrotreater	BATLMT	C	BP	0.75	GO	Gas Oil	L	N	P	342.2	95	NA
D-2092	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	N	N	P	85.8	70	NA
D-2094	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	N	N	P	301.2	70	Y
D-2096	DHT	Hydrotreater	V-13901	C		0.75	GO	Gas Oil	N	N	P	311.4	70	NA
D-2098	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	N	N	G	80.2	70	Y
D-2100	DHT	Hydrotreater	V-13901	C	BP	0.75	GO	Gas Oil	N	N	G	82.9	70	NA
D-2102	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	N	N	G	82.7	70	Y
D-2104	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	N	N	G	83.6	70	Y
D-2106	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	N	N	G	82.1	70	Y
D-2108	DHT	Hydrotreater	V-13901	C	Flange	2	GO	Gas Oil	N	N	G	89.2	70	NA
D-2110	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	N	N	G	82.4	70	Y
D-2112	DHT	Hydrotreater	V-13901	C	Flange	2	GO	Gas Oil	N	N	G	82.4	70	NA
D-2114	DHT	Hydrotreater	V-13901	V	GT	1	GO	Gas Oil	N	N	G	102.1	70	Y
D-2116	DHT	Hydrotreater	V-13901	V	GT	1	GO	Gas Oil	N	N	G	110.1	70	Y
D-2118	DHT	Hydrotreater	V-13901	C		1	GO	Gas Oil	N	N	G	112	70	NA
D-2120	DHT	Hydrotreater	V-13901	C		1	GO	Gas Oil	N	N	G	121.3	70	NA
D-2122	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	G	98.6	70	Y
D-2124	DHT	Hydrotreater	V-13901	C	BP	0.5	GO	Gas Oil	N	N	G	102.7	70	NA
D-2126	DHT	Hydrotreater	V-13901	V	BL	0.5	GO	Gas Oil	N	N	G	135.2	70	Y
D-2128	DHT	Hydrotreater	V-13901	V	BL	0.5	GO	Gas Oil	N	N	G	102.6	70	Y
D-2130	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	N	N	G	96.3	70	NA
D-2132	DHT	Hydrotreater	V-13901	V	BL	0.5	GO	Gas Oil	N	N	G	111.8	70	Y
D-2134	DHT	Hydrotreater	V-13901	C	BP	0.5	GO	Gas Oil	N	N	G	86.2	70	NA
D-2136	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	N	N	G	102.7	70	N
D-2138	DHT	Hydrotreater	V-13901	C	BP	0.75	GO	Gas Oil	N	N	G	102.7	70	NA
D-2140	DHT	Hydrotreater	V-13901	V	GT	1	GO	Gas Oil	N	N	G	135.5	70	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-2142	DHT	Hydrotreater	V-13901	C	Flange	1	GO	Gas Oil	N	N	G	113.5	70	NA
D-2144	DHT	Hydrotreater	V-13901	V	GT	1	GO	Gas Oil	N	N	G	90.6	70	N
D-2146	DHT	Hydrotreater	V-13901	C	BP	1	GO	Gas Oil	N	N	G	90.6	70	NA
D-2148	DHT	Hydrotreater	V-13901	V	GT	1	GO	Gas Oil	N	N	G	93.8	70	N
D-2150	DHT	Hydrotreater	V-13901	C		1	GO	Gas Oil	N	N	G	90.8	70	NA
D-2032	DHT	Hydrotreater	P-13932	C	Flange	8	GO	Gas Oil	L	N	G	479.3	27	NA
D-2034	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	322.7	27	Y
D-2036	DHT	Hydrotreater	P-13932	C		0.5	GO	Gas Oil	L	N	G	153.5	27	NA
D-2038	DHT	Hydrotreater	P-13932	V	N	0.5	GO	Gas Oil	L	N	G	128.4	27	Y
D-2040	DHT	Hydrotreater	P-13932	C	BP	0.5	GO	Gas Oil	L	N	G	138.8	27	NA
D-2042	DHT	Hydrotreater	P-13932	V	GT	0.75	GO	Gas Oil	L	N	G	307.8	27	Y
D-2044	DHT	Hydrotreater	P-13932	C	Flange	8	GO	Gas Oil	L	N	G	430.3	27	NA
D-2046	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	L	N	P	190.9	70	Y
D-2048	DHT	Hydrotreater	V-13901	C	Flange	2	GO	Gas Oil	L	N	P	190.9	70	NA
D-2050	DHT	Hydrotreater	V-13901	C	Flange	6	GO	Gas Oil	N	N	P	431.8	70	NA
D-2052	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	N	N	P	277.3	70	Y
D-2054	DHT	Hydrotreater	V-13901	C	Flange	2	GO	Gas Oil	N	N	P	275.1	70	NA
D-2056	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	P	75.6	70	Y
D-2058	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	N	N	P	82.6	70	NA
D-2060	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	P	95.8	70	Y
D-2062	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	P	75.5	70	Y
D-2064	DHT	Hydrotreater	V-13901	C	BP	0.25	GO	Gas Oil	N	N	P	72.8	70	NA
D-2066	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	P	73.6	70	Y
D-2068	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	N	N	P	73.8	70	NA
D-2070	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	N	N	P	85.1	70	NA
D-2072	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	P	85.1	70	Y
D-2074	DHT	Hydrotreater	V-13901	C		0.25	GO	Gas Oil	N	N	P	75.6	70	NA
D-2076	DHT	Hydrotreater	V-13901	V	GT	2	GO	Gas Oil	N	N	P	282.9	70	Y
D-2078	DHT	Hydrotreater	V-13901	C	Casing Flange	2	GO	Gas Oil	N	N	P	81.6	70	NA
D-2080	DHT	Hydrotreater	V-13901	V	GT	0.75	GO	Gas Oil	N	N	P	81	70	Y
D-2082	DHT	Hydrotreater	V-13901	C	Flange	0.75	GO	Gas Oil	N	N	P	81.3	70	NA
D-2084	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	P	85.1	70	Y
D-2086	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	N	N	P	83.5	70	NA
D-2088	DHT	Hydrotreater	V-13901	C		0.5	GO	Gas Oil	N	N	P	80.9	70	NA
D-2090	DHT	Hydrotreater	V-13901	V	N	0.5	GO	Gas Oil	N	N	P	81.7	70	Y
D-1941	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	265	75	NA
D-1943	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	87.1	75	NA
D-1945	DHT	Hydrotreater	P-13933	C	Flange	8	HGO	Gas Oil	N	Blank	G	402	75	NA
D-1947	DHT	Hydrotreater	P-13933	V	GT	0.5	HGO	Gas Oil	N	Blank	G	283	75	Y
D-1949	DHT	Hydrotreater	P-13933	V	GT	10	HGO	Gas Oil	N	Blank	G	458	75	Y
D-1951	DHT	Hydrotreater	P-13933	C	Flange	10	HGO	Gas Oil	N	Blank	G	419	75	NA
D-1953	DHT	Hydrotreater	P-13933	V	GT	0.75	HGO	Gas Oil	N	Blank	G	186	75	Y
D-1955	DHT	Hydrotreater	P-13933	C	Flange	0.75	HGO	Gas Oil	N	Blank	G	162	75	NA
D-1957	DHT	Hydrotreater	P-13933	V	GT	0.5	HGO	Gas Oil	N	Blank	G	83.1	75	Y
D-1959	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	80	75	NA
D-1961	DHT	Hydrotreater	P-13933	C	Flange	6	HGO	Gas Oil	N	Blank	G	485	75	NA
D-1963	DHT	Hydrotreater	P-13933	V	GT	0.5	HGO	Gas Oil	N	Blank	G	511	75	Y
D-1965	DHT	Hydrotreater	P-13933	V	GT	0.5	HGO	Gas Oil	N	Blank	G	343	75	Y
D-1967	DHT	Hydrotreater	P-13933	C		0.5	HGO	Gas Oil	N	Blank	G	505	75	NA
D-2179	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	109	75	NA
D-2181	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	101	75	NA
D-2183	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	104	75	NA
D-2185	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	112	75	NA
D-2187	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	100	75	NA
D-2189	DHT	Hydrotreater	P-13933	V	N	0.5	GO	Gas Oil	N	Blank	G	108	75	Y
D-2191	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	108	75	NA
D-2193	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	107	75	NA
D-2195	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	114	75	NA
D-2197	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	113	75	NA
D-2199	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	84.1	75	NA
D-2201	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	84.3	75	NA
D-2203	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	82.9	75	NA
D-2205	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	82	75	NA
D-1999	DHT	Hydrotreater	C-6	V	GT	3	GO	Gas Oil	N	Blank	G	67.3	70	Y
D-2001	DHT	Hydrotreater	C-6	C	Flange	3	GO	Gas Oil	N	Blank	G	69.2	70	NA
D-2003	DHT	Hydrotreater	C-6	V	GT	0.5	GO	Gas Oil	N	Blank	G	69.3	70	N
D-2005	DHT	Hydrotreater	C-6	V	GT	3	GO	Gas Oil	N	Blank	G	70	70	Y
D-2007	DHT	Hydrotreater	C-6	C	Flange	3	GO	Gas Oil	N	Blank	G	75.1	70	NA
D-2009	DHT	Hydrotreater	C-6	V	GT	0.5	GO	Gas Oil	N	Blank	G	72.7	70	N
D-2011	DHT	Hydrotreater	C-6	V	CU	3	GO	Gas Oil	N	Blank	G	71.8	70	Y
D-2013	DHT	Hydrotreater	C-6	C	Flange	6	GO	Gas Oil	L	N	G	478	70	NA
D-2015	DHT	Hydrotreater	C-6	C	Flange	6	GO	Gas Oil	L	N	G	501	70	NA
D-2017	DHT	Hydrotreater	C-6	V	GT	4	GO	Gas Oil	L	N	G	496	70	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-2019	DHT	Hydrotreater	C-6	V	GT	0.5	GO	Gas Oil	L	N	G	193	70	Y
D-2021	DHT	Hydrotreater	C-6	C	Flange	4	GO	Gas Oil	L	N	G	436	70	NA
D-2023	DHT	Hydrotreater	C-6	V	CU	4	GO	Gas Oil	L	N	G	492	70	Y
D-2025	DHT	Hydrotreater	C-6	V	GT	0.5	GO	Gas Oil	L	N	G	193	70	Y
D-2121	DHT	Hydrotreater	P-13925	C	BP	0.5	GO	Gas Oil	L	N	G	95.8	70	NA
D-2123	DHT	Hydrotreater	P-13925	V	GT	0.5	GO	Gas Oil	L	N	G	97.4	70	Y
D-2125	DHT	Hydrotreater	P-13925	V	GT	2	GO	Gas Oil	L	N	G	104	70	Y
D-2127	DHT	Hydrotreater	P-13925	V	GT	2	GO	Gas Oil	L	N	G	79.8	70	Y
D-2129	DHT	Hydrotreater	P-13925	V	GT	1	GO	Gas Oil	L	N	G	89.5	70	Y
D-2131	DHT	Hydrotreater	P-13925	V	GT	2	GO	Gas Oil	L	N	G	105	70	Y
D-2133	DHT	Hydrotreater	P-13925	C	Flange	1	GO	Gas Oil	L	N	G	97.4	70	NA
D-2135	DHT	Hydrotreater	P-13925	V	GT	1	GO	Gas Oil	L	N	G	100	70	Y
D-2137	DHT	Hydrotreater	P-13925	V	GT	1	GO	Gas Oil	L	N	G	99.6	70	Y
D-2139	DHT	Hydrotreater	P-13925	C	Flange	1	GO	Gas Oil	L	N	G	95.6	70	NA
D-2141	DHT	Hydrotreater	P-13925	C	Flange	1	GO	Gas Oil	L	N	G	82.1	70	NA
D-2143	DHT	Hydrotreater	P-13925	V	GT	1	GO	Gas Oil	L	N	G	98.5	70	Y
D-2145	DHT	Hydrotreater	P-13925	C		0.75	GO	Gas Oil	L	N	G	101	2900	NA
D-2147	DHT	Hydrotreater	P-13925	C		0.75	GO	Gas Oil	L	N	G	99.3	2900	NA
D-2089	DHT	Hydrotreater	D-4	V	GT	0.75	GO	Gas Oil	L	N	G	81.8	2800	Y
D-2091	DHT	Hydrotreater	D-4	V	GT	2	GO	Gas Oil	L	N	G	163	2800	Y
D-2093	DHT	Hydrotreater	D-4	V	GT	6	GO	Gas Oil	L	N	G	401	2800	Y
D-2095	DHT	Hydrotreater	D-5	C	Flange	8	GO	Gas Oil	L	N	G	110	70	NA
D-2097	DHT	Hydrotreater	D-5	V	GT	8	GO	Gas Oil	L	N	G	88	70	Y
D-2099	DHT	Hydrotreater	D-5	V	GT	0.5	GO	Gas Oil	L	N	G	78.2	70	Y
D-2101	DHT	Hydrotreater	D-5	C	BP	0.5	GO	Gas Oil	L	N	G	80.6	70	NA
D-2103	DHT	Hydrotreater	D-5	V	GL	6	GO	Gas Oil	L	N	G	89.7	70	Y
D-2105	DHT	Hydrotreater	D-5	C	Flange	6	GO	Gas Oil	L	N	G	79.2	70	NA
D-2107	DHT	Hydrotreater	D-5	V	CU	6	GO	Gas Oil	L	N	G	80.2	70	Y
D-2109	DHT	Hydrotreater	D-5	V	GT	0.5	GO	Gas Oil	L	N	G	81.2	70	Y
D-2111	DHT	Hydrotreater	D-5	C	Flange	8	GO	Gas Oil	L	N	G	102	70	NA
D-2113	DHT	Hydrotreater	D-5	V	GT	8	GO	Gas Oil	L	N	G	109	70	Y
D-2117	DHT	Hydrotreater	D-5	C	Flange	8	GO	Gas Oil	L	N	G	89.1	70	NA
D-2119	DHT	Hydrotreater	P-13925	V	GT	3	GO	Gas Oil	L	N	G	90.3	70	Y
D-2149	DHT	Hydrotreater	P-13925	V	N	0.5	GO	Gas Oil	L	N	G	98.2	2900	Y
D-2151	DHT	Hydrotreater	P-13925	V	N	0.5	GO	Gas Oil	L	N	G	102	2900	Y
D-2153	DHT	Hydrotreater	P-13925	V	GT	1.5	GO	Gas Oil	L	N	G	202	2900	Y
D-2155	DHT	Hydrotreater	P-13925	V	GT	2	GO	Gas Oil	L	N	G	348	2900	Y
D-2157	DHT	Hydrotreater	P-13925	C		0.75	GO	Gas Oil	L	N	G	225	70	NA
D-2159	DHT	Hydrotreater	P-13925	C		0.75	GO	Gas Oil	L	N	G	201	70	NA
D-2161	DHT	Hydrotreater	P-13925	V	N	0.5	GO	Gas Oil	L	N	G	204	70	Y
D-2163	DHT	Hydrotreater	P-13925	V	GT	0.75	GO	Gas Oil	L	N	G	240	70	Y
D-2165	DHT	Hydrotreater	P-13925	C	Flange	8	GO	Gas Oil	L	N	G	434	70	NA
D-2167	DHT	Hydrotreater	P-13925	V	GT	0.75	GO	Gas Oil	L	N	G	197	70	Y
D-2169	DHT	Hydrotreater	P-13925	C		0.75	GO	Gas Oil	L	N	G	152	70	NA
D-2171	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	104	75	NA
D-2173	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	102	75	NA
D-2175	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	98.7	75	NA
D-2177	DHT	Hydrotreater	P-13933	V	N	0.5	GO	Gas Oil	N	Blank	G	108	75	Y
D-2027	DHT	Hydrotreater	C-6	C	Flange	4	GO	Gas Oil	L	N	G	486	70	NA
D-2029	DHT	Hydrotreater	C-6	V	GT	4	GO	Gas Oil	L	N	G	487	70	Y
D-2031	DHT	Hydrotreater	C-6	V	CU	4	GO	Gas Oil	L	N	G	443	70	Y
D-2033	DHT	Hydrotreater	C-6	C	Flange	4	GO	Gas Oil	L	N	G	372	70	NA
D-2035	DHT	Hydrotreater	C-6	V	GT	0.5	GO	Gas Oil	L	N	G	111	70	Y
D-2037	DHT	Hydrotreater	C-6	C	Flange	4	GO	Gas Oil	L	N	G	449	70	NA
D-2039	DHT	Hydrotreater	C-6	V	GT	4	GO	Gas Oil	L	N	G	436	70	Y
D-2041	DHT	Hydrotreater	C-6	V	GT	3	GO	Gas Oil	N	Blank	G	264	70	Y
D-2043	DHT	Hydrotreater	C-6	C	Flange	3	GO	Gas Oil	N	Blank	G	267	70	NA
D-2045	DHT	Hydrotreater	C-6	V	GT	0.5	GO	Gas Oil	N	Blank	G	78.6	70	Y
D-2047	DHT	Hydrotreater	C-6	V	CU	3	GO	Gas Oil	N	Blank	G	293	70	Y
D-2049	DHT	Hydrotreater	C-6	C	Flange	3	GO	Gas Oil	N	Blank	G	328	70	NA
D-2051	DHT	Hydrotreater	C-6	V	GT	0.5	GO	Gas Oil	N	Blank	G	169	70	Y
D-2053	DHT	Hydrotreater	C-6	V	GT	1	GO	Gas Oil	N	Blank	G	178	70	N
D-2055	DHT	Hydrotreater	D-4	C	Flange	3	GO	Gas Oil	N	Blank	G	74.9	2000	NA
D-2057	DHT	Hydrotreater	D-4	V	GT	3	GO	Gas Oil	N	Blank	G	75.8	2000	N
D-2059	DHT	Hydrotreater	D-4	V	GT	3	GO	Gas Oil	N	Blank	G	76.4	2000	Y
D-2061	DHT	Hydrotreater	D-4	V	GT	1	GO	Gas Oil	N	Blank	G	77.4	2000	Y
D-2063	DHT	Hydrotreater	D-4	C	BP	1	GO	Gas Oil	N	Blank	G	77.7	2000	NA
D-2065	DHT	Hydrotreater	D-4	V	CU	3	GO	Gas Oil	N	Blank	G	74.3	2000	Y
D-2067	DHT	Hydrotreater	D-4	V	N	0.5	GO	Gas Oil	L	N	G	88.1	2800	Y
D-2069	DHT	Hydrotreater	D-4	C		0.5	GO	Gas Oil	L	N	G	99.8	2800	NA
D-2071	DHT	Hydrotreater	D-4	V	GT	1	GO	Gas Oil	L	N	G	188	2800	Y
D-2073	DHT	Hydrotreater	D-4	V	GT	2	GO	Gas Oil	L	N	G	343	2800	Y
D-2075	DHT	Hydrotreater	D-4	V	GT	6	GO	Gas Oil	L	N	G	354	2800	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-2079	DHT	Hydrotreater	D-4	V	CU	6	GO	Gas Oil	L	N	G	399	2800	Y
D-2081	DHT	Hydrotreater	D-4	C	Flange	2	GO	Gas Oil	L	N	G	317	2800	NA
D-2083	DHT	Hydrotreater	D-4	V	GT	2	GO	Gas Oil	L	N	G	94.3	2800	Y
D-2085	DHT	Hydrotreater	D-4	V	CV	4	GO	Gas Oil	L	N	G	261	2800	Y
D-2087	DHT	Hydrotreater	D-4	C		0.75	GO	Gas Oil	L	N	G	79.3	2800	NA
D-2207	DHT	Hydrotreater	P-13933	V	N	0.5	GO	Gas Oil	N	Blank	G	90.2	75	Y
D-2209	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	80.4	75	NA
D-2211	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	87.7	75	NA
D-2213	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	91	75	NA
D-2215	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	103	75	NA
D-2217	DHT	Hydrotreater	P-13933	V	N	0.5	GO	Gas Oil	N	Blank	G	89.5	75	Y
D-2219	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	84.9	75	NA
D-2221	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	82.1	75	NA
D-2223	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	85.4	75	NA
D-2225	DHT	Hydrotreater	P-13933	C		0.5	GO	Gas Oil	N	Blank	G	83.1	75	NA
D-2212	DHT	Hydrotreater	RX-13908	V	GT	3	GO	Gas Oil	N	N	G	88.6	0	Y
D-2214	DHT	Hydrotreater	RX-13908	C	Flange	3	GO	Gas Oil	N	N	G	88.6	0	NA
D-2216	DHT	Hydrotreater	RX-13908	V	GT	3	GO	Gas Oil	N	N	G	74	0	Y
D-2218	DHT	Hydrotreater	RX-13908	C	Flange	3	GO	Gas Oil	N	N	G	74	0	NA
D-2220	DHT	Hydrotreater	RX-13908	V	GT	2	GO	Gas Oil	N	N	P	236.7	0	N
D-2222	DHT	Hydrotreater	RX-13908	C	Flange	0.5	GO	Gas Oil	N	N	P	60.8	0	NA
D-2224	DHT	Hydrotreater	RX-13907	V	GT	2	GO	Gas Oil	N	N	P	200.2	0	N
D-2226	DHT	Hydrotreater	RX-13907	C	Flange	20	GO	Gas Oil	N	N	P	580.2	0	NA
D-2228	DHT	Hydrotreater	RX-13907	C		10	GO	Gas Oil	N	N	P	543.2	0	NA
D-2230	DHT	Hydrotreater	RX-13907	C	Flange	6	GO	Gas Oil	N	N	P	549.9	0	NA
D-2232	DHT	Hydrotreater	RX-13907	V	GT	1	GO	Gas Oil	N	N	T	249.7	0	Y
D-2234	DHT	Hydrotreater	RX-13907	C		1	GO	Gas Oil	N	N	T	249.7	0	NA
D-2236	DHT	Hydrotreater	RX-13907	V	GT	2	GO	Gas Oil	N	N	T	287.2	0	Y
D-2238	DHT	Hydrotreater	RX-13907	C	Flange	2	GO	Gas Oil	N	N	T	287.2	0	NA
D-2240	DHT	Hydrotreater	RX-13907	V	N	0.5	GO	Gas Oil	N	N	T	61.1	0	Y
D-2242	DHT	Hydrotreater	RX-13907	C		0.5	GO	Gas Oil	N	N	T	61.1	0	NA
D-2244	DHT	Hydrotreater	RX-13907	V	N	0.5	GO	Gas Oil	N	N	T	61.1	0	Y
D-2246	DHT	Hydrotreater	RX-13907	C		0.5	GO	Gas Oil	N	N	T	61.1	0	NA
D-2248	DHT	Hydrotreater	RX-13907	V	GT	0.75	GO	Gas Oil	N	N	T	81.1	0	Y
D-2250	DHT	Hydrotreater	RX-13907	C		1	GO	Gas Oil	N	N	T	88.5	0	NA
D-2252	DHT	Hydrotreater	RX-13907	V	GT	0.75	GO	Gas Oil	N	N	T	88.5	0	Y
D-2254	DHT	Hydrotreater	RX-13907	C		0.75	GO	Gas Oil	N	N	T	88.5	0	NA
D-2256	DHT	Hydrotreater	RX-13907	C		0.75	GO	Gas Oil	N	N	T	88.5	0	NA
D-2258	DHT	Hydrotreater	RX-13907	V	GT	0.75	GO	Gas Oil	N	N	T	86.7	0	Y
D-2260	DHT	Hydrotreater	RX-13907	C		1	GO	Gas Oil	N	N	T	82.8	0	NA
D-2262	DHT	Hydrotreater	RX-13907	V	GT	0.75	GO	Gas Oil	N	N	T	82	0	Y
D-2264	DHT	Hydrotreater	RX-13907	C		0.75	GO	Gas Oil	N	N	T	83.2	0	NA
D-2266	DHT	Hydrotreater	RX-13907	C		0.75	GO	Gas Oil	N	N	T	83.2	0	NA
D-2268	DHT	Hydrotreater	RX-13907	V	GT	0.75	GO	Gas Oil	N	N	T	79.8	0	Y
D-2270	DHT	Hydrotreater	RX-13907	C		1	GO	Gas Oil	N	N	T	81.3	0	NA
D-2272	DHT	Hydrotreater	RX-13907	V	GT	0.75	GO	Gas Oil	N	N	T	76	0	Y
D-2274	DHT	Hydrotreater	RX-13907	C		0.75	GO	Gas Oil	N	N	T	76	0	NA
D-2276	DHT	Hydrotreater	RX-13907	C		0.75	GO	Gas Oil	N	N	T	80.4	0	NA
D-2278	DHT	Hydrotreater	RX-13907	C	Flange	50	GO	Gas Oil	N	N	T	417.8	0	NA
D-2280	DHT	Hydrotreater	RX-13908	V	GT	0.75	GO	Gas Oil	N	N	T	83.3	0	Y
D-2282	DHT	Hydrotreater	RX-13908	C		1	GO	Gas Oil	N	N	T	199.4	0	NA
D-2284	DHT	Hydrotreater	RX-13908	V	GT	0.75	GO	Gas Oil	N	N	T	77.3	0	Y
D-2286	DHT	Hydrotreater	RX-13908	C		0.75	GO	Gas Oil	N	N	T	77.3	0	NA
D-2288	DHT	Hydrotreater	RX-13908	C		0.75	GO	Gas Oil	N	N	T	77.3	0	NA
D-2290	DHT	Hydrotreater	RX-13908	V	GT	0.75	GO	Gas Oil	N	N	T	94.9	0	Y
D-2292	DHT	Hydrotreater	RX-13908	C		1	GO	Gas Oil	N	N	T	71.3	0	NA
D-2294	DHT	Hydrotreater	RX-13908	V	GT	0.75	GO	Gas Oil	N	N	T	94.9	0	Y
D-2296	DHT	Hydrotreater	RX-13908	C		0.75	GO	Gas Oil	N	N	T	94.9	0	NA
D-2298	DHT	Hydrotreater	RX-13908	C		0.75	GO	Gas Oil	N	N	T	94.9	0	NA
D-2300	DHT	Hydrotreater	RX-13908	V	GT	0.75	GO	Gas Oil	N	N	T	86.3	0	Y
D-2302	DHT	Hydrotreater	RX-13908	C		1	GO	Gas Oil	N	N	T	83.4	0	NA
D-2304	DHT	Hydrotreater	RX-13908	V	GT	0.75	GO	Gas Oil	N	N	T	80.7	0	Y
D-2306	DHT	Hydrotreater	RX-13908	C		0.75	GO	Gas Oil	N	N	T	80.7	0	NA
D-2308	DHT	Hydrotreater	RX-13908	C		0.75	GO	Gas Oil	N	N	T	80.7	0	NA
D-2310	DHT	Hydrotreater	RX-13908	C	Flange	50	GO	Gas Oil	N	N	T	465.6	0	NA
D-2312	DHT	Hydrotreater	RX-13908	V	GT	2	GO	Gas Oil	N	N	P	104.8	0	Y
D-2314	DHT	Hydrotreater	RX-13908	C	Flange	4	GO	Gas Oil	N	N	P	246.8	0	NA
D-2316	DHT	Hydrotreater	BAT LMTS	V	GT	6	GO	Gas Oil	N	N	G	111.2	273	Y
D-2318	DHT	Hydrotreater	BAT LMTS	V	GT	6	GO	Gas Oil	N	N	G	110.2	273	Y
D-2320	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	G	71.5	273	Y
D-2322	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	G	99	273	Y
D-2324	DHT	Hydrotreater	BAT LMTS	C	BP	0.75	GO	Gas Oil	N	N	G	99	273	NA
D-2336-1	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	G	67.7	273	Y

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D-2328	DHT	Hydrotreater	BAT LMTS	C	BP	0.75	GO	Gas Oil	N	N	G	67.7	273	NA
D-2330	DHT	Hydrotreater	BAT LMTS	C	BP	0.75	GO	Gas Oil	N	N	G	110.2	273	NA
D-2332	DHT	Hydrotreater	BAT LMTS	V	GT	0.5	GO	Gas Oil	N	N	T	73.3	273	Y
D-2334	DHT	Hydrotreater	BAT LMTS	C	BP	0.5	GO	Gas Oil	N	N	T	73.3	273	NA
D-2336-2	DHT	Hydrotreater	BAT LMTS	V	GT	4	GO	Gas Oil	N	N	T	127.5	273	Y
D-2338	DHT	Hydrotreater	BAT LMTS	C	Flange	4	GO	Gas Oil	N	N	T	127.5	273	NA
D-2340	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	T	377.8	273	Y
D-2342	DHT	Hydrotreater	BAT LMTS	V	GT	4	GO	Gas Oil	N	N	T	421.8	273	Y
D-2344	DHT	Hydrotreater	BAT LMTS	C	Flange	4	GO	Gas Oil	N	N	T	421.8	273	NA
D-2346	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	T	299.2	273	Y
D-2348	DHT	Hydrotreater	BAT LMTS	C	BP	0.75	GO	Gas Oil	N	N	T	299.2	273	NA
D-2350	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	T	81.4	273	Y
D-2352	DHT	Hydrotreater	BAT LMTS	C	BP	0.75	GO	Gas Oil	N	N	T	81.4	273	NA
D-2354	DHT	Hydrotreater	BAT LMTS	V	GT	4	GO	Gas Oil	N	N	T	67.6	273	Y
D-2356	DHT	Hydrotreater	BAT LMTS	C	Flange	4	GO	Gas Oil	N	N	T	67.6	273	NA
D-2358	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	T	73.2	273	Y
D-2360	DHT	Hydrotreater	BAT LMTS	C	BP	0.75	GO	Gas Oil	N	N	T	73.2	273	NA
D-2362	DHT	Hydrotreater	BAT LMTS	V	GT	4	GO	Gas Oil	N	N	T	114.4	273	Y
D-2364	DHT	Hydrotreater	BAT LMTS	C	Flange	4	GO	Gas Oil	N	N	T	114.4	273	NA
D-2366	DHT	Hydrotreater	BAT LMTS	V	GT	3	GO	Gas Oil	N	N	T	252.5	273	Y
D-2368	DHT	Hydrotreater	BAT LMTS	C	Flange	3	GO	Gas Oil	N	N	T	252.5	273	NA
D-2370	DHT	Hydrotreater	BAT LMTS	V	GT	4	GO	Gas Oil	N	N	T	447.7	273	Y
D-2372	DHT	Hydrotreater	BAT LMTS	C	Flange	4	GO	Gas Oil	N	N	T	447.7	273	NA
D-2374	DHT	Hydrotreater	BAT LMTS	V	GT	0.75	GO	Gas Oil	N	N	T	240.5	273	Y
D-2376	DHT	Hydrotreater	BAT LMTS	C	BP	0.75	GO	Gas Oil	N	N	T	240.5	273	NA
D-2378	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2380	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2382	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2384	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2386	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2388	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2390	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2392	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2394	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2396	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2398	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2400	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2402	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2404	DHT	Hydrotreater	E-13920A	C	BP	1	GO	Gas Oil	L	N	T	310.7	80	NA
D-2406	DHT	Hydrotreater	E-13920A	V	GT	4	GO	Gas Oil	L	N	T	115.9	80	Y
D-2408	DHT	Hydrotreater	E-13920A	C	Flange	4	GO	Gas Oil	L	N	T	118.6	80	NA
D-2410	DHT	Hydrotreater	E-13920A	V	GT	4	GO	Gas Oil	L	N	T	118.6	80	Y
D-2412	DHT	Hydrotreater	E-13920A	C	BP	0.75	GO	Gas Oil	L	N	T	365	80	NA
D-2414	DHT	Hydrotreater	E-13920A	V	GT	4	GO	Gas Oil	L	N	T	318.2	80	Y
D-2416	DHT	Hydrotreater	E-13920A	C	Flange	4	GO	Gas Oil	L	N	T	490.5	80	NA
D-2418	DHT	Hydrotreater	E-13920A	V	GT	4	GO	Gas Oil	L	N	T	490.5	80	Y
D-2420	DHT	Hydrotreater	E-13920A	C	BP	0.75	GO	Gas Oil	L	N	T	291.5	80	NA
D-2257	DHT	Hydrotreater	C13910	C	BP	0.5	GO	Gas Oil	N	N	P	65.8	27	NA
D-2259	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	81	27	NA
D-2261	DHT	Hydrotreater	C13910	V	N	0.5	GO	Gas Oil	N	N	P	82	27	Y
D-2263	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	54.5	27	NA
D-2265	DHT	Hydrotreater	C13910	C	Flange	2	GO	Gas Oil	N	N	P	112.5	27	NA
D-2267	DHT	Hydrotreater	C13910	V	GT	4	GO	Gas Oil	N	N	P	88.1	27	Y
D-2269	DHT	Hydrotreater	C13910	C	Flange	4	GO	Gas Oil	N	N	P	207.6	27	NA
D-2271	DHT	Hydrotreater	C13910	V	GT	2	GO	Gas Oil	N	N	P	189.1	27	Y
D-2273	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	79.9	27	NA
D-2275	DHT	Hydrotreater	C13910	V	N	0.5	GO	Gas Oil	N	N	P	123.4	27	Y
D-2277	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	71.3	27	NA
D-2279	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	69.1	27	NA
D-2281	DHT	Hydrotreater	C13910	V	N	0.5	GO	Gas Oil	N	N	P	69.3	27	Y
D-2283	DHT	Hydrotreater	C13910	C	GT	0.5	GO	Gas Oil	N	N	P	70.1	27	NA
D-2285	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	73.9	27	NA
D-2317	DHT	Hydrotreater	C13910	V	GT	3	GO	Gas Oil	N	N	P	97.8	27	Y
D-2319	DHT	Hydrotreater	C13910	C	Flange	3	GO	Gas Oil	N	N	P	82.4	27	NA
D-2321	DHT	Hydrotreater	V13902	V	GT	2	GO	Gas Oil	L	N	G	107	1880	Y
D-2323	DHT	Hydrotreater	V13902	C	Flange	2	GO	Gas Oil	L	N	G	80.4	1880	NA
D-2325	DHT	Hydrotreater	V13902	V	GT	6	GO	Gas Oil	L	N	G	407.1	1880	Y
D-2327	DHT	Hydrotreater	V13902	V	GT	2	GO	Gas Oil	L	N	G	184.5	1880	Y
D-2329	DHT	Hydrotreater	V13902	C	Flange	2	GO	Gas Oil	L	N	G	70.4	1880	NA
D-2331	DHT	Hydrotreater	E13915	V	GT	6	GO	Gas Oil	L	N	G	425.5	1880	Y
D-2333	DHT	Hydrotreater	E13915	C	Flange	6	GO	Gas Oil	L	N	G	338.5	1880	NA
D-2335	DHT	Hydrotreater	E13915	V	GT	6	GO	Gas Oil	L	N	G	495.5	1880	Y
D-2337	DHT	Hydrotreater	E13915	V	GT	1	GO	Gas Oil	L	N	G	132.6	1880	N

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D-2339	DHT	Hydrotreater	E13915	C	BP	0.5	GO	Gas Oil	L	N	G	203.7	1880	NA
D-2341	DHT	Hydrotreater	E13915	V	GT	2	GO	Gas Oil	L	N	G	151.1	1880	N
D-2343	DHT	Hydrotreater	E13915	C	Flange	2	GO	Gas Oil	L	N	G	303	1880	NA
D-2287	DHT	Hydrotreater	C13910	V	GT	2	GO	Gas Oil	N	N	P	289.3	27	Y
D-2289	DHT	Hydrotreater	C13910	C	Flange	2	GO	Gas Oil	N	N	P	367	27	NA
D-2291	DHT	Hydrotreater	C13910	V	GT	2	GO	Gas Oil	N	N	P	263.5	27	N
D-2293	DHT	Hydrotreater	C13910	C	Flange	2	GO	Gas Oil	N	N	P	346	27	NA
D-2295	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	69.8	27	NA
D-2297	DHT	Hydrotreater	C13910	C	BP	0.5	GO	Gas Oil	N	N	P	101	27	NA
D-2299	DHT	Hydrotreater	C13910	V	N	0.5	GO	Gas Oil	N	N	P	89.8	27	Y
D-2301	DHT	Hydrotreater	C13910	V	N	0.5	GO	Gas Oil	N	N	P	80.7	27	Y
D-2303	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	90.2	27	NA
D-2305	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	90.1	27	NA
D-2307	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	91.2	27	NA
D-2309	DHT	Hydrotreater	C13910	V	GT	2	GO	Gas Oil	N	N	P	203.3	27	Y
D-2311	DHT	Hydrotreater	C13910	C	Flange	6	GO	Gas Oil	N	N	P	495.6	27	NA
D-2313	DHT	Hydrotreater	C13910	V	CV	6	GO	Gas Oil	N	N	P	528.2	27	Y
D-2315	DHT	Hydrotreater	C13910	C	Flange	3	GO	Gas Oil	N	N	P	320.7	27	NA
D-2345	DHT	Hydrotreater	E17478	C	Flange	2	GO	Gas Oil	N	N	G	83.4	1880	NA
D-2347	DHT	Hydrotreater	E17478	V	GT	2	GO	Gas Oil	N	N	G	84.6	1880	Y
D-2349	DHT	Hydrotreater	E17478	C	Flange	2	GO	Gas Oil	N	N	G	225.7	1880	NA
D-2351	DHT	Hydrotreater	E17478	V	GT	2	GO	Gas Oil	N	N	G	309.6	1880	Y
D-2353	DHT	Hydrotreater	E17478	V	GT	2	GO	Gas Oil	N	N	G	206.3	1880	Y
D-2355	DHT	Hydrotreater	E17478	C	Flange	2	GO	Gas Oil	N	N	G	129.2	1880	NA
D-2357	DHT	Hydrotreater	P13932	V	GT	0.75	GO	Gas Oil	N	N	G	138.9	25	Y
D-2359	DHT	Hydrotreater	P13932	C	Flange	0.75	GO	Gas Oil	N	N	G	121.2	25	NA
D-2361	DHT	Hydrotreater	P13932	V	GT	0.75	GO	Gas Oil	N	N	G	137.8	25	Y
D-2363	DHT	Hydrotreater	P13932	C		0.5	GO	Gas Oil	N	N	G	162.7	25	NA
D-2365	DHT	Hydrotreater	P13932	C		0.5	GO	Gas Oil	N	N	G	129.8	25	NA
D-2367	DHT	Hydrotreater	P13932	C		0.5	GO	Gas Oil	N	N	G	80.5	25	NA
D-2369	DHT	Hydrotreater	P13932	C		0.5	GO	Gas Oil	N	N	G	143.4	25	NA
D-2371	DHT	Hydrotreater	P13932	V	GT	0.5	GO	Gas Oil	N	N	G	94.7	25	Y
D-2373	DHT	Hydrotreater	P13932	C	Flange	0.5	GO	Gas Oil	N	N	G	129.7	25	NA
D-2375	DHT	Hydrotreater	P13932	C		0.5	GO	Gas Oil	N	N	G	138.6	25	NA
D-2377	DHT	Hydrotreater	P13932	C		0.5	GO	Gas Oil	N	N	G	84.4	25	NA
D-2379	DHT	Hydrotreater	P13932	V	GT	0.75	GO	Gas Oil	N	N	G	68.7	25	Y
D-2381	DHT	Hydrotreater	E1622	V	CV	6	GO	Gas Oil	N	N	G	68.4	40	N
D-2383	DHT	Hydrotreater	E1622	C	BP	0.5	GO	Gas Oil	N	N	G	68	40	NA
D-2385	DHT	Hydrotreater	E1622	C	Flange	2	GO	Gas Oil	N	N	G	69.3	40	NA
D-2387	DHT	Hydrotreater	E1622	V	GT	0.75	GO	Gas Oil	N	N	G	71.5	40	Y
D-2389	DHT	Hydrotreater	E1622	V	GT	0.75	GO	Gas Oil	N	N	G	139.2	40	Y
D-2391	DHT	Hydrotreater	E1622	C	Flange	0.75	GO	Gas Oil	N	N	G	91.5	40	NA
D-2393	DHT	Hydrotreater	E1622	V	N	0.5	GO	Gas Oil	N	N	G	193.3	40	Y
D-2395	DHT	Hydrotreater	E1622	V	GT	0.75	GO	Gas Oil	N	N	G	84	40	Y
D-2397	DHT	Hydrotreater	E1622	V	GT	0.75	GO	Gas Oil	N	N	G	83	40	Y
D-2399	DHT	Hydrotreater	E1622	V	GT	0.75	GO	Gas Oil	N	N	G	94.4	40	Y
D-2401	DHT	Hydrotreater	E1622	V	N	0.5	GO	Gas Oil	N	N	G	81.3	40	Y
D-2403	DHT	Hydrotreater	E-13918	C	Flange	1	GO	Gas Oil	N	N	G	283.1	40	NA
D-2405	DHT	Hydrotreater	E-13918	V	GT	0.75	GO	Gas Oil	N	N	G	105.9	40	Y
D-2407	DHT	Hydrotreater	E-13918	V	GT	2	GO	Gas Oil	N	N	G	108.7	40	Y
D-2409	DHT	Hydrotreater	E-13918	V	GT	0.75	GO	Gas Oil	N	N	G	277.4	40	Y
D-2411	DHT	Hydrotreater	E-13918	V	CV	3	GO	Gas Oil	N	N	G	331	40	Y
D-2413	DHT	Hydrotreater	E-13918	V	GT	0.75	GO	Gas Oil	N	N	G	227.7	40	Y
D-2415	DHT	Hydrotreater	E-13918	C		0.75	GO	Gas Oil	N	N	G	99.6	40	NA
D-2417	DHT	Hydrotreater	E1622	V	GT	4	GO	Gas Oil	N	N	G	79.8	40	Y
D-2419	DHT	Hydrotreater	E1622	V	GT	0.75	GO	Gas Oil	N	N	G	72.1	40	Y
D-2421	DHT	Hydrotreater	E1622	V	GT	0.75	GO	Gas Oil	N	N	G	89.2	40	Y
D-2423	DHT	Hydrotreater	E1622	C		0.75	GO	Gas Oil	N	N	G	82.4	40	NA
D-2425	DHT	Hydrotreater	E1622	V	GT	0.5	GO	Gas Oil	N	N	G	80.6	40	Y
D-2227	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	71.9	27	NA
D-2229	DHT	Hydrotreater	C13910	V	Needle	0.5	GO	Gas Oil	N	N	P	83.2	27	Y
D-2231	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	69.5	27	NA
D-2233	DHT	Hydrotreater	C13910	V	N	0.5	GO	Gas Oil	N	N	P	70.5	27	Y
D-2235	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	71	27	NA
D-2237	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	70.8	27	NA
D-2239	DHT	Hydrotreater	C13910	V	GT	2	GO	Gas Oil	N	N	P	168.1	27	Y
D-2241	DHT	Hydrotreater	C13910	C	Flange	10	GO	Gas Oil	N	N	P	289.3	27	NA
D-2243	DHT	Hydrotreater	C13910	V	GT	10	GO	Gas Oil	N	N	P	314.8	27	Y
D-2245	DHT	Hydrotreater	C13910	C	Flange	2	GO	Gas Oil	N	N	P	367	27	NA
D-2247	DHT	Hydrotreater	C13910	V	GT	2	GO	Gas Oil	N	N	P	263.3	27	Y
D-2249	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	43.6	27	NA
D-2251	DHT	Hydrotreater	C13910	V	GT	2	GO	Gas Oil	N	N	P	101.2	27	Y
D-2253	DHT	Hydrotreater	C13910	C		0.5	GO	Gas Oil	N	N	P	91.1	27	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
D-2255	DHT	Hydrotreater	C13910	V	N	0.5	GO	Gas Oil	N	N	P	89.8	27	Y
E-1	HCU	Hydrocracker	P-504	V	GATE	0.75	Frac Bottoms	Diesel	L	N	G	176.2	49	N
E-3	HCU	Hydrocracker	P-504	V	GATE	0.75	Frac Bottoms	Diesel	L	N	G	158.4	49	Y
E-5	HCU	Hydrocracker	P-504	C	Threaded Connector	0.75	Frac Bottoms	Diesel	L	N	G	130	49	NA
E-7	HCU	Hydrocracker	P-504	V	GATE	10.00	Frac Bottoms	Diesel	L	N	G	318	49	Y
E-9	HCU	Hydrocracker	P-504	C	FLANGE	10.00	Frac Bottoms	Diesel	L	N	G	315	49	NA
E-11	HCU	Hydrocracker	P-504	V	GATE	4.00	Frac Bottoms	Diesel	L	N	G	202	49	Y
E-13	HCU	Hydrocracker	P-504	V	GATE	0.75	Frac Bottoms	Diesel	L	N	G	113	49	N
E-15	HCU	Hydrocracker	P-504	C	BULL PLUG	0.75	Frac Bottoms	Diesel	L	N	G	208	49	NA
E-17	HCU	Hydrocracker	P-504	C	FLANGE	4.00	Frac Bottoms	Diesel	L	N	G	129	49	NA
E-19	HCU	Hydrocracker	P-504	V	GATE	4.00	Frac Bottoms	Diesel	L	N	G	136	49	Y
E-21	HCU	Hydrocracker	P-504	C	FLANGE	6.00	Frac Bottoms	Diesel	L	N	G	145	49	NA
E-23	HCU	Hydrocracker	P-504	V	GATE	6.00	Frac Bottoms	Diesel	L	N	G	214	49	Y
E-25	HCU	Hydrocracker	P-504	V	GATE	1.00	Frac Bottoms	Diesel	L	N	G	214	49	Y
E-27	HCU	Hydrocracker	P-504	C	Threaded Connector	1.00	Frac Bottoms	Diesel	L	N	G	236	49	NA
E-29	HCU	Hydrocracker	P-504	V	GATE	0.75	Frac Bottoms	Diesel	L	N	G	206	49	N
E-31	HCU	Hydrocracker	P-504	C	Threaded Connector	0.75	Frac Bottoms	Diesel	L	N	G	178	49	NA
E-33	HCU	Hydrocracker	P-504	C	Reducing Union	0.75	Frac Bottoms	Diesel	L	N	G	102	49	NA
E-35	HCU	Hydrocracker	P-504	C	FLANGE	0.75	Frac Bottoms	Diesel	L	N	G	225	49	NA
E-37	HCU	Hydrocracker	P-504	P	CENT	Blank	Frac Bottoms	Diesel	L	N	G	130	49	NA
E-39	HCU	Hydrocracker	P-504	C	Pump Housing	Blank	Frac Bottoms	Diesel	L	N	G	266	49	NA
E-41	HCU	Hydrocracker	P-402A	C	Threaded Connector	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	126	2200	NA
E-43	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	119	2200	Y
E-45	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	114	2200	Y
E-47	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	156	2200	N
E-49	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	228	2200	N
E-51	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	116	2200	N
E-53	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	121	2200	N
E-55	HCU	Hydrocracker	P-402A	C	BULL PLUG	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	107	2200	NA
E-57	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	90	2200	N
E-59	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	90.1	2200	N
E-61	HCU	Hydrocracker	P-402A	V	GATE	8.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	200	2200	Y
E-63	HCU	Hydrocracker	P-402A	V	GATE	8.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	278	2200	N
E-65	HCU	Hydrocracker	P-402A	C	FLANGE	8.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	333	2200	NA
E-67	HCU	Hydrocracker	P-402A	V	GATE	8.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	261	2200	Y
E-69	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	94	2200	N
E-71	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	116	2200	Y
E-73	HCU	Hydrocracker	P-402A	V	GATE	1.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	102	2200	N
E-2	HCU	Hydrocracker	R-402A	V	CONTROL	2.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	572.5	1500	Y
E-4	HCU	Hydrocracker	R-402A	V	GLOBE	1.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	136.6	1500	N
E-6	HCU	Hydrocracker	R-402A	C	BULL PLUG	1.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	75.6	1500	NA
E-8	HCU	Hydrocracker	R-402A	V	GLOBE	3.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	594.9	1500	Y
E-10	HCU	Hydrocracker	R-402A	V	GLOBE	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	295.2	1500	N
E-12	HCU	Hydrocracker	R-402A	V	GATE	3.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	246.6	1500	N
E-14	HCU	Hydrocracker	R-402A	C	BULL PLUG	0.75	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	111.7	1500	NA
E-16	HCU	Hydrocracker	R-402A	V	GLOBE	2.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	272.8	1500	N
E-18	HCU	Hydrocracker	R-402A	V	GLOBE	1.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	382.1	1500	Y
E-20	HCU	Hydrocracker	R-402A	V	GLOBE	1.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	153.9	1500	Y
E-22	HCU	Hydrocracker	R-402A	C	BULL PLUG	1.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	84.4	1500	NA
E-24	HCU	Hydrocracker	R-402A	V	GLOBE	3.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	573.8	1500	Y
E-26	HCU	Hydrocracker	R-402A	V	GLOBE	3.00	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	523	1500	Y
E-28	HCU	Hydrocracker	R-402A	V	NEEDLE	0.25	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	67.3	1500	N
E-30	HCU	Hydrocracker	R-402A	V	NEEDLE	0.25	HCRF (Hydrocracker Recycle Feed)	Gas Oil	L	N	G	64.4	1500	N
E-32	HCU	Hydrocracker	R-402A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	69.4	1500	N
E-34	HCU	Hydrocracker	R-402A	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	71.6	1500	NA
E-36	HCU	Hydrocracker	R-402A	C	Threaded Connector	0.25	LGO	Gas Oil	L	N	G	69.4	1500	NA
E-38	HCU	Hydrocracker	R-402B	V	CONTROL	3.00	LGO	Gas Oil	L	N	G	585.1	1500	Y
E-40	HCU	Hydrocracker	R-402B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	107.1	1500	N
E-42	HCU	Hydrocracker	R-402B	C	BULL PLUG	1.00	LGO	Gas Oil	L	N	G	86.5	1500	NA
E-44	HCU	Hydrocracker	R-402B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	163	1500	N
E-46	HCU	Hydrocracker	R-402B	V	GLOBE	3.00	LGO	Gas Oil	L	N	G	548.4	1500	N
E-48	HCU	Hydrocracker	R-402B	V	GLOBE	3.00	LGO	Gas Oil	L	N	G	533.1	1500	N
E-50	HCU	Hydrocracker	R-402B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	279.5	1500	N
E-52	HCU	Hydrocracker	R-402B	V	GLOBE	2.00	LGO	Gas Oil	L	N	G	226.8	1500	N
E-54	HCU	Hydrocracker	R-402B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	141.8	1500	N
E-56	HCU	Hydrocracker	R-402B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	113.7	1500	N
E-58	HCU	Hydrocracker	R-402B	C	REDUCER	0.25	LGO	Gas Oil	L	N	G	174.6	1500	NA
E-60	HCU	Hydrocracker	R-402B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	209.3	1500	N
E-62	HCU	Hydrocracker	R-402B	V	GATE	3.00	LGO	Gas Oil	L	N	G	473.9	1500	N
E-64	HCU	Hydrocracker	R-402B	V	GATE	3.00	LGO	Gas Oil	L	N	G	267.3	1500	N
E-66	HCU	Hydrocracker	R-402B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	143.8	1500	N
E-68	HCU	Hydrocracker	R-402B	C	BULL PLUG	1.00	LGO	Gas Oil	L	N	G	112.1	1500	NA
E-70	HCU	Hydrocracker	E-401	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	156.6	2200	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-72	HCU	Hydrocracker	E-401	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	486.7	2200	N
E-74	HCU	Hydrocracker	E-401	C	Threaded Connector	1.00	LGO	Gas Oil	L	N	G	259.2	2200	NA
E-76	HCU	Hydrocracker	E-401	C	Threaded Connector	1.00	LGO	Gas Oil	L	N	G	171.9	2200	NA
E-78	HCU	Hydrocracker	E-401	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	240.3	2200	N
E-80	HCU	Hydrocracker	E-401	C	FLANGE	3.00	LGO	Gas Oil	L	N	G	304.3	2200	NA
E-82	HCU	Hydrocracker	E-401	V	GATE	3.00	LGO	Gas Oil	L	N	G	95	2200	Y
E-84	HCU	Hydrocracker	E-401	C	BULL PLUG	0.75	LGO	Gas Oil	L	N	G	97.9	2200	NA
E-86	HCU	Hydrocracker	E-401	V	GLOBE	0.75	LGO	Gas Oil	L	N	G	89.8	2200	N
E-88	HCU	Hydrocracker	E-401	V	GLOBE	0.75	LGO	Gas Oil	L	N	G	108.3	2200	N
E-90	HCU	Hydrocracker	E-401	V	CONTROL	6.00	LGO	Gas Oil	L	N	G	453	2200	Y
E-92	HCU	Hydrocracker	E-401	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	124.3	2200	N
E-94	HCU	Hydrocracker	E-401	C	Threaded Connector	1.00	LGO	Gas Oil	L	N	G	89.2	2200	NA
E-96	HCU	Hydrocracker	E-401	V	CONTROL	6.00	LGO	Gas Oil	L	N	G	536.2	2200	Y
E-98	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	83.1	32.3	N
E-100	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	83.1	32.3	N
E-102	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	85.8	32.3	N
E-104	HCU	Hydrocracker	E-403A	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	93.7	32.3	NA
E-106	HCU	Hydrocracker	E-403A	C	Threaded Connector	0.25	LGO	Gas Oil	L	N	G	82	32	NA
E-108	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	82.9	32	N
E-110	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	84.7	32	N
E-112	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	80.2	32.19	N
E-114	HCU	Hydrocracker	E-403A	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	79.2	32.46	NA
E-116	HCU	Hydrocracker	E-403A	C	Threaded Connector	0.25	LGO	Gas Oil	L	N	G	82.2	32.46	NA
E-118	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	78.8	96	N
E-120	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	78.8	96	N
E-122	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	80	95	N
E-124	HCU	Hydrocracker	E-403A	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	84	95	NA
E-126	HCU	Hydrocracker	E-403A	C	Threaded Connector	0.25	LGO	Gas Oil	L	N	G	79	95	NA
E-128	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	114	1552	N
E-130	HCU	Hydrocracker	E-403A	C	BULL PLUG	1.00	LGO	Gas Oil	L	N	G	94	1552	NA
E-132	HCU	Hydrocracker	E-403A	V	CONTROL	6.00	LGO	Gas Oil	L	N	G	251	1552	Y
E-134	HCU	Hydrocracker	E-403A	V	GATE	6.00	LGO	Gas Oil	L	N	G	217	1552	N
E-136	HCU	Hydrocracker	E-403A	C	FLANGE	6.00	LGO	Gas Oil	L	N	G	144	1552	NA
E-138	HCU	Hydrocracker	E-403A	V	GLOBE	6.00	LGO	Gas Oil	L	N	G	229	1552	Y
E-140	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	95	1552	N
E-142	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	117	1552	N
E-144	HCU	Hydrocracker	E-403A	V	CONTROL	6.00	LGO	Gas Oil	L	N	G	411	1552	N
E-146	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	116	1552	N
E-148	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	145	1552	N
E-150	HCU	Hydrocracker	E-403A	C	FLANGE	6.00	LGO	Gas Oil	L	N	G	495	1552	NA
E-152	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	105	1550	N
E-154	HCU	Hydrocracker	E-403A	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	96	1550	N
E-156	HCU	Hydrocracker	E-403A	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	109	1550	NA
E-158	HCU	Hydrocracker	E-403A	V	GLOBE	1.50	LGO	Gas Oil	L	N	G	120	1550	N
E-160	HCU	Hydrocracker	E-403A	V	GLOBE	1.50	LGO	Gas Oil	L	N	G	114	1550	N
E-162	HCU	Hydrocracker	E-403A	V	GLOBE	1.50	LGO	Gas Oil	L	N	G	117	1550	N
E-164	HCU	Hydrocracker	E-403A	C	Threaded Connector	0.25	LGO	Gas Oil	L	N	G	130	1550	NA
E-166	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	125	1550	N
E-168	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	105	1550	N
E-170	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	102	1550	N
E-172	HCU	Hydrocracker	E-403A	C	FLANGE	6.00	LGO	Gas Oil	L	N	G	258	1550	NA
E-174	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	132	1550	N
E-176	HCU	Hydrocracker	E-403A	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	127	1550	N
E-178	HCU	Hydrocracker	E-403A	C	BULL PLUG	1.00	LGO	Gas Oil	L	N	G	115	1550	NA
E-180	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	129	1545	N
E-182	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	107	1545	N
E-184	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	109	1545	N
E-186	HCU	Hydrocracker	E-403B	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	133	1545	NA
E-188	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	127	1545	N
E-190	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	125	1545	N
E-192	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	132	1545	N
E-194	HCU	Hydrocracker	E-403B	C	BULL PLUG	1.00	LGO	Gas Oil	L	N	G	125	1545	NA
E-196	HCU	Hydrocracker	E-403B	C	FLANGE	6.00	LGO	Gas Oil	L	N	G	259	1545	NA
E-198	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	116	1545	N
E-200	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	104	1545	N
E-202	HCU	Hydrocracker	E-403B	C	Threaded Connector	0.25	LGO	Gas Oil	L	N	G	108	1545	NA
E-204	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	131	1540	N
E-206	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	105	1540	N
E-208	HCU	Hydrocracker	E-403B	V	CONTROL	6.00	LGO	Gas Oil	L	N	G	466	1540	N
E-210	HCU	Hydrocracker	E-403B	C	BULL PLUG	1.00	LGO	Gas Oil	L	N	G	102	1540	NA
E-212	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	92	1540	N
E-214	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	115	1540	N
E-75	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF	Gas Oil	L	N	G	103	2200	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-77	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF	Gas Oil	L	N	G	113	2200	N
E-79	HCU	Hydrocracker	P-402A	C	FLANGE	0.75	HCRF	Gas Oil	L	N	G	278	2200	NA
E-81	HCU	Hydrocracker	P-402A	V	GATE	10.00	HCRF	Gas Oil	L	N	G	205	2200	Y
E-83	HCU	Hydrocracker	P-402A	P	SEAL	Blank	HCRF	Gas Oil	L	N	G	155	2200	NA
E-85	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF	Gas Oil	L	N	G	128	2200	N
E-87	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF	Gas Oil	L	N	G	163	2200	Y
E-89	HCU	Hydrocracker	P-402A	C	Threaded Connector	0.75	HCRF	Gas Oil	L	N	G	101	2200	NA
E-91	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF	Gas Oil	L	N	G	104	2200	N
E-93	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF	Gas Oil	L	N	G	101	2200	N
E-95	HCU	Hydrocracker	P-402A	C	Threaded Connector	0.75	HCRF	Gas Oil	L	N	G	95	2200	NA
E-97	HCU	Hydrocracker	P-402A	C	FLANGE	0.75	HCRF	Gas Oil	L	N	G	103	2200	NA
E-99	HCU	Hydrocracker	P-402A	V	GATE	0.75	HCRF	Gas Oil	L	N	G	113	2200	N
E-101	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	150	120	Y
E-103	HCU	Hydrocracker	P-402B	C	FLANGE	0.75	HCRF	Gas Oil	L	N	G	85	120	NA
E-105	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	78	120	Y
E-107	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	84	120	Y
E-109	HCU	Hydrocracker	P-402B	P	SEAL	Blank	HCRF	Gas Oil	L	N	G	138	120	NA
E-111	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	76	120	N
E-113	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	76	120	N
E-115	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	78	120	N
E-117	HCU	Hydrocracker	P-402B	C	RED	0.75	HCRF	Gas Oil	L	N	G	78	120	NA
E-119	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	77	120	N
E-121	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	81	120	N
E-123	HCU	Hydrocracker	P-402B	V	CHECK	6.00	HCRF	Gas Oil	L	N	G	75	120	Y
E-125	HCU	Hydrocracker	P-402B	V	GATE	6.00	HCRF	Gas Oil	L	N	G	75	120	Y
E-127	HCU	Hydrocracker	P-402B	V	GATE	6.00	HCRF	Gas Oil	L	N	G	75	120	N
E-129	HCU	Hydrocracker	P-402B	V	GATE	0.75	HCRF	Gas Oil	L	N	G	74	120	N
E-131	HCU	Hydrocracker	P-402B	C	BULL PLUG	0.75	HCRF	Gas Oil	L	N	G	73	120	NA
E-133	HCU	Hydrocracker	P-402B	V	GATE	12.00	HCRF	Gas Oil	L	N	G	72	120	N
E-135	HCU	Hydrocracker	P-402B	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	75	120	N
E-137	HCU	Hydrocracker	P-401	V	GATE	10.00	FRESH FEED	Gas Oil	L	N	G	139	2200	N
E-139	HCU	Hydrocracker	P-401	V	GATE	10.00	FRESH FEED	Gas Oil	L	N	G	199	2200	N
E-141	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	130	2200	N
E-143	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	85	2200	N
E-145	HCU	Hydrocracker	P-401	C	FLANGE	6.00	FRESH FEED	Gas Oil	L	N	G	235	2200	NA
E-147	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	90	2200	N
E-149	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	94	2200	N
E-151	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	77	2200	N
E-153	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	91	2200	N
E-155	HCU	Hydrocracker	P-401	C	FLANGE	0.75	FRESH FEED	Gas Oil	L	N	G	81	2200	NA
E-157	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	91	2200	N
E-159	HCU	Hydrocracker	P-401	V	GATE	0.75	FRESH FEED	Gas Oil	L	N	G	82	2200	Y
E-161	HCU	Hydrocracker	P-401	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	82	0	Y
E-163	HCU	Hydrocracker	P-401	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	81	0	Y
E-165	HCU	Hydrocracker	P-401	V	NEEDLE	0.50	LGO	Gas Oil	L	N	G	94	0	Y
E-167	HCU	Hydrocracker	P-401	C	TUBE FITTING	0.50	LGO	Gas Oil	L	N	G	94	0	NA
E-169	HCU	Hydrocracker	P-401	C	Threaded Connector	0.50	LGO	Gas Oil	L	N	G	94	0	NA
E-171	HCU	Hydrocracker	P-401	C	RED	0.75	FRESH FEED	Gas Oil	L	N	G	80	230	NA
E-173	HCU	Hydrocracker	P-401	V	GATE	1.00	FRESH FEED	Gas Oil	L	N	G	176	2200	N
E-175	HCU	Hydrocracker	P-401	V	GATE	2.00	FRESH FEED	Gas Oil	L	N	G	112	2200	Y
E-177	HCU	Hydrocracker	P-401	C	ELBOW	0.75	FRESH FEED	Gas Oil	L	N	G	118	2200	NA
E-179	HCU	Hydrocracker	P-401	P	SEAL	Blank	FRESH FEED	Gas Oil	L	N	G	130	2200	NA
E-181	HCU	Hydrocracker	T-502	V	GATE	0.75	BOTTOMS	Diesel	L	N	P	110	30	Y
E-183	HCU	Hydrocracker	T-502	V	GATE	0.75	BOTTOMS	Diesel	L	N	P	250	30	Y
E-185	HCU	Hydrocracker	T-502	V	GATE	0.75	BOTTOMS	Diesel	L	N	P	140	30	Y
E-187	HCU	Hydrocracker	T-502	C	RED	0.75	BOTTOMS	Diesel	L	N	P	277	30	NA
E-189	HCU	Hydrocracker	T-502	V	GATE	0.75	BOTTOMS	Diesel	L	N	P	228	30	Y
E-191	HCU	Hydrocracker	T-502	V	GATE	0.75	BOTTOMS	Diesel	L	N	P	89	30	Y
E-193	HCU	Hydrocracker	T-502	V	GATE	0.75	DSL	Diesel	L	N	P	127	30	Y
E-195	HCU	Hydrocracker	T-502	V	GATE	0.75	DSL	Diesel	L	N	P	86	50	N
E-197	HCU	Hydrocracker	E-510	V	GATE	4.00	DSL	Diesel	L	N	G	95	50	Y
E-199	HCU	Hydrocracker	E-510	V	GATE	4.00	DSL	Diesel	L	N	G	73	50	Y
E-201	HCU	Hydrocracker	E-510	V	GATE	0.75	DSL	Diesel	L	N	G	72	50	N
E-203	HCU	Hydrocracker	E-510	C	ELBOW	0.75	DSL	Diesel	L	N	G	72	50	NA
E-205	HCU	Hydrocracker	E-510	V	GATE	4.00	DSL	Diesel	L	N	G	74	50	Y
E-207	HCU	Hydrocracker	E-510	C	FLANGE	4.00	DSL	Diesel	L	N	G	73	50	NA
E-209	HCU	Hydrocracker	E-510	V	GATE	0.75	DSL	Diesel	L	N	G	71	50	Y
E-211	HCU	Hydrocracker	E-507	V	GATE	6.00	DSL	Diesel	L	N	G	132	50	Y
E-213	HCU	Hydrocracker	E-507	C	BULL PLUG	1.00	DSL	Diesel	L	N	G	220	50	NA
E-215	HCU	Hydrocracker	E-507	V	GATE	6.00	DSL	Diesel	L	N	G	78	50	Y
E-217	HCU	Hydrocracker	E-507	C	FLANGE	6.00	DSL	Diesel	L	N	G	82	50	NA
E-219	HCU	Hydrocracker	E-507	V	GATE	0.75	DSL	Diesel	L	N	G	83	50	N
E-221	HCU	Hydrocracker	E-507	C	BULL PLUG	0.75	DSL	Diesel	L	N	G	79	50	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-223	HCU	Hydrocracker	E-507	V	GATE	4.00	DSL	Diesel	L	N	G	99	50	Y
E-225	HCU	Hydrocracker	P-505A/B	V	CONTROL	3.00	DSL	Diesel	L	N	G	75	32	Y
E-227	HCU	Hydrocracker	P-505A/B	V	GATE	0.75	DSL	Diesel	L	N	G	73	32	Y
E-229	HCU	Hydrocracker	P-505	V	GATE	0.75	DSL	Diesel	L	N	G	72	32	N
E-231	HCU	Hydrocracker	P-505	V	GATE	3.00	HHHC/DSL	Diesel	L	N	G	73	32	Y
E-233	HCU	Hydrocracker	P-505	V	NEEDLE	0.25	HHHC/DSL	Diesel	L	N	G	73	32	N
E-235	HCU	Hydrocracker	P-505	C	TUBE FITTING	0.25	HHHC/DSL	Diesel	L	N	G	73	32	NA
E-237	HCU	Hydrocracker	P-505	C	TUBE FITTING	0.25	HHHC/DSL	Diesel	L	N	G	73	32	NA
E-239	HCU	Hydrocracker	P-505	C	COUPLING	0.25	HHHC/DSL	Diesel	L	N	G	73	32	NA
E-241	HCU	Hydrocracker	P-505	C	Threaded Connector	0.50	HHHC/DSL	Diesel	L	N	G	73	32	NA
E-243	HCU	Hydrocracker	P-505	V	NEEDLE	0.50	HHHC/DSL	Diesel	L	N	G	74	32	N
E-245	HCU	Hydrocracker	P-505	C	TUBE FITTING	0.50	HHHC/DSL	Diesel	L	N	G	74	32	NA
E-247	HCU	Hydrocracker	P-505	V	NEEDLE	0.50	HHHC/DSL	Diesel	L	N	G	74	32	N
E-249	HCU	Hydrocracker	P-505	C	RED	0.50	HHHC/DSL	Diesel	L	N	G	72	32	NA
E-251	HCU	Hydrocracker	P-505	V	GATE	2.00	HHHC/DSL	Diesel	L	N	G	72	32	Y
E-253	HCU	Hydrocracker	P-505	C	FLANGE	3.00	HHHC/DSL	Diesel	L	N	G	73.6	32	NA
E-216	HCU	Hydrocracker	E-403B	V	CONTROL	6.00	LGO	Gas Oil	L	N	G	257	1540	N
E-218	HCU	Hydrocracker	E-403B	V	GATE	6.00	LGO	Gas Oil	L	N	G	205	1540	Y
E-220	HCU	Hydrocracker	E-403B	C	FLANGE	6.00	LGO	Gas Oil	L	N	G	261	1540	NA
E-222	HCU	Hydrocracker	E-403B	V	CONTROL	6.00	LGO	Gas Oil	L	N	G	206	1540	Y
E-224	HCU	Hydrocracker	E-403B	V	GLOBE	1.00	LGO	Gas Oil	L	N	G	100	1540	N
E-226	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	78	1540	N
E-228	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	85	1540	N
E-230	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	182.5	1540	N
E-232	HCU	Hydrocracker	E-403B	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	99	1540	NA
E-234	HCU	Hydrocracker	E-403B	C	Threaded Connector	0.25	LGO	Gas Oil	L	N	G	78	1540	NA
E-236	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	69	1540	N
E-238	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	72	1540	N
E-240	HCU	Hydrocracker	E-403B	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	72	1540	N
E-242	HCU	Hydrocracker	E-403B	C	ELBOW	0.25	LGO	Gas Oil	L	N	G	71	1540	NA
E-244	HCU	Hydrocracker	E-403B	C	TUBE FITTING	0.25	LGO	Gas Oil	L	N	G	72	1540	NA
E-246	HCU	Hydrocracker	T-504	V	BALL VALVE	0.75	MEA	Amine	L	N	G	65	2000	N
E-248	HCU	Hydrocracker	T-504	C	BULL PLUG	0.75	MEA	Amine	L	N	G	67	2000	NA
E-250	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	69	2000	Y
E-252	HCU	Hydrocracker	T-504	C	FLANGE	0.75	MEA	Amine	L	N	G	69	2000	NA
E-254	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	89	2000	Y
E-256	HCU	Hydrocracker	T-504	V	GATE	2.00	MEA	Amine	L	N	G	133	2000	Y
E-258	HCU	Hydrocracker	T-504	V	GATE	3.00	MEA	Amine	L	N	G	143	2000	Y
E-260	HCU	Hydrocracker	T-504	C	FLANGE	3.00	MEA	Amine	L	N	G	151	2000	NA
E-262	HCU	Hydrocracker	T-504	V	CONTROL	2.00	MEA	Amine	L	N	G	142	2000	Y
E-264	HCU	Hydrocracker	T-504	V	GATE	2.00	MEA	Amine	L	N	G	137	2000	Y
E-266	HCU	Hydrocracker	T-504	C	FLANGE	2.00	MEA	Amine	L	N	G	139	2000	NA
E-268	HCU	Hydrocracker	T-504	V	GATE	2.00	MEA	Amine	L	N	G	157	2000	Y
E-270	HCU	Hydrocracker	T-504	C	BULL PLUG	0.75	MEA	Amine	L	N	G	71	2000	NA
E-272	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	69	2000	Y
E-274	HCU	Hydrocracker	T-504	C	FLANGE	1.50	MEA	Amine	L	N	G	113	2000	NA
E-276	HCU	Hydrocracker	T-504	V	GATE	2.00	MEA	Amine	L	N	G	128	2000	Y
E-278	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	74	2000	N
E-280	HCU	Hydrocracker	T-504	C	BULL PLUG	0.75	MEA	Amine	L	N	G	79	2000	NA
E-282	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	106	2000	N
E-284	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	68	2000	Y
E-286	HCU	Hydrocracker	T-504	C	FLANGE	0.75	MEA	Amine	L	N	G	70	2000	NA
E-288	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	70	2000	Y
E-290	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	68	2000	Y
E-292	HCU	Hydrocracker	T-504	C	BULL PLUG	0.75	MEA	Amine	L	N	G	67	2000	NA
E-294	HCU	Hydrocracker	T-504	V	GATE	0.75	MEA	Amine	L	N	G	78	2000	Y
E-296	HCU	Hydrocracker	T-504	V	CONTROL	1.50	MEA	Amine	L	N	G	101	2000	Y
E-298	HCU	Hydrocracker	T-501	V	GATE	0.75	MEA	Amine	L	N	G	89	2000	N
E-300	HCU	Hydrocracker	T-501	C	BULL PLUG	0.75	MEA	Amine	L	N	G	79	2000	NA
E-302	HCU	Hydrocracker	T-501	V	GATE	1.50	MEA	Amine	L	N	G	96	2000	Y
E-304	HCU	Hydrocracker	T-501	V	CHECK	3.00	MEA	Amine	L	N	G	124	2000	Y
E-306	HCU	Hydrocracker	T-501	V	GATE	1.50	MEA	Amine	L	N	G	87	2000	Y
E-308	HCU	Hydrocracker	T-501	C	FLANGE	1.50	MEA	Amine	L	N	G	100	2000	NA
E-310	HCU	Hydrocracker	T-501	V	GATE	1.50	MEA	Amine	L	N	G	112	2000	Y
E-312	HCU	Hydrocracker	T-501	V	GATE	0.75	MEA	Amine	L	N	G	96	2000	N
E-314	HCU	Hydrocracker	T-501	C	BULL PLUG	0.75	MEA	Amine	L	N	G	74	2000	NA
E-316	HCU	Hydrocracker	D-403	V	GATE	6.00	MEA	Amine	L	N	G	70	60	Y
E-318	HCU	Hydrocracker	D-403	V	GATE	1.50	MEA	Amine	L	N	G	66	60	Y
E-320	HCU	Hydrocracker	D-403	C	FLANGE	1.50	MEA	Amine	L	N	G	63	60	NA
E-322	HCU	Hydrocracker	D-403	V	GATE	1.00	MEA	Amine	L	N	G	63	60	N
E-324	HCU	Hydrocracker	D-403	V	GATE	6.00	MEA	Amine	L	N	G	78	60	Y
E-326	HCU	Hydrocracker	D-403	V	GATE	0.75	MEA	Amine	L	N	G	65	60	Y
E-328	HCU	Hydrocracker	D-403	C	BULL PLUG	0.75	MEA	Amine	L	N	G	76	60	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-330	HCU	Hydrocracker	D-403	V	CONTROL	3.00	MEA	Amine	L	N	G	71	60	Y
E-332	HCU	Hydrocracker	D-403	V	GATE	0.75	MEA	Amine	L	N	G	62	60	N
E-334	HCU	Hydrocracker	D-403	C	Threaded Connector	0.75	MEA	Amine	L	N	G	63	60	NA
E-336	HCU	Hydrocracker	P-505A	V	GATE	4.00	DSL	Diesel	L	N	G	69	38	Y
E-338	HCU	Hydrocracker	P-505A	C	FLANGE	2.00	DSL	Diesel	L	N	G	65	38	NA
E-340	HCU	Hydrocracker	P-505A	P	SEAL	2.00	DSL	Diesel	L	N	G	67	38	NA
E-342	HCU	Hydrocracker	P-505A	C	Pump Housing	6.00	DSL	Diesel	L	N	G	66	38	NA
E-344	HCU	Hydrocracker	P-505A	V	GATE	0.75	DSL	Diesel	L	N	G	65	38	Y
E-346	HCU	Hydrocracker	P-505A	C	Threaded Connector	0.75	DSL	Diesel	L	N	G	63	38	NA
E-348	HCU	Hydrocracker	P-505A	V	GATE	0.75	DSL	Diesel	L	N	G	62	38	Y
E-350	HCU	Hydrocracker	P-505A	C	BULL PLUG	0.75	DSL	Diesel	L	N	G	61	38	NA
E-352	HCU	Hydrocracker	P-505A	V	GATE	4.00	DSL	Diesel	L	N	G	67	38	Y
E-354	HCU	Hydrocracker	P-505A	C	FLANGE	4.00	DSL	Diesel	L	N	G	66	38	NA
E-356	HCU	Hydrocracker	P-505A	V	GATE	0.75	DSL	Diesel	L	N	G	65	38	N
E-358	HCU	Hydrocracker	P-505A	C	Threaded Connector	0.75	DSL	Diesel	L	N	G	65	38	NA
E-360	HCU	Hydrocracker	P-505A	C	ELBOW	0.75	DSL	Diesel	L	N	G	66	38	NA
E-362	HCU	Hydrocracker	P-505A	C	Threaded Connector	0.75	DSL	Diesel	L	N	G	63	38	NA
E-364	HCU	Hydrocracker	P-505A	V	GATE	0.75	DSL	Diesel	L	N	G	65	38	N
E-366	HCU	Hydrocracker	P-505B	C	Threaded Connector	0.75	DSL	Diesel	L	N	G	72	36	NA
E-368	HCU	Hydrocracker	P-505B	C	ELBOW	0.75	DSL	Diesel	L	N	G	70	36	NA
E-370	HCU	Hydrocracker	P-505B	C	ELBOW	0.75	DSL	Diesel	L	N	G	72	36	NA
E-372	HCU	Hydrocracker	P-505B	C	UNION	0.75	DSL	Diesel	L	N	G	73	36	NA
E-374	HCU	Hydrocracker	P-505B	V	GATE	1.00	DSL	Diesel	L	N	G	65	36	Y
E-376	HCU	Hydrocracker	P-505B	P	SEAL	2.00	DSL	Diesel	L	N	G	69	32	NA
E-378	HCU	Hydrocracker	P-505B	C	Pump Housing	6.00	DSL	Diesel	L	N	G	67	32	NA
E-380	HCU	Hydrocracker	P-505B	V	GATE	0.75	DSL	Diesel	L	N	G	64	32	N
E-382	HCU	Hydrocracker	P-505B	C	ELBOW	0.75	DSL	Diesel	L	N	G	67	32	NA
E-384	HCU	Hydrocracker	P-505B	V	GATE	4.00	DSL	Diesel	L	N	G	70	32	Y
E-386	HCU	Hydrocracker	P-505B	C	FLANGE	2.00	DSL	Diesel	L	N	G	69	32	NA
E-388	HCU	Hydrocracker	P-505B	V	GATE	1.00	DSL	Diesel	L	N	G	62	32	Y
E-390	HCU	Hydrocracker	P-505B	C	BULL PLUG	1.00	DSL	Diesel	L	N	G	65	32	NA
E-392	HCU	Hydrocracker	P-505B	V	GATE	0.75	DSL	Diesel	L	N	G	68	32	N
E-394	HCU	Hydrocracker	P-505B	C	UNION	0.75	DSL	Diesel	L	N	G	65	32	NA
E-396	HCU	Hydrocracker	P-505B	C	ELBOW	0.75	DSL	Diesel	L	N	G	64	32	NA
E-398	HCU	Hydrocracker	P-505B	C	UNION	0.75	DSL	Diesel	L	N	G	65	32	NA
E-400	HCU	Hydrocracker	P-505B	V	GATE	0.75	DSL	Diesel	L	N	G	65	32	Y
E-402	HCU	Hydrocracker	P-505B	V	GATE	0.75	DSL	Diesel	L	N	G	69	32	Y
E-404	HCU	Hydrocracker	P-505B	V	GATE	4.00	DSL	Diesel	L	N	G	68	32	Y
E-406	HCU	Hydrocracker	D-413	V	GATE	2.00	LGO	Gas Oil	L	N	G	72.5	100	Y
E-408	HCU	Hydrocracker	D-413	V	GATE	3.00	LGO	Gas Oil	L	N	G	62	100	Y
E-410	HCU	Hydrocracker	D-413	C	FLANGE	3.00	LGO	Gas Oil	L	N	G	62	100	NA
E-412	HCU	Hydrocracker	D-413	V	GATE	0.75	LGO	Gas Oil	L	N	G	58	100	N
E-414	HCU	Hydrocracker	D-413	V	GATE	6.00	LGO	Gas Oil	L	N	G	60	100	Y
E-416	HCU	Hydrocracker	D-413	V	GATE	0.75	LGO	Gas Oil	L	N	G	63	100	Y
E-418	HCU	Hydrocracker	D-413	C	ELBOW	0.75	LGO	Gas Oil	L	N	G	57	100	NA
E-420	HCU	Hydrocracker	D-413	C	RED	0.25	LGO	Gas Oil	L	N	G	63	100	NA
E-422	HCU	Hydrocracker	D-413	C	TEE	0.25	LGO	Gas Oil	L	N	G	65	100	NA
E-424	HCU	Hydrocracker	D-413	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	67	100	N
E-426	HCU	Hydrocracker	D-413	V	NEEDLE	0.25	LGO	Gas Oil	L	N	G	62	100	N
E-428	HCU	Hydrocracker	D-413	C	CAP	0.25	LGO	Gas Oil	L	N	G	62	100	NA
E-430	HCU	Hydrocracker	D-413	C	TEE	0.25	LGO	Gas Oil	L	N	G	63	100	NA
E-432	HCU	Hydrocracker	E-406	V	GATE	0.75	LCCO	Cycle Oil	L	N	G	132	1500	N
E-434	HCU	Hydrocracker	E-406	V	GATE	6.00	LCCO	Cycle Oil	L	N	G	306	1500	Y
E-436	HCU	Hydrocracker	E-406A	C	FLANGE	6.00	LCCO	Cycle Oil	L	N	G	310	1500	NA
E-438	HCU	Hydrocracker	E-406A	V	GATE	0.75	LCCO	Cycle Oil	L	N	G	299	1500	N
E-440	HCU	Hydrocracker	E-406A	V	GATE	6.00	LCCO	Cycle Oil	L	N	G	336	1500	Y
E-442	HCU	Hydrocracker	E-406A	C	FLANGE	6.00	LCCO	Cycle Oil	L	N	G	346	1500	NA
E-444	HCU	Hydrocracker	E-406A	V	GATE	2.00	LCCO	Cycle Oil	L	N	G	351	1500	Y
E-446	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	LCCO	Cycle Oil	L	N	G	116	1500	NA
E-448	HCU	Hydrocracker	E-406A	V	GATE	0.75	LCCO	Cycle Oil	L	N	G	175	1500	Y
E-450	HCU	Hydrocracker	E-406A	V	GATE	2.00	LCCO	Cycle Oil	L	N	G	353	1500	Y
E-452	HCU	Hydrocracker	E-406A	C	FLANGE	2.00	LCCO	Cycle Oil	L	N	G	313	1500	NA
E-454	HCU	Hydrocracker	E-406A	C	CHECK	3.00	LCCO	Cycle Oil	L	N	G	335	1500	NA
E-456	HCU	Hydrocracker	E-406A	V	GATE	3.00	LCCO	Cycle Oil	L	N	G	319	1500	Y
E-458	HCU	Hydrocracker	E-406A	C	FLANGE	2.00	KLGO	Gas Oil	L	N	G	244	1500	NA
E-460	HCU	Hydrocracker	E-406A	V	GATE	2.00	KLGO	Gas Oil	L	N	G	280	1500	Y
E-462	HCU	Hydrocracker	E-406A	V	GATE	0.75	KLGO	Gas Oil	L	N	G	88	1500	Y
E-464	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	KLGO	Gas Oil	L	N	G	131	1500	NA
E-468	HCU	Hydrocracker	E-406A	V	GATE	2.00	KLGO	Gas Oil	L	N	G	158	1500	Y
E-490	HCU	Hydrocracker	E-406A	C	FLANGE	2.00	KLGO	Gas Oil	L	N	G	168	1500	NA
E-492	HCU	Hydrocracker	E-406A	V	GATE	2.00	KLGO	Gas Oil	L	N	G	249	1500	Y
E-494	HCU	Hydrocracker	E-406A	V	GATE	6.00	KLGO	Gas Oil	L	N	G	253	1500	Y
E-496	HCU	Hydrocracker	E-406A	C	FLANGE	6.00	KLGO	Gas Oil	L	N	G	273	1500	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-498	HCU	Hydrocracker	E-406A	V	GATE	0.75	KLGO	Gas Oil	L	N	G	114	1500	N
E-500	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	KLGO	Gas Oil	L	N	G	123	1500	NA
E-502	HCU	Hydrocracker	E-406A	V	GATE	2.00	KLGO	Gas Oil	L	N	G	277	1500	Y
E-504	HCU	Hydrocracker	E-406A	V	GATE	2.00	KLGO	Gas Oil	L	N	G	176	1500	Y
E-506	HCU	Hydrocracker	E-406A	C	FLANGE	2.00	KLGO	Gas Oil	L	N	G	136	1500	NA
E-508	HCU	Hydrocracker	E-406A	V	GATE	2.00	KLGO	Gas Oil	L	N	G	103	1500	Y
E-510	HCU	Hydrocracker	E-406A	V	GATE	8.00	KLGO	Gas Oil	L	N	G	250	1500	Y
E-512	HCU	Hydrocracker	E-406A	C	FLANGE	8.00	KLGO	Gas Oil	L	N	G	225	1500	NA
E-514	HCU	Hydrocracker	E-406A	V	GATE	4.00	KLGO	Gas Oil	L	N	G	127	1500	Y
E-516	HCU	Hydrocracker	E-406A	V	CONTROL	6.00	KLGO	Gas Oil	L	N	G	225	1500	Y
E-518	HCU	Hydrocracker	E-406A	C	FLANGE	2.00	LAGO	Gas Oil	L	N	G	231	1500	NA
E-520	HCU	Hydrocracker	E-406A	V	GATE	2.00	LAGO	Gas Oil	L	N	G	175	1500	Y
E-522	HCU	Hydrocracker	E-406A	V	GATE	2.00	LAGO	Gas Oil	L	N	G	150	1500	Y
E-524	HCU	Hydrocracker	E-406A	V	GATE	0.75	LAGO	Gas Oil	L	N	G	106	1500	N
E-526	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.48	LAGO	Gas Oil	L	N	G	111	1500	NA
E-528	HCU	Hydrocracker	E-406A	V	GATE	2.00	LAGO	Gas Oil	L	N	G	131	1500	Y
E-530	HCU	Hydrocracker	E-406A	V	GATE	2.00	LAGO	Gas Oil	L	N	G	96	1500	Y
E-532	HCU	Hydrocracker	E-406A	C	FLANGE	2.00	LAGO	Gas Oil	L	N	G	141	1500	NA
E-534	HCU	Hydrocracker	E-406A	V	GATE	0.75	LAGO	Gas Oil	L	N	G	80	1500	N
E-536	HCU	Hydrocracker	E-406A	V	GATE	2.00	LAGO	Gas Oil	H	N	G	136	1500	Y
E-538	HCU	Hydrocracker	E-406A	V	GATE	0.75	LAGO	Gas Oil	H	N	G	119	1500	N
E-540	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	LAGO	Gas Oil	H	N	G	86	1500	NA
E-542	HCU	Hydrocracker	E-406A	V	CONTROL	8.00	LAGO	Gas Oil	H	N	G	164	1500	Y
E-544	HCU	Hydrocracker	E-406A	V	CONTROL	4.00	LCCO	Cycle Oil	L	N	G	102	300	Y
E-546	HCU	Hydrocracker	E-406A	C	FLANGE	4.00	LCCO	Cycle Oil	L	N	G	112	300	NA
E-548	HCU	Hydrocracker	E-406A	V	GATE	0.75	LCCO	Cycle Oil	L	N	G	86	300	N
E-550	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	LCCO	Cycle Oil	L	N	G	77	300	NA
E-552	HCU	Hydrocracker	E-406A	V	GATE	2.00	LCCO	Cycle Oil	L	N	G	130	300	Y
E-554	HCU	Hydrocracker	E-406A	V	GATE	0.75	LCCO	Cycle Oil	L	N	G	112	300	N
E-556	HCU	Hydrocracker	E-406A	C	RED	0.75	LCCO	Cycle Oil	L	N	G	87	300	NA
E-558	HCU	Hydrocracker	E-406A	V	GATE	2.00	LCCO	Cycle Oil	L	N	G	146	300	Y
E-560	HCU	Hydrocracker	E-406A	V	GATE	0.75	LCCO	Cycle Oil	L	N	G	96	300	N
E-562	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	LCCO	Cycle Oil	L	N	G	95	300	NA
E-564	HCU	Hydrocracker	E-406A	V	GATE	2.00	LCCO	Cycle Oil	L	N	G	101	300	Y
E-566	HCU	Hydrocracker	E-406A	V	GATE	0.75	LCCO	Cycle Oil	L	N	G	77	300	N
E-568	HCU	Hydrocracker	E-406A	V	GATE	8.00	MIX FEED	Gas Oil	L	N	G	202	350	Y
E-570	HCU	Hydrocracker	E-406A	V	GATE	0.75	MIX FEED	Gas Oil	L	N	G	86	350	N
E-572	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	MIX FEED	Gas Oil	L	N	G	93	350	NA
E-574	HCU	Hydrocracker	E-406A	V	GATE	0.75	MIX FEED	Gas Oil	L	N	G	113	350	N
E-576	HCU	Hydrocracker	E-406A	V	GATE	8.00	MIX FEED	Gas Oil	L	N	G	192	350	Y
E-578	HCU	Hydrocracker	E-406A	C	FLANGE	8.00	MIX FEED	Gas Oil	L	N	G	224	350	NA
E-580	HCU	Hydrocracker	E-406A	V	GATE	0.75	MIX FEED	Gas Oil	L	N	G	87	350	N
E-582	HCU	Hydrocracker	E-406A	C	BULL PLUG	0.75	MIX FEED	Gas Oil	L	N	G	208	350	NA
E-255	HCU	Hydrocracker	T-502	V	GATE	0.75	DSL	Diesel	L	N	P	158	50	N
E-257	HCU	Hydrocracker	T-502	V	GATE	6.00	DSL	Diesel	L	N	P	294	50	Y
E-259	HCU	Hydrocracker	T-502	V	GATE	0.75	DSL	Diesel	L	N	P	130	50	N
E-261	HCU	Hydrocracker	T-502	C	BULL PLUG	0.75	DSL	Diesel	L	N	P	149	50	NA
E-263	HCU	Hydrocracker	T-502	V	GATE	6.00	DSL	Diesel	L	N	P	250	50	Y
E-265	HCU	Hydrocracker	T-502	V	GATE	0.75	DSL	Diesel	L	N	P	95	50	N
E-267	HCU	Hydrocracker	T-502	V	GATE	10.00	DSL	Diesel	L	N	P	372	50	Y
E-269	HCU	Hydrocracker	T-502	V	GATE	10.00	DSL	Diesel	L	N	P	382	50	Y
E-271	HCU	Hydrocracker	T-502	V	GATE	1.00	DSL	Diesel	L	N	P	303	50	Y
E-273	HCU	Hydrocracker	T-502	C	FLANGE	1.00	DSL	Diesel	L	N	P	239	50	NA
E-275	HCU	Hydrocracker	T-502	V	GATE	0.75	DSL	Diesel	L	N	P	200	50	N
E-279	HCU	Hydrocracker	T-502	C	BULL PLUG	0.75	DSL	Diesel	L	N	P	140	50	NA
E-281	HCU	Hydrocracker	T-502	V	PRD - Safety Valve	1.00	DSL	Diesel	L	N	P	184	50	NA
E-283	HCU	Hydrocracker	T-502	C	FLANGE	1.00	DSL	Diesel	L	N	P	195	50	NA
E-285	HCU	Hydrocracker	T-502	C	FLANGE	2.00	DSL	Diesel	L	N	P	180	50	NA
E-287	HCU	Hydrocracker	T-503	V	GATE	0.75	DSL	Diesel	L	N	P	141	50	N
E-289	HCU	Hydrocracker	T-504	C	BULL PLUG	0.75	DSL	Diesel	L	N	P	140	50	NA
E-291	HCU	Hydrocracker	T-505	C	BULL PLUG	0.75	DSL	Diesel	L	N	P	190	50	NA
E-293	HCU	Hydrocracker	T-506	C	FLANGE	6.00	DSL	Diesel	L	N	P	360	50	NA
E-295	HCU	Hydrocracker	T-507	V	GATE	3.00	DSL	Diesel	L	N	P	190	50	Y
E-297	HCU	Hydrocracker	P-502B	V	CONTROL	6.00	DSL	Diesel	L	N	G	367	50	Y
E-299	HCU	Hydrocracker	P-502B	V	GATE	0.75	DSL	Diesel	L	N	G	120	50	Y
E-301	HCU	Hydrocracker	P-502B	C	Threaded Connector	0.75	DSL	Diesel	L	N	G	98	50	NA
E-303	HCU	Hydrocracker	P-502B	V	GATE	0.75	DSL	Diesel	L	N	G	91	50	Y
E-305	HCU	Hydrocracker	P-502B	C	ELBOW	0.75	DSL	Diesel	L	N	G	89	50	NA
E-307	HCU	Hydrocracker	P-502B	V	GATE	6.00	DSL	Diesel	L	N	G	207	50	Y
E-309	HCU	Hydrocracker	P-502B	C	FLANGE	6.00	DSL	Diesel	L	N	G	149	50	NA
E-311	HCU	Hydrocracker	P-502B	V	GATE	0.75	DSL	Diesel	L	N	G	95	50	N
E-313	HCU	Hydrocracker	P-502B	V	GATE	6.00	DSL	Diesel	L	N	G	182	50	Y
E-315	HCU	Hydrocracker	P-502B	C	FLANGE	6.00	DSL	Diesel	L	N	G	282	50	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-317	HCU	Hydrocracker	P-502B	V	GATE	0.75	DSL	Diesel	L	N	G	140	50	N
E-319	HCU	Hydrocracker	P-502B	V	GATE	0.75	DSL	Diesel	L	N	G	140	50	Y
E-321	HCU	Hydrocracker	E-505-1	V	PRD - Safety Valve	3.00	DSL	Diesel	L	N	G	76	167	NA
E-323	PSU	Crude Unit	P-108A	P	SEAL	Blank	DSL	Diesel	L	N	G	280	280	NA
E-325	PSU	Crude Unit	P-108A	C	Pump Housing	Blank	DSL	Diesel	L	N	G	308	280	NA
E-327	PSU	Crude Unit	P-107B	P	SEAL	Blank	JET	Jet	L	N	G	115	1600	NA
E-329	PSU	Crude Unit	P-107B	C	Pump Housing	Blank	JET	Jet	L	N	G	270	1600	NA
E-331	PSU	Crude Unit	P-107A	P	SEAL	6	JET	Jet	L	N	G	132	1600	NA
E-333	PSU	Crude Unit	P-107A	C	Pump Housing	Blank	JET	Jet	L	N	G	209	1600	NA
E-335	PSU	Crude Unit	P-120A	P	SEAL	Blank	HVGO	Gas Oil	L	N	G	178	40	NA
E-337	PSU	Crude Unit	P-120A	C	Pump Housing	Blank	HVGO	Gas Oil	L	N	G	435	40	NA
E-339	PSU	Crude Unit	P-120B	P	SEAL	Blank	HVGO	Gas Oil	L	N	G	130	200	NA
E-341	PSU	Crude Unit	P-120B	C	Pump Housing	Blank	HVGO	Gas Oil	L	N	G	398	200	NA
E-343	PSU	Crude Unit	P-119A	P	SEAL	Blank	LVGO	Gas Oil	L	N	G	159	40	NA
E-345	PSU	Crude Unit	P-119A	C	Pump Housing	Blank	LVGO	Gas Oil	L	N	G	273	40	NA
E-347	PSU	Crude Unit	P-119B	P	SEAL	Blank	LVGO	Gas Oil	L	N	G	131	210	NA
E-349	PSU	Crude Unit	P-119B	C	Pump Housing	Blank	LVGO	Gas Oil	L	N	G	230	210	NA
E-351	PSU	Crude Unit	P-157	P	SEAL	Blank	T-102Overflash	Gas Oil	L	N	G	95	0	NA
E-353	PSU	Crude Unit	P-157	C	Pump Housing	Blank	T-102Overflash	Gas Oil	L	N	G	113	0	NA
E-355	PSU	Crude Unit	P-135A	P	SEAL	Blank	ABPA (APS Bottoms)	Gas Oil	L	N	G	177	140	NA
E-357	PSU	Crude Unit	P-135A	C	Pump Housing	Blank	ABPA (APS Bottoms)	Gas Oil	L	N	G	385	140	NA
E-359	PSU	Crude Unit	P-135B	P	SEAL	Blank	ABPA (APS Bottoms)	Gas Oil	L	N	G	174	140	NA
E-361	PSU	Crude Unit	P-135B	C	Pump Housing	Blank	ABPA (APS Bottoms)	Gas Oil	L	N	G	396	140	NA
E-363	PSU	Crude Unit	P-110A	P	SEAL	Blank	ABPA (APS Bottoms)	Gas Oil	L	N	G	160	350	NA
E-365	PSU	Crude Unit	P-110A	C	Pump Housing	Blank	ABPA (APS Bottoms)	Gas Oil	L	N	G	281	350	NA
E-367	PSU	Crude Unit	P-121A	P	SEAL	Blank	LAGO	Gas Oil	L	N	G	144	50	NA
E-369	PSU	Crude Unit	P-121A	C	Pump Housing	Blank	LAGO	Gas Oil	L	N	G	274	50	NA
E-371	PSU	Crude Unit	P-121B	P	SEAL	Blank	LAGO	Gas Oil	L	N	G	230	50	NA
E-373	PSU	Crude Unit	P-121B	C	Pump Housing	Blank	LAGO	Gas Oil	L	N	G	330	50	NA
E-375	PSU	Crude Unit	P-122A	P	SEAL	Blank	PITCH	Asphalt	L	N	G	230	100	NA
E-377	PSU	Crude Unit	P-122A	C	Pump Housing	Blank	PITCH	Asphalt	L	N	G	515	100	NA
E-379	PSU	Crude Unit	P-122B	P	SEAL	Blank	PITCH	Asphalt	L	N	G	130	90	NA
E-381	PSU	Crude Unit	P-122B	C	Pump Housing	Blank	PITCH	Asphalt	L	N	G	355	90	NA
E-383	PSU	Crude Unit	P-122C	P	SEAL	3.00	PITCH	Asphalt	L	N	G	127	450	NA
E-385	PSU	Crude Unit	P-122C	C	Pump Housing	16.00	PITCH	Asphalt	L	N	G	400	450	NA
E-387	PSU	Crude Unit	P-110B	P	SEAL	3.00	APSB = Atmospheric Pipestill Bottoms (T-101 Bottoms)	Gas Oil	L	N	G	138	450	NA
E-389	PSU	Crude Unit	P-110B	C	Pump Housing	16.00	APSB = Atmospheric Pipestill Bottoms (T-101 Bottoms)	Gas Oil	L	N	G	400	450	NA
E-391	PSU	Crude Unit	P-109B	P	SEAL	2.00	HAGO	Gas Oil	L	N	G	185	40	NA
E-393	PSU	Crude Unit	P-109B	C	Pump Housing	10.00	HAGO	Gas Oil	L	N	G	401	40	NA
E-395	PSU	Crude Unit	P-109A	P	SEAL	2.00	HAGO	Gas Oil	L	N	G	136	135	NA
E-397	PSU	Crude Unit	P-109A	C	Pump Housing	10.00	HAGO	Gas Oil	L	N	G	250	135	NA
E-399	PSU	Crude Unit	P-133	P	SEAL	0.75	JET FUEL	Jet	L	N	G	72	30	NA
E-401	PSU	Crude Unit	P-133	C	Pump Housing	6.00	JET FUEL	Jet	L	N	G	72	30	NA
E-403	PSU	Crude Unit	P-108C	P	SEAL	1.00	DSL	Diesel	L	N	G	75	75	NA
E-405	FCCU	Catalytic Cracking	P-708B	P	SEAL	2.00	LCCO/LGO	Gas Oil	L	N	G	144	130	NA
E-407	FCCU	Catalytic Cracking	P-708B	C	Pump Housing	8.00	LCCO/LGO	Gas Oil	L	N	G	275	130	NA
E-409	FCCU	Catalytic Cracking	P-708A	P	SEAL	2.00	LGO	Gas Oil	L	N	G	168	70	NA
E-411	FCCU	Catalytic Cracking	P-708A	C	Pump Housing	8.00	LGO	Gas Oil	L	N	G	247	70	NA
E-413	FCCU	Catalytic Cracking	P-710B	P	SEAL	2.00	SLURRY	Slurry	L	N	G	150	230	NA
E-415	FCCU	Catalytic Cracking	P-710B	C	Pump Housing	8.00	SLURRY	Slurry	L	N	G	300	230	NA
E-417	FCCU	Catalytic Cracking	P-710A	P	SEAL	2.00	SLURRY	Slurry	L	N	G	178	220	NA
E-419	FCCU	Catalytic Cracking	P-710A	C	Pump Housing	8.00	SLURRY	Slurry	L	N	G	335	220	NA
E-421	FCCU	Catalytic Cracking	P-730B	P	SEAL	2.00	SLURRY	Slurry	L	N	G	75	0	NA
E-423	FCCU	Catalytic Cracking	P-730B	C	Pump Housing	8.00	SLURRY	Slurry	L	N	G	75	0	NA
E-425	FCCU	Catalytic Cracking	P-730A	P	SEAL	2.00	SLURRY	Slurry	L	N	G	72	0	NA
E-427	FCCU	Catalytic Cracking	P-730A	C	Pump Housing	8.00	SLURRY	Slurry	L	N	G	72	0	NA
E-429	FCCU	Catalytic Cracking	P-704B	P	SEAL	2.00	MPA	Gas Oil	L	N	G	180	120	NA
E-431	FCCU	Catalytic Cracking	P-704B	C	Pump Housing	26.00	MPA	Gas Oil	L	N	G	342	120	NA
E-433	FCCU	Catalytic Cracking	P-704A	P	SEAL	2.00	MPA	Gas Oil	L	N	G	200	230	NA
E-435	FCCU	Catalytic Cracking	P-704A	C	Pump Housing	26.00	MPA	Gas Oil	L	N	G	402	230	NA
E-437	FCCU	Catalytic Cracking	P-711	P	SEAL	2.00	WASH OIL	Gas Oil	L	N	G	138	40	NA
E-439	FCCU	Catalytic Cracking	P-711	C	Pump Housing	8.00	WASH OIL	Gas Oil	L	N	G	316	40	NA
E-441	CLE	Distillation	P-1106B	P	SEAL	1.00	JET	Jet	L	N	G	67	65	NA
E-443	CLE	Distillation	P-1106B	C	Pump Housing	8.00	JET	Jet	L	N	G	66	65	NA
E-445	CLE	Distillation	P-1106A	P	SEAL	1.00	JET	Jet	L	N	G	68	92	NA
E-447	CLE	Distillation	P-1106A	C	Pump Housing	8.00	JET	Jet	L	N	G	72	92	NA
E-449	MRU	Reformulation	P-4410B	P	SEAL	2.00	HCN	Gas Oil	L	N	G	132	180	NA
E-451	MRU	Reformulation	P-4410B	C	Pump Housing	16.00	HCN	Gas Oil	L	N	G	329	180	NA
E-453	MRU	Reformulation	P-4410A	P	SEAL	2.00	HCN	Gas Oil	L	N	G	184	20	NA
E-455	MRU	Reformulation	P-4410A	C	Pump Housing	16.00	HCN	Gas Oil	L	N	G	350	20	NA
E-457	MRU	Reformulation	P-4446B	C	Pump Housing	6.00	LEAN MEA	Amine	L	N	G	82	710	NA
E-459	MRU	Reformulation	P-4461	C	Pump Housing	6.00	HOT OIL	Hot Oil	L	N	G	55	2	NA
E-461	MRU	Reformulation	P-4460B	P	SEAL	3.00	HOT OIL	Hot Oil	L	N	G	286	260	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-463	MRU	Reformulation	P-4460B	C	Pump Housing	28.00	HOT OIL	Hot Oil	L	N	G	265	260	NA
E-584	HCU	Hydrocracker	E-406	V	GATE	6.00	LCCO	Cycle Oil	N	N	G	199.6	40	Y
E-586	HCU	Hydrocracker	E-406	V	GATE	0.75	LCCO	Cycle Oil	N	N	G	104.2	40	Y
E-588	HCU	Hydrocracker	E-406	C	BULL PLUG	0.75	LCCO	Cycle Oil	N	N	G	78.6	40	NA
E-590	HCU	Hydrocracker	E-406	V	GATE	2.00	LCCO	Cycle Oil	N	N	G	172.6	40	Y
E-592	HCU	Hydrocracker	E-406	V	GATE	0.75	LCCO	Cycle Oil	N	N	G	98.4	40	Y
E-594	HCU	Hydrocracker	E-406	C	BULL PLUG	0.75	LCCO	Cycle Oil	N	N	G	74.5	40	NA
E-596	HCU	Hydrocracker	E-406	V	GATE	0.75	LCCO	Cycle Oil	N	N	G	90.9	40	Y
E-598	HCU	Hydrocracker	E-406	V	GATE	0.75	LCCO	Cycle Oil	N	N	G	120.6	40	Y
E-600	FCCU	Catalytic Cracking	P-705C	C	Pump Housing	28.00	SLURRY	Slurry	L	N	G	497.8	210	NA
E-602	FCCU	Catalytic Cracking	P-705C	P	SEAL	2.00	SLURRY	Slurry	L	N	G	145	210	NA
E-604	FCCU	Catalytic Cracking	P-705B	C	Pump Housing	28.00	SLURRY	Slurry	L	N	G	516	199	NA
E-606	FCCU	Catalytic Cracking	P-705B	P	SEAL	2.00	SLURRY	Slurry	L	N	G	161	199	NA
E-608	FCCU	Catalytic Cracking	P-705A	C	Pump Housing	28.00	SLURRY	Slurry	L	N	G	509	154	NA
E-610	FCCU	Catalytic Cracking	P-705A	P	SEAL	2.00	SLURRY	Slurry	L	N	G	180	154	NA
E-612	FCCU	Catalytic Cracking	P-709A	C	Pump Housing	20.00	SLURRY	Slurry	L	N	G	405	55	NA
E-614	FCCU	Catalytic Cracking	P-709A	P	SEAL	2.00	SLURRY	Slurry	L	N	G	105	55	NA
E-616	FCCU	Catalytic Cracking	P-709B	C	Pump Housing	20.00	SLURRY	Slurry	L	N	G	385	50	NA
E-618	FCCU	Catalytic Cracking	P-709B	P	SEAL	2.00	SLURRY	Slurry	L	N	G	179	50	NA
E-620	CLE	Distillation	P-805A	C	Pump Housing	18.00	LEAN OIL	Gas Oil	L	N	G	313	420	NA
E-622	CLE	Distillation	P-805A	P	SEAL	2.00	LEAN OIL	Gas Oil	L	N	G	257	420	NA
E-624	CLE	Distillation	P-701B	C	Pump Housing	20.00	HOT FEED	Gas Oil	L	N	G	419	280	NA
E-626	CLE	Distillation	P-701B	P	SEAL	2.00	HOT FEED	Gas Oil	L	N	G	96	280	NA
E-628	CLE	Distillation	P-701A	C	Pump Housing	20.00	HOT FEED	Gas Oil	L	N	G	286	30	NA
E-630	CLE	Distillation	P-701A	P	SEAL	2.00	HOT FEED	Gas Oil	L	N	G	155	30	NA
E-632	MRU	Reformulation	P-4406A	C	Pump Housing	10.00	T-90 REFLUX	Gas Oil	L	N	G	298	200	NA
E-634	MRU	Reformulation	P-4406A	P	SEAL	2.00	T-90 REFLUX	Gas Oil	L	N	G	198	200	NA
E-636	MRU	Reformulation	P-4407B	C	Pump Housing	20.00	T-90 BTTMS	Gas Oil	L	N	G	67	50	NA
E-638	MRU	Reformulation	P-4407B	P	SEAL	2.00	T-90 BTTMS	Gas Oil	L	N	G	68	50	NA
E-640	MRU	Reformulation	P-4407A	C	Pump Housing	20.00	T-90 BTTMS	Gas Oil	L	N	G	65	20	NA
E-642	MRU	Reformulation	P-4407A	P	SEAL	2.00	T-90 BTTMS	Gas Oil	L	N	G	65	20	NA
E-644	MRU	Reformulation	P-4460C	C	Pump Housing	30.00	HOT OIL	Hot Oil	L	N	G	260	260	NA
E-646	MRU	Reformulation	P-4460C	P	SEAL	2.00	HOT OIL	Hot Oil	L	N	G	210	260	NA
E-648	MRU	Reformulation	P-4460C	P	SEAL	2.00	HOT OIL	Hot Oil	L	N	G	208	260	NA
E-650	COKER	Coker	STR-907B	V	GATE	1.50	HGO	Gas Oil	L	N	G	82	2000	Y
E-652	COKER	Coker	STR-907B	C	BULL PLUG	1.50	HGO	Gas Oil	L	N	G	79	2000	NA
E-654	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	L	N	G	86	2000	N
E-658	COKER	Coker	STR-907B	V	GATE	2.00	HGO	Gas Oil	L	N	G	76	2000	Y
E-660	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	L	N	G	83	2000	Y
E-662	COKER	Coker	STR-907B	V	GATE	2.00	HGO	Gas Oil	L	N	G	86	2000	N
E-664	COKER	Coker	STR-907B	V	GATE	1.50	HGO	Gas Oil	L	N	G	84	2000	Y
E-666	COKER	Coker	STR-907B	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	G	80	2000	NA
E-668	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	L	N	G	80	2000	N
E-670	COKER	Coker	STR-907B	V	NEEDLE	0.25	HGO	Gas Oil	L	N	G	122	2000	N
E-672	COKER	Coker	STR-907B	V	NEEDLE	0.25	HGO	Gas Oil	L	N	G	122	2000	N
E-674	COKER	Coker	STR-907B	V	NEEDLE	1.40	HGO	Gas Oil	L	N	G	122	2000	N
E-678	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	L	N	G	175	2000	N
E-680	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	L	N	G	111	2000	N
E-682	COKER	Coker	STR-907B	C	FLANGE	0.75	HGO	Gas Oil	L	N	G	222	2000	NA
E-684	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	L	N	G	77	2000	Y
E-686	COKER	Coker	STR-907A	C	FLANGE	1.00	HGO	Gas Oil	L	N	G	76	2000	NA
E-688	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	G	86	2000	N
E-690	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	G	80	2000	N
E-692	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	G	79	2000	N
E-694	COKER	Coker	STR-907A	V	GATE	1.50	HGO	Gas Oil	L	N	G	175	2000	Y
E-696	COKER	Coker	STR-907A	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	G	90	2000	NA
E-698	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	G	135	2000	N
E-700	COKER	Coker	STR-907A	V	NEEDLE	0.25	HGO	Gas Oil	L	N	G	130	2000	N
E-702	COKER	Coker	STR-907A	V	NEEDLE	0.25	HGO	Gas Oil	L	N	G	120	2000	N
E-704	COKER	Coker	STR-907A	V	NEEDLE	0.25	HGO	Gas Oil	L	N	G	117	2000	N
E-706	COKER	Coker	STR-907A	C	TUBE FITTING	0.25	HGO	Gas Oil	L	N	G	128	2000	NA
E-708	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	L	N	G	287	2000	Y
E-710	COKER	Coker	STR-907A	C	BULL PLUG	2.00	HGO	Gas Oil	L	N	G	125	2000	NA
E-712	COKER	Coker	STR-907A	C	FLANGE	6.00	HGO	Gas Oil	L	N	G	345	2000	NA
E-465	BAP	Asphalt Plant	P-4616A	C	Pump Housing	2.00	AMINE	Amine	L	N	G	58	200	NA
E-467	BAP	Asphalt Plant	P-4609A	P	SEAL	2.00	ASPHALT	Asphalt	L	N	G	220	160	NA
E-469	BAP	Asphalt Plant	P-4609A	C	Pump Housing	10.00	ASPHALT	Asphalt	L	N	G	320	220	NA
E-471	BAP	Asphalt Plant	P-4609B	C	Pump Housing	10.00	ASPHALT	Asphalt	L	N	G	128	0	NA
E-473	BAP	Asphalt Plant	P-4606A	P	SEAL	2.00	LVGO	Gas Oil	L	N	G	111	100	NA
E-475	BAP	Asphalt Plant	P-4606A	C	Pump Housing	10.00	LVGO	Gas Oil	L	N	G	212	100	NA
E-477	BAP	Asphalt Plant	P-4606B	P	SEAL	2.00	LVGO	Gas Oil	L	N	G	86	0	NA
E-479	BAP	Asphalt Plant	P-4606B	C	Pump Housing	10.00	LVGO	Gas Oil	L	N	G	106	0	NA
E-481	BAP	Asphalt Plant	P-4613A	P	SEAL	2.00	HVGO	Gas Oil	L	N	G	106	18	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-483	BAP	Asphalt Plant	P-4613A	C	Pump Housing	12.00	HVGO	Gas Oil	L	N	G	206	18	NA
E-485	BAP	Asphalt Plant	P-4613B	P	SEAL	2.00	HVGO	Gas Oil	L	N	G	280	85	NA
E-487	BAP	Asphalt Plant	P-4613B	C	Pump Housing	12.00	HVGO	Gas Oil	L	N	G	290	85	NA
E-489	BAP	Asphalt Plant	P-4611A	P	SEAL	2.00	ASPHALT	Asphalt	L	N	G	160	35	NA
E-491	BAP	Asphalt Plant	P-4611A	C	Pump Housing	6.00	ASPHALT	Asphalt	L	N	G	390	35	NA
E-493	BAP	Asphalt Plant	P-4611B	C	Pump Housing	6.00	ASPHALT	Asphalt	L	N	G	190	35	NA
E-495	BAP	Asphalt Plant	P-46103B	C	Pump Housing	6.00	HVGO	Gas Oil	L	N	G	50	0	NA
E-497	BAP	Asphalt Plant	P-46103A	C	Pump Housing	6.00	HVGO	Gas Oil	L	N	G	50	0	NA
E-499	BAP	Asphalt Plant	P-46508	P	SEAL	2.00	ASPHALT	Asphalt	L	N	G	209	0	NA
E-501	BAP	Asphalt Plant	P-46508	C	Pump Housing	8.00	ASPHALT	Asphalt	L	N	G	205	0	NA
E-503	BAP	Asphalt Plant	P-46507	P	SEAL	2.00	ASPHALT	Asphalt	L	N	G	162	0	NA
E-505	BAP	Asphalt Plant	P-46507	C	Pump Housing	8.00	ASPHALT	Asphalt	L	N	G	250	0	NA
E-507	BAP	Asphalt Plant	P-46506	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	93	106	NA
E-509	BAP	Asphalt Plant	P-46506	C	FLANGE	0.75	ASPHALT	Asphalt	N	N	G	93	106	NA
E-511	BAP	Asphalt Plant	P-46506	C	FLANGE	1.00	ASPHALT	Asphalt	N	N	G	93	106	NA
E-513	BAP	Asphalt Plant	P-46506	C	Pump Housing	8.00	ASPHALT	Asphalt	N	N	G	172	0	NA
E-515	BAP	Asphalt Plant	P-4672	P	SEAL	2.00	ASPHALT	Asphalt	N	N	G	157	160	NA
E-517	BAP	Asphalt Plant	P-46500A	P	SEAL	3.00	ASPHALT	Asphalt	N	N	G	178	0	NA
E-519	BAP	Asphalt Plant	P-46500A	C	Pump Housing	20.00	ASPHALT	Asphalt	N	N	G	273	0	NA
E-521	BAP	Asphalt Plant	P-46504B	P	SEAL	3.00	HOT OIL	Hot Oil	L	N	G	74	70	NA
E-523	BAP	Asphalt Plant	P-46504B	C	Pump Housing	6.00	HOT OIL	Hot Oil	L	N	G	316	70	NA
E-525	BAP	Asphalt Plant	P-46504A	P	SEAL	2.00	HOT OIL	Hot Oil	N	N	G	64	0	NA
E-527	BAP	Asphalt Plant	P-46504A	C	Pump Housing	6.00	HOT OIL	Hot Oil	N	N	G	66	0	NA
E-529	BAP	Asphalt Plant	P-46503	P	SEAL	2.00	ASPHALT	Asphalt	N	N	G	150	0	NA
E-531	BAP	Asphalt Plant	P-46501	P	SEAL	2.00	ASPHALT	Asphalt	N	N	G	163	40	NA
E-533	BAP	Asphalt Plant	P-4635D	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	68	134	NA
E-535	BAP	Asphalt Plant	P-4635D	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	65	162	NA
E-537	BAP	Asphalt Plant	P-4635C	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	81	162	NA
E-539	BAP	Asphalt Plant	P-4635C	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	75	134	NA
E-541	BAP	Asphalt Plant	P-4536C	C	Pump Housing	16.00	ASPHALT	Asphalt	N	N	G	188	60	NA
E-543	BAP	Asphalt Plant	P-4536B	P	SEAL	2.00	ASPHALT	Asphalt	N	N	G	69	0	NA
E-545	BAP	Asphalt Plant	P-4536B	C	Pump Housing	6.00	ASPHALT	Asphalt	N	N	G	69	0	NA
E-547	BAP	Asphalt Plant	P-4536B	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	72	162	NA
E-549	BAP	Asphalt Plant	P-4536B	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	69	162	NA
E-551	BAP	Asphalt Plant	P-4536A	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	N	N	G	70	162	NA
E-553	BAP	Asphalt Plant	P-4536A	P	SEAL	2.00	ASPHALT	Asphalt	N	N	G	260	70	NA
E-555	BAP	Asphalt Plant	P-4635A	V	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	68	162	NA
E-557	BAP	Asphalt Plant	P-4662	P	SEAL	1.00	ASPHALT	Asphalt	N	N	G	95	20	NA
E-559	BAP	Asphalt Plant	P-4630A	P	SEAL	1.00	HOT OIL	Hot Oil	N	N	G	132	0	NA
E-561	BAP	Asphalt Plant	P-4630A	C	Pump Housing	6.00	HOT OIL	Hot Oil	N	N	G	196	0	NA
E-563	BAP	Asphalt Plant	P-4630B	P	SEAL	1.00	HOT OIL	Hot Oil	L	N	G	132	85	NA
E-565	BAP	Asphalt Plant	P-4630B	C	Pump Housing	6.00	HOT OIL	Hot Oil	L	N	G	277	85	NA
E-567	BAP	Asphalt Plant	P-4677A	P	SEAL	1.00	HOT OIL	Hot Oil	L	N	G	158	0	NA
E-569	BAP	Asphalt Plant	P-4677A	C	Pump Housing	6.00	HOT OIL	Hot Oil	L	N	G	247	0	NA
E-571	BAP	Asphalt Plant	P-4677B	P	SEAL	1.00	HOT OIL	Hot Oil	L	N	G	265	100	NA
E-573	BAP	Asphalt Plant	P-4677B	C	Pump Housing	6.00	HOT OIL	Hot Oil	L	N	G	250	100	NA
E-575	BAP	Asphalt Plant	P-4663	P	SEAL	1.00	ASPHALT	Asphalt	N	N	G	95	50	NA
E-577	BAP	Asphalt Plant	P-4600A	P	SEAL	1.00	GAS OIL	Gas Oil	N	N	G	69	0	NA
E-579	BAP	Asphalt Plant	P-4660A	C	Pump Housing	20.00	GAS OIL	Gas Oil	N	N	G	72	0	NA
E-581	BAP	Asphalt Plant	D-4614	V	PRD - Safety Valve	0.75	RUN-DOWN	Gas Oil	N	N	G	72	162	NA
E-583	BAP	Asphalt Plant	P-4675	P	SEAL	2.00	ASPHALT	Asphalt	N	N	G	62	30	NA
E-585	BAP	Asphalt Plant	P-4674	P	SEAL	2.00	ASPHALT	Asphalt	L	N	G	181	200	NA
E-587	BAP	Asphalt Plant	P-46505	P	SEAL	2.00	ASPHALT	Asphalt	N	N	G	64	14	NA
E-589	BAP	Asphalt Plant	P-46505	C	Pump Housing	6.00	ASPHALT	Asphalt	N	N	G	194	14	NA
E-591	BAP	Asphalt Plant	TK-4603	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	68	0	NA
E-593	BAP	Asphalt Plant	TK-4602A	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	55	0	NA
E-595	BAP	Asphalt Plant	TK-4602B	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	77	0	NA
E-597	BAP	Asphalt Plant	TK-4605	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	51	0	NA
E-599	BAP	Asphalt Plant	TK-4605	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	47	0	NA
E-601	BAP	Asphalt Plant	TK-4604	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	54	0	NA
E-603	BAP	Asphalt Plant	TK-4603	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	67	0	NA
E-605	BAP	Asphalt Plant	TK-4604	PRD	PRD - Safety Valve	0.75	ASPHALT	Asphalt	L	N	G	62	0	NA
E-607	DOCK	Marine Terminal	P-1966	P	SEAL	1.00	Hydraulic Oil	Hydraulic Oil	L	N	G	88	280	NA
E-609	DOCK	Marine Terminal	P-1966	C	Pump Housing	4.00	Hydraulic Oil	Hydraulic Oil	L	N	G	88	280	NA
E-611	FLEX	Sulfur Recovery	P-4505B	P	SEAL	2.00	Lean Flexsorb	Amine	L	N	G	97	110	NA
E-613	FLEX	Sulfur Recovery	P-4505B	C	Pump Housing	6.00	Lean Flexsorb	Amine	L	N	G	124	110	NA
E-615	FLEX	Sulfur Recovery	P-4505A	P	SEAL	2.00	Lean Flexsorb	Amine	L	N	G	61	19	NA
E-617	FLEX	Sulfur Recovery	P-4505A	C	Pump Housing	6.00	Lean Flexsorb	Amine	L	N	G	60	19	NA
E-619	FLEX	Sulfur Recovery	P-4502B	P	SEAL	2.00	Rich Flexsorb	Amine	L	N	G	61	20	NA
E-621	FLEX	Sulfur Recovery	P-4502B	C	Pump Housing	8.00	Rich Flexsorb	Amine	L	N	G	62	20	NA
E-623	FLEX	Sulfur Recovery	P-4502A	P	SEAL	2.00	Rich Flexsorb	Amine	L	N	G	89	95	NA
E-625	FLEX	Sulfur Recovery	P-4502A	C	Pump Housing	8.00	Rich Flexsorb	Amine	L	N	G	93	95	NA
E-627	FLEX	Sulfur Recovery	P-4506	C	Pump Housing	1.20	Rich Flexsorb	Amine	L	N	G	62	0	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-629	FGS	Fuel Gas Treatment	P-5613A	P	SEAL	2.00	Lean amine	Amine	L	N	G	111	130	NA
E-631	FGS	Fuel Gas Treatment	P-5613A	C	Pump Housing	12.00	Lean amine	Amine	L	N	G	189	130	NA
E-633	FGS	Fuel Gas Treatment	P-4613B	P	SEAL	2.00	Lean amine	Amine	L	N	G	64	19	NA
E-635	FGS	Fuel Gas Treatment	P-4613B	C	Pump Housing	12.00	Lean amine	Amine	L	N	G	64	19	NA
E-637	FGS	Fuel Gas Treatment	P-5629	P	SEAL	1.00	AMINE	Amine	L	N	G	68	0	NA
E-639	FGS	Fuel Gas Treatment	P-5629	C	Pump Housing	8.00	AMINE	Amine	L	N	G	78	0	NA
E-641	FGS	Fuel Gas Treatment	P-5627B	P	SEAL	2.00	AMINE	Amine	L	N	G	66	18	NA
E-643	FGS	Fuel Gas Treatment	P-5627B	C	Pump Housing	8.00	AMINE	Amine	L	N	G	73	18	NA
E-645	FGS	Fuel Gas Treatment	P-5627A	P	SEAL	2.00	AMINE	Amine	L	N	G	90	110	NA
E-647	FGS	Fuel Gas Treatment	P-5627A	C	Pump Housing	8.00	AMINE	Amine	L	N	G	90	110	NA
E-714	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	491	19	Y
E-716	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	522	19	Y
E-718	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	202	19	N
E-720	COKER	Coker	STR-907A	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	P	190	19	NA
E-722	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	301	19	N
E-724	COKER	Coker	STR-907A	C	FLANGE	0.75	HGO	Gas Oil	L	N	P	141	19	NA
E-726	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	346	19	N
E-728	COKER	Coker	STR-907A	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	132	19	NA
E-730	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	88	19	N
E-732	COKER	Coker	STR-907A	C	FLANGE	0.75	HGO	Gas Oil	L	N	P	79	19	NA
E-734	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	163	19	N
E-736	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	87	19	Y
E-738	COKER	Coker	STR-907A	C	FLANGE	6.00	HGO	Gas Oil	L	N	P	399	19	NA
E-740(1)	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	432	19	Y
E-740(2)	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	143	19	Y
E-742	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	479	19	Y
E-744	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	67	19	N
E-746	COKER	Coker	STR-907B	V	GATE	4.00	HGO	Gas Oil	N	N	P	92	26	Y
E-748	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	N	N	P	76	26	N
E-750	COKER	Coker	STR-907B	C	FLANGE	0.75	HGO	Gas Oil	N	N	P	67	26	NA
E-752	COKER	Coker	STR-907B	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	P	63	26	NA
E-754	COKER	Coker	STR-907B	V	CONTROL	6.00	HGO	Gas Oil	N	N	P	67	26	Y
E-756	COKER	Coker	STR-907B	C	FLANGE	0.75	HGO	Gas Oil	N	N	P	67	26	NA
E-758	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	N	N	P	66	26	N
E-760	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	N	N	P	65	26	N
E-762	COKER	Coker	STR-907B	C	FLANGE	8.00	HGO	Gas Oil	N	N	P	69	25	NA
E-764	COKER	Coker	STR-907B	V	CONTROL	8.00	HGO	Gas Oil	N	N	P	73	25	Y
E-766	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	N	N	P	70	26	N
E-768	COKER	Coker	STR-907B	C	FLANGE	0.75	HGO	Gas Oil	N	N	P	68	26	NA
E-770	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	N	N	P	67	26	N
E-772	COKER	Coker	STR-907B	C	Threaded Connector	0.75	HGO	Gas Oil	N	N	P	77	26	NA
E-774	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	N	N	P	74	26	N
E-776	COKER	Coker	STR-907B	V	CONTROL	8.00	HGO	Gas Oil	N	N	P	126	26	Y
E-778	COKER	Coker	STR-907B	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	P	93	26	NA
E-780	COKER	Coker	STR-907B	V	GATE	0.75	HGO	Gas Oil	N	N	P	97	26	Y
E-782	COKER	Coker	STR-907B	V	CONTROL	8.00	HGO	Gas Oil	N	N	P	129	26	Y
E-784	COKER	Coker	CV9F058	V	CONTROL	4.00	HGO	Gas Oil	N	N	G	309	26	Y
E-786	COKER	Coker	CV9F058	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	89	26	NA
E-788	COKER	Coker	CV9F058	V	GATE	0.75	HGO	Gas Oil	N	N	G	107	26	N
E-790	COKER	Coker	CV9F058	V	GATE	4.00	HGO	Gas Oil	N	N	G	246	26	Y
E-792	COKER	Coker	CV9F058	C	FLANGE	4.00	HGO	Gas Oil	N	N	G	449	26	NA
E-794	COKER	Coker	CV9F058	V	GATE	4.00	HGO	Gas Oil	N	N	G	370	26	Y
E-796	COKER	Coker	CV9F058	V	GATE	4.00	HGO	Gas Oil	N	N	G	265	26	Y
E-798	COKER	Coker	CV9F058	V	GATE	0.75	HGO	Gas Oil	N	N	G	75	26	N
E-800	COKER	Coker	CV9F059	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	74	26	Y
E-802	COKER	Coker	CV9F060	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	74	26	Y
E-804	COKER	Coker	CV9F061	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	79	26	Y
E-806	COKER	Coker	CV9F062	C	Threaded Connector	0.50	HGO	Gas Oil	N	N	G	91	26	NA
E-808	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	G	74	26	N
E-810	COKER	Coker	STR-907A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	71	26	NA
E-812	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	N	N	G	71	26	Y
E-814	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	G	72	26	N
E-816	COKER	Coker	STR-907A	C	ELBOW	0.75	HGO	Gas Oil	N	N	G	70	26	NA
E-818	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	N	N	G	72	26	Y
E-820	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	N	N	G	73	26	N
E-822	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	N	N	G	75	26	Y
E-824	COKER	Coker	STR-907A	C	FLANGE	8.00	HGO	Gas Oil	N	N	G	82	26	NA
E-826	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	G	70	26	N
E-828	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	N	N	G	69	26	Y
E-830	COKER	Coker	STR-907A	C	BULL PLUG	2.00	HGO	Gas Oil	N	N	G	70	26	NA
E-832	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	N	N	G	69	26	Y
E-834	COKER	Coker	STR-907A	C	FLANGE	4.00	HGO	Gas Oil	N	N	G	83	26	NA
E-834	COKER	Coker	STR-907A	V	GATE	2.00	HGO	Gas Oil	N	N	P	74	19	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-836	COKER	Coker	STR-907A	C	BULL PLUG	2.00	HGO	Gas Oil	N	N	P	74	19	NA
E-838	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	75	19	N
E-840	COKER	Coker	STR-907A	C	FLANGE	0.75	HGO	Gas Oil	L	N	P	70	19	NA
E-842	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	79	19	N
E-844	COKER	Coker	STR-907A	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	77	19	NA
E-846	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	96	20	Y
E-848	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	78	20	N
E-850	COKER	Coker	STR-907A	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	P	88	20	NA
E-852	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	103	20	Y
E-854	COKER	Coker	STR-907A	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	81	20	NA
E-856	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	138	20	Y
E-858	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	79	20	N
E-860	COKER	Coker	STR-907A	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	P	79	20	NA
E-862	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	145	20	Y
E-864	COKER	Coker	STR-907A	C	FLANGE	6.00	HGO	Gas Oil	L	N	P	102	20	NA
E-866	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	77	20	N
E-868	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	77	20	Y
E-870	COKER	Coker	STR-907A	C	FLANGE	0.75	HGO	Gas Oil	L	N	P	75	20	NA
E-872	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	76	20	N
E-874	COKER	Coker	STR-907A	V	CONTROL	6.00	HGO	Gas Oil	L	N	P	95	20	Y
E-876	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	L	N	P	77	20	Y
E-878	COKER	Coker	STR-907A	V	CONTROL	8.00	HGO	Gas Oil	N	N	P	73	26	Y
E-880	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	P	71	26	N
E-882	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	P	70	26	N
E-884	COKER	Coker	STR-907A	C	FLANGE	0.75	HGO	Gas Oil	N	N	P	71	26	NA
E-886	COKER	Coker	STR-907A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	P	72	26	NA
E-888	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	P	72	26	N
E-890	COKER	Coker	STR-907A	V	CONTROL	8.00	HGO	Gas Oil	N	N	P	70	26	Y
E-892	COKER	Coker	STR-907A	V	GATE	4.00	HGO	Gas Oil	N	N	P	101	26	Y
E-894	COKER	Coker	STR-907A	V	GATE	1.00	HGO	Gas Oil	N	N	P	70	26	Y
E-896	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	P	74	26	N
E-898	COKER	Coker	STR-907A	C	FLANGE	0.75	HGO	Gas Oil	N	N	P	70	26	NA
E-649	FGS	Fuel Gas Treatment	P-5622B	P	SEAL	2.00	AMINE	Amine	L	N	G	65	0	NA
E-651	FGS	Fuel Gas Treatment	P-5622B	C	Pump Housing	12.00	AMINE	Amine	L	N	G	82	0	NA
E-653	FGS	Fuel Gas Treatment	P-5622A	P	SEAL	2.00	AMINE	Amine	L	N	G	106	100	NA
E-655	FGS	Fuel Gas Treatment	P-5622A	C	Pump Housing	12.00	AMINE	Amine	L	N	G	99	100	NA
E-657	FGS	Fuel Gas Treatment	P-5623	C	Pump Housing	8.00	AMINE	Amine	L	N	G	42	15	NA
E-659	FGS	Fuel Gas Treatment	P-5609A	P	SEAL	2.00	RICH AMINE	Amine	L	N	G	41	10	NA
E-661	FGS	Fuel Gas Treatment	P-5609A	C	Pump Housing	10.00	RICH AMINE	Amine	L	N	G	44	10	NA
E-663	FGS	Fuel Gas Treatment	P-5609B	P	SEAL	2.00	RICH AMINE	Amine	L	N	G	68	100	NA
E-665	FGS	Fuel Gas Treatment	P-5609B	C	Pump Housing	10.00	RICH AMINE	Amine	L	N	G	87	100	NA
E-667	SGU	Sulfur Recovery	P-1201A	P	SEAL	2.00	MEA	Amine	N	N	G	75	10	NA
E-669	SGU	Sulfur Recovery	P-1201A	C	Pump Housing	10.00	MEA	Amine	N	N	G	111	10	NA
E-671	SGU	Sulfur Recovery	P-1201B	P	SEAL	2.00	MEA	Amine	L	N	G	120	400	NA
E-673	SGU	Sulfur Recovery	P-1201B	C	Pump Housing	10.00	MEA	Amine	L	N	G	137	400	NA
E-675	SGU	Sulfur Recovery	P-1208	C	Pump Housing	8.00	MEA	Amine	L	N	G	50	20	NA
E-677	SGU	Sulfur Recovery	P-1204C	C	Pump Housing	8.00	MEA	Amine	L	N	G	82	0	NA
E-679	SGU	Sulfur Recovery	P-1204B	C	Pump Housing	8.00	MEA	Amine	L	N	G	108	190	NA
E-681	SGU	Sulfur Recovery	P-1204A	C	Pump Housing	8.00	MEA	Amine	L	N	G	100	170	NA
E-683	FGU	Other	P-1213B	P	SEAL	1.00	RICH MEA	Amine	L	N	G	58	10	NA
E-685	FGU	Other	P-1213B	C	Pump Housing	8.00	RICH MEA	Amine	L	N	G	61	10	NA
E-687	FGU	Other	P-1213A	P	SEAL	1.00	RICH MEA	Amine	L	N	G	77	70	NA
E-689	FGU	Other	P-1213A	C	Pump Housing	8.00	RICH MEA	Amine	L	N	G	111	70	NA
E-691	FGU	Other	P-2201A	C	Pump Housing	8.00	LEAN MEA	Amine	L	N	G	85	520	NA
E-693	FGU	Other	P-2201B	C	Pump Housing	8.00	LEAN MEA	Amine	L	N	G	78	400	NA
E-695	FGU	Other	P-1207	C	Pump Housing	4.00	MEA	Amine	L	N	G	46	75	NA
E-697	OM-13	Tank Farm	TK-1779	P	SEAL	1.00	JET	Jet	N	N	G	71	0	NA
E-699	OM-13	Tank Farm	TK-1779	C	Pump Housing	3.00	JET	Jet	N	N	G	74	0	NA
E-701	OM-13	Tank Farm	TK-1775	P	SEAL	1.00	DSL	Diesel	N	N	G	63	62	NA
E-703	OM-13	Tank Farm	TK-1775	C	Pump Housing	3.00	DSL	Diesel	N	N	G	65	62	NA
E-705	OM-13	Tank Farm	TK-1774	P	SEAL	1.00	DSL	Diesel	N	N	G	62	15	NA
E-707	OM-13	Tank Farm	TK-1774	C	Pump Housing	3.00	DSL	Diesel	N	N	G	62	15	NA
E-709	OM-13	Tank Farm	P-1710	P	SEAL	2.00	GO	Gas Oil	L	N	G	143	0	NA
E-711	OM-13	Tank Farm	P-1710	C	Pump Housing	10.00	GO	Gas Oil	L	N	G	183	0	NA
E-713	OM-13	Tank Farm	P-1710	P	SEAL	2.00	GO	Gas Oil	L	N	G	142	0	NA
E-715	OM-13	Tank Farm	P-1710	P	SEAL	2.00	GO	Gas Oil	L	N	G	87	0	NA
E-717	OM-13	Tank Farm	P-1710	C	Pump Housing	12.00	GO	Gas Oil	L	N	G	72	0	NA
E-719	OM-13	Tank Farm	P-1710	P	SEAL	2.00	GO	Gas Oil	L	N	G	72	0	NA
E-721	OM-13	Tank Farm	P-1710	V	PRD - Safety Valve	3.00	GO	Gas Oil	L	N	G	102	0	NA
E-900	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	P	63	26	N
E-902	COKER	Coker	STR-907A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	P	69	26	NA
E-904	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	P	68	26	N
E-906	COKER	Coker	STR-907A	V	GATE	0.75	HGO	Gas Oil	N	N	P	83	26	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-908	COKER	Coker	STR-907A	C	ELBOW	0.50	HGO	Gas Oil	N	N	P	79	26	NA
E-910	COKER	Coker	STR-907A	V	CONTROL	8.00	HGO	Gas Oil	N	N	P	90	26	Y
E-912	COKER	Coker	STR-907A	V	CONTROL	8.00	HGO	Gas Oil	N	N	P	111	26	Y
E-914	COKER	Coker	E-907	V	GATE	6.00	WASH OIL/ HKGO	Gas Oil	N	N	G	68	0	Y
E-916	COKER	Coker	E-907	V	GATE	0.75	WASH OIL/ HKGO	Gas Oil	N	N	G	63	0	N
E-918	COKER	Coker	E-907	C	BULL PLUG	0.75	WASH OIL/ HKGO	Gas Oil	N	N	G	76	0	NA
E-920	COKER	Coker	E-907	V	GATE	3.00	WASH OIL/ HKGO	Gas Oil	N	N	G	61	0	Y
E-922	COKER	Coker	E-907	V	GATE	4.00	WASH OIL/ HKGO	Gas Oil	N	N	G	66	0	Y
E-924	COKER	Coker	E-907	V	GATE	8.00	CAT SLURRY	Slurry	N	N	G	78	0	Y
E-926	COKER	Coker	E-907	C	BULL PLUG	0.75	CAT SLURRY	Slurry	N	N	G	77	0	NA
E-928	COKER	Coker	E-907	V	GATE	0.75	CAT SLURRY	Slurry	N	N	G	76	0	Y
E-930	COKER	Coker	E-907	V	GATE	0.75	WASH OIL/ HGO	Gas Oil	N	N	G	66	0	Y
E-932	COKER	Coker	E-907	C	FLANGE	4.00	LGO	Gas Oil	N	N	G	66	0	NA
E-934	COKER	Coker	E-907	V	GATE	4.00	LGO	Gas Oil	N	N	G	66	0	Y
E-936	COKER	Coker	E-907	V	GATE	4.00	HGO	Gas Oil	N	N	G	69	0	Y
E-938	COKER	Coker	E-907	V	GATE	0.75	HGO	Gas Oil	N	N	G	66	0	N
E-940	COKER	Coker	E-907	C	FLANGE	4.00	WASH OIL/HGO	Gas Oil	N	N	G	75	0	NA
E-942	COKER	Coker	E-907	V	GATE	4.00	WASH OIL/HGO	Gas Oil	N	N	G	73	0	Y
E-944	COKER	Coker	E-907	C	CHECK	4.00	WASH OIL/HGO	Gas Oil	N	N	G	84	0	NA
E-946	COKER	Coker	E-907	V	GATE	2.00	WASH OIL/HGO	Gas Oil	N	N	G	68	0	Y
E-948	COKER	Coker	CV-9F017A	C	Threaded Connector	0.50	HGO	Gas Oil	N	N	G	62	10	NA
E-950	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	69	10	Y
E-952	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	163	225	N
E-954	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	107	225	N
E-956	COKER	Coker	CV-9F017A	C	GAUGE	0.75	HGO	Gas Oil	N	N	G	86	225	NA
E-958	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	89	225	N
E-960	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	384	225	Y
E-962	COKER	Coker	CV-9F017A	V	CONTROL	6.00	HGO	Gas Oil	N	N	G	425	225	Y
E-964	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	155	225	N
E-966	COKER	Coker	CV-9F017A	C	FLANGE	0.75	HGO	Gas Oil	N	N	G	77	225	NA
E-968	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	112	225	Y
E-970	COKER	Coker	CV-9F017A	V	GATE	2.00	HGO	Gas Oil	N	N	G	112	225	Y
E-972	COKER	Coker	CV-9F017A	C	BULL PLUG	2.00	HGO	Gas Oil	N	N	G	83	225	NA
E-974	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	355	225	Y
E-976	COKER	Coker	CV-9F017A	C	FLANGE	6.00	HGO	Gas Oil	N	N	G	432	225	NA
E-978	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	300	225	Y
E-980	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	413	225	Y
E-982	COKER	Coker	CV-9F017A	C	FLANGE	6.00	HGO	Gas Oil	N	N	G	563	225	NA
E-984	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	77	225	N
E-986	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	126	225	N
E-988	COKER	Coker	CV-9F017A	C	UNION	0.50	HGO	Gas Oil	N	N	G	86	225	NA
E-990	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	364	225	Y
E-992	COKER	Coker	CV-9F017A	C	FLANGE	6.00	HGO	Gas Oil	N	N	G	497	225	NA
E-994	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	400	225	Y
E-996	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	351	225	Y
E-998	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	65	277	Y
E-1000	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	66	277	Y
E-1002	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	69	277	Y
E-1004	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	75	277	Y
E-1006	COKER	Coker	CV-9F017A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	79	255	NA
E-1008	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	77	255	N
E-1010	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	100	255	N
E-1012	COKER	Coker	CV-9F017A	V	CONTROL	6.00	HGO	Gas Oil	N	N	G	163	355	Y
E-1014	COKER	Coker	CV-9F017A	C	FLANGE	6.00	HGO	Gas Oil	N	N	G	195	255	NA
E-1016	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	182	255	Y
E-1018	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	87	225	Y
E-1020	COKER	Coker	CV-9F017A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	85	225	NA
E-1022	COKER	Coker	CV-9F017A	V	GATE	6.00	HGO	Gas Oil	N	N	G	96	225	Y
E-1024	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	90	225	N
E-1026	COKER	Coker	CV-9F017A	C	Threaded Connector	0.75	HGO	Gas Oil	N	N	G	133	400	NA
E-1028	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	133	400	N
E-1030	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	163	400	N
E-1032	COKER	Coker	CV-9F017A	C	Threaded Connector	0.50	HGO	Gas Oil	N	N	G	86	400	NA
E-1034	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	79	400	Y
E-1036	COKER	Coker	CV-9F017A	C	TUBE FITTING	0.50	HGO	Gas Oil	N	N	G	93	400	NA
E-1038	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	79	400	Y
E-1040	COKER	Coker	CV-9F017A	C	FLANGE	0.50	HGO	Gas Oil	N	N	G	74	400	NA
E-1042	COKER	Coker	CV-9F017A	C	FLANGE	0.50	HGO	Gas Oil	N	N	G	97	400	NA
E-1044	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	72	400	Y
E-1046	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	79	400	Y
E-1048	COKER	Coker	CV-9F017A	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	94	400	Y
E-1050	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	83	400	N
E-1052	COKER	Coker	CV-9F017A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	84	400	NA

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E-1054	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	77	400	N
E-1056	COKER	Coker	CV-9F017A	C	Threaded Connector	0.75	HGO	Gas Oil	N	N	G	81	400	NA
E-1058	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	75	400	N
E-1060	COKER	Coker	CV-9F017A	V	GATE	0.75	HGO	Gas Oil	N	N	G	77	400	N
E-1062	COKER	Coker	CV-9F017A	C	UNION	0.75	HGO	Gas Oil	N	N	G	75	400	NA
E-1064	COKER	Coker	T-903	V	GATE	1.00	HGO	Gas Oil	N	N	G	73	225	N
E-1066	COKER	Coker	T-903	V	GATE	1.00	HGO	Gas Oil	N	N	G	75	225	N
E-1068	COKER	Coker	T-903	V	GATE	1.00	HGO	Gas Oil	N	N	G	77	225	N
E-1070	COKER	Coker	T-903	V	GATE	1.00	HGO	Gas Oil	N	N	G	77	225	N
E-1072	COKER	Coker	T-903	C	FLANGE	1.00	HGO	Gas Oil	N	N	G	81	225	NA
E-1074	COKER	Coker	T-903	V	GATE	1.00	HGO	Gas Oil	N	N	G	83	225	Y
E-1076	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	78	225	N
E-1078	COKER	Coker	T-903	V	GATE	4.00	HGO	Gas Oil	N	N	G	116	225	Y
E-1080	COKER	Coker	T-903	V	GATE	4.00	HGO	Gas Oil	N	N	G	163	225	Y
E-1082	COKER	Coker	T-903	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	91	225	NA
E-1084	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	88	225	Y
E-1086	COKER	Coker	T-903	V	GATE	4.00	HGO	Gas Oil	N	N	G	451	225	Y
E-1088	COKER	Coker	T-903	C	FLANGE	4.00	HGO	Gas Oil	N	N	G	372	225	NA
E-1090	COKER	Coker	T-903	V	GATE	4.00	HGO	Gas Oil	N	N	G	417	225	N
E-1092	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	214	225	Y
E-1094	COKER	Coker	T-903	C	FLANGE	4.00	HGO	Gas Oil	N	N	G	296	225	NA
E-1096	COKER	Coker	T-903	V	CONTROL	4.00	HGO	Gas Oil	N	N	G	451	225	Y
E-1098	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	137	225	N
E-1100	COKER	Coker	T-903	C	FLANGE	3.00	HGO	Gas Oil	N	N	G	367	225	NA
E-1102	COKER	Coker	T-903	V	GATE	3.00	HGO	Gas Oil	N	N	G	373	225	Y
E-1104	COKER	Coker	T-903	V	GATE	3.00	HGO	Gas Oil	N	N	G	315	225	Y
E-1106	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	85	225	N
E-1108	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	113	225	N
E-1110	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	100	225	Y
E-1112	COKER	Coker	T-903	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	98	225	NA
E-1114	COKER	Coker	T-903	V	GATE	1.00	HGO	Gas Oil	N	N	G	173	225	N
E-1116	COKER	Coker	T-903	V	GATE	1.00	HGO	Gas Oil	N	N	G	139	225	Y
E-1118	COKER	Coker	T-903	C	RED	1.00	HGO	Gas Oil	N	N	G	119	225	NA
E-1120	COKER	Coker	T-903	C	FLANGE	0.75	HGO	Gas Oil	N	N	G	105	225	NA
E-1122	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	202	225	N
E-723	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	129	65	Y
E-725	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	414	65	Y
E-727	COKER	Coker	R-901	C	FLANGE	10.00	HGO	Gas Oil	L	N	P	47	65	NA
E-729	COKER	Coker	R-901	V	GATE	6.00	HGO	Gas Oil	L	N	P	161	65	Y
E-731	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	495	65	Y
E-723	COKER	Coker	R-901	C	FLANGE	6.00	HGO	Gas Oil	L	N	P	348	65	NA
E-725	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	182	65	N
E-727	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	460	65	N
E-729	COKER	Coker	R-901	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	460	65	NA
E-731	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	470	65	Y
E-733	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	177	65	Y
E-735	COKER	Coker	R-901	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	177	65	NA
E-737	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	337	65	Y
E-739	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	240	40	N
E-741	COKER	Coker	R-901	C	RED	0.75	HGO	Gas Oil	L	N	P	240	40	NA
E-743	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	135	70	Y
E-745	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	88	70	Y
E-747	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	400	70	Y
E-749	COKER	Coker	R-901	C	FLANGE	10.00	HGO	Gas Oil	L	N	P	303	70	NA
E-751	COKER	Coker	R-901	V	GATE	6.00	HGO	Gas Oil	L	N	P	120	70	Y
E-753	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	274	70	Y
E-755	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	176	70	N
E-757	COKER	Coker	R-901	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	176	70	NA
E-759	COKER	Coker	R-901	V	GATE	10.00	HGO	Gas Oil	L	N	P	320	70	Y
E-761	COKER	Coker	R-901	C	FLANGE	10.00	HGO	Gas Oil	L	N	P	320	70	NA
E-763	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	218	70	N
E-765	COKER	Coker	R-901	C	TEE	0.75	HGO	Gas Oil	L	N	P	180	70	NA
E-767	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	117	70	N
E-769	COKER	Coker	R-901	C	RED	0.75	HGO	Gas Oil	L	N	P	117	70	NA
E-771	COKER	Coker	R-901	V	GATE	0.75	HGO	Gas Oil	L	N	P	124	70	N
E-773	COKER	Coker	STR-901A	C	TEE	0.75	HGO	Gas Oil	L	N	P	122	70	NA
E-775	COKER	Coker	STR-901A	V	GATE	0.75	HGO	Gas Oil	L	N	P	118	70	Y
E-777	COKER	Coker	STR-901A	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	P	118	70	NA
E-779	COKER	Coker	STR-901A	V	GATE	0.75	HGO	Gas Oil	L	N	P	95	70	Y
E-781	COKER	Coker	STR-901A	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	95	70	NA
E-783	COKER	Coker	E-925	V	CONTROL	12.00	BPA	Gas Oil	L	N	G	495	0	Y
E-785	COKER	Coker	E-925	V	GATE	1.00	BPA	Gas Oil	L	N	G	106	0	N
E-787	COKER	Coker	E-925	C	BULL PLUG	1.00	BPA	Gas Oil	L	N	G	106	0	NA

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E-789	COKER	Coker	E-925	V	GATE	12.00	BPA	Gas Oil	L	N	G	274	0	Y
E-791	COKER	Coker	E-925	V	GATE	0.75	BPA	Gas Oil	L	N	G	134	0	N
E-793	COKER	Coker	E-925	C	Threaded Connector	0.75	BPA	Gas Oil	L	N	G	134	0	NA
E-795	COKER	Coker	E-925	V	GATE	12.00	BPA	Gas Oil	L	N	G	176	0	Y
E-797	COKER	Coker	E-925	V	GATE	12.00	BPA	Gas Oil	L	N	G	225	0	Y
E-799	COKER	Coker	E-925	V	GATE	0.75	BPA	Gas Oil	L	N	G	86	0	N
E-801	COKER	Coker	E-925	C	BULL PLUG	0.75	BPA	Gas Oil	L	N	G	86	0	NA
E-803	COKER	Coker	E-925	C	FLANGE	3.00	BPA	Gas Oil	L	N	G	266	35	NA
E-805	COKER	Coker	E-925	V	GATE	0.75	BPA	Gas Oil	L	N	G	131	35	N
E-807	COKER	Coker	E-925	V	GATE	2.00	BPA	Gas Oil	L	N	G	146	35	Y
E-809	COKER	Coker	E-925	C	BULL PLUG	2.00	BPA	Gas Oil	L	N	G	146	35	NA
E-811	COKER	Coker	E-925	V	GATE	8.00	BPA	Gas Oil	L	N	G	287	35	Y
E-813	COKER	Coker	E-925	V	GATE	8.00	MPA	Gas Oil	L	N	G	306	42	Y
E-815	COKER	Coker	E-925	V	GATE	0.75	MPA	Gas Oil	L	N	G	79	42	Y
E-817	COKER	Coker	E-925	C	Threaded Connector	0.75	MPA	Gas Oil	L	N	G	79	42	NA
E-819	COKER	Coker	E-925	V	GATE	3.00	MPA	Gas Oil	L	N	G	138	42	Y
E-821	COKER	Coker	E-925	C	FLANGE	3.00	MPA	Gas Oil	L	N	G	138	42	NA
E-823	COKER	Coker	E-925	V	GATE	12.00	MPA	Gas Oil	L	N	G	298	42	Y
E-825	COKER	Coker	E-925	V	GATE	0.75	MPA	Gas Oil	L	N	G	124	42	Y
E-827	COKER	Coker	E-925	C	BULL PLUG	0.75	MPA	Gas Oil	L	N	G	79	42	NA
E-829	COKER	Coker	E-925	V	FLANGE	2.00	MPA	Gas Oil	L	N	G	239	42	Y
E-831	COKER	Coker	E-925	C	BULL PLUG	2.00	MPA	Gas Oil	L	N	G	147	42	NA
E-833	COKER	Coker	E-925	V	GATE	12.00	MPA	Gas Oil	L	N	G	380	40	Y
E-835	COKER	Coker	E-925	V	GATE	0.75	MPA	Gas Oil	L	N	G	76	42	Y
E-837	COKER	Coker	E-925	C	BULL PLUG	0.75	MPA	Gas Oil	L	N	G	61	42	NA
E-839	COKER	Coker	E-925	V	GATE	0.75	MPA	Gas Oil	L	N	G	157	42	Y
E-841	COKER	Coker	E-925	V	GATE	12.00	MPA	Gas Oil	L	N	G	280	42	Y
E-843	COKER	Coker	E-925	V	GATE	12.00	MPA	Gas Oil	L	N	G	370	42	Y
E-845	COKER	Coker	E-925	C	FLANGE	12.00	MPA	Gas Oil	L	N	G	349	42	NA
E-847	COKER	Coker	E-925	V	GATE	0.75	MPA	Gas Oil	L	N	G	114	42	N
E-849	COKER	Coker	E-925	C	ELBOW	0.75	MPA	Gas Oil	L	N	G	114	42	NA
E-1124	COKER	Coker	T-903	V	GATE	2.00	HGO	Gas Oil	N	N	G	172	225	Y
E-1126	COKER	Coker	T-903	C	FLANGE	2.00	HGO	Gas Oil	N	N	G	217	225	NA
E-1128	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	92	225	Y
E-1130	COKER	Coker	T-903	V	CONTROL	2.00	HGO	Gas Oil	N	N	G	252	225	Y
E-1132	COKER	Coker	T-903	C	FLANGE	2.00	HGO	Gas Oil	N	N	G	214	12	NA
E-1134	COKER	Coker	T-903	V	GATE	2.00	HGO	Gas Oil	N	N	G	287	12	Y
E-1136	COKER	Coker	T-903	V	GATE	2.00	HGO	Gas Oil	N	N	G	97	12	Y
E-1138	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	111	12	N
E-1140	COKER	Coker	T-903	V	BALL	0.50	HGO	Gas Oil	N	N	G	84	12	Y
E-1142	COKER	Coker	T-903	C	Threaded Connector	0.50	HGO	Gas Oil	N	N	G	79	12	NA
E-1144	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	79	12	N
E-1146	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	N	N	G	72	12	N
E-1148	COKER	Coker	T-903	C	UNION	0.75	HGO	Gas Oil	N	N	G	72	12	NA
E-1150	COKER	Coker	T-903	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	76	12	Y
E-1152	COKER	Coker	T-903	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	77	12	Y
E-1154	COKER	Coker	STR-906A	V	GATE	2.00	HGO	Gas Oil	N	N	G	90	0	N
E-1156	COKER	Coker	STR-906A	V	GATE	0.75	HGO	Gas Oil	N	N	G	78	0	Y
E-1158	COKER	Coker	STR-906A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	78	0	NA
E-1160	COKER	Coker	STR-906A	V	GATE	2.00	HGO	Gas Oil	N	N	G	78	0	N
E-1162	COKER	Coker	STR-906A	C	FLANGE	0.75	HGO	Gas Oil	N	N	G	117	0	NA
E-1164	COKER	Coker	STR-906A	V	GATE	0.75	HGO	Gas Oil	N	N	G	80	0	N
E-1166	COKER	Coker	STR-906A	V	GATE	0.75	HGO	Gas Oil	N	N	G	86	0	N
E-1168	COKER	Coker	STR-906A	V	GATE	2.00	HGO	Gas Oil	N	N	G	77	0	N
E-1170	COKER	Coker	STR-906A	V	GATE	1.00	HGO	Gas Oil	N	N	G	81	0	N
E-1172	COKER	Coker	STR-906A	V	GATE	4.00	HGO	Gas Oil	L	N	P	282	91	Y
E-1174	COKER	Coker	STR-906A	V	GATE	0.75	HGO	Gas Oil	L	N	P	185	91	N
E-1176	COKER	Coker	STR-906A	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	P	114	91	NA
E-1178	COKER	Coker	STR-906A	V	GATE	0.75	HGO	Gas Oil	L	N	P	114	91	N
E-1180	COKER	Coker	STR-906A	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	P	103	91	NA
E-1182	COKER	Coker	STR-906A	V	GATE	3.00	HGO	Gas Oil	N	N	P	171	90	Y
E-1184	COKER	Coker	STR-905B	V	GATE	3.00	HGO	Gas Oil	N	N	P	117	90	N
E-1186	COKER	Coker	STR-905B	C	BULL PLUG	3.00	HGO	Gas Oil	N	N	P	101	90	NA
E-1188	COKER	Coker	STR-905B	V	GATE	2.00	HGO	Gas Oil	N	N	P	99	90	Y
E-1190	COKER	Coker	STR-905B	V	GATE	0.50	HGO	Gas Oil	N	N	P	86	90	N
E-1192	COKER	Coker	STR-905B	V	GATE	0.50	HGO	Gas Oil	N	N	P	109	90	Y
E-1194	COKER	Coker	STR-905B	V	GATE	4.00	HGO	Gas Oil	N	N	P	225	90	Y
E-1196	COKER	Coker	STR-905B	V	GATE	0.75	HGO	Gas Oil	N	N	P	210	90	N
E-1198	COKER	Coker	STR-905B	C	Threaded Connector	0.75	HGO	Gas Oil	N	N	P	86	90	NA
E-1200	COKER	Coker	STR-905B	V	GATE	0.75	HGO	Gas Oil	N	N	P	112	90	Y
E-1202	COKER	Coker	STR-905B	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	P	86	90	NA
E-1204	COKER	Coker	P-902A	V	GATE	10.00	HGO	Gas Oil	N	N	G	258	80	Y
E-1206	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	N	N	G	111	80	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1208	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	N	N	G	164	80	N
E-1210	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	N	N	G	197	80	N
E-1212	COKER	Coker	P-902A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	204	80	NA
E-1214	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	N	N	G	137	80	N
E-1216	COKER	Coker	P-902A	C	RED	0.75	HGO	Gas Oil	N	N	G	156	80	NA
E-1218	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	N	N	G	312	80	Y
E-1220	COKER	Coker	P-902A	C	FLANGE	10.00	HGO	Gas Oil	N	N	G	496	80	NA
E-1222	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	N	N	G	247	80	Y
E-1224	COKER	Coker	P-902A	V	GATE	2.00	HGO	Gas Oil	N	N	G	99	80	N
E-1226	COKER	Coker	P-902A	C	FLANGE	2.00	HGO	Gas Oil	N	N	G	120	80	NA
E-1228	COKER	Coker	P-902A	V	GATE	2.00	HGO	Gas Oil	N	N	G	142	80	Y
E-1230	COKER	Coker	P-902A	V	GATE	2.00	HGO	Gas Oil	N	N	G	189	80	Y
E-1232	COKER	Coker	P-902B	V	GATE	2.00	HGO	Gas Oil	N	N	G	106	300	Y
E-1234	COKER	Coker	P-902B	C	FLANGE	2.00	HGO	Gas Oil	N	N	G	110	300	NA
E-1236	COKER	Coker	P-902B	V	GATE	2.00	HGO	Gas Oil	N	N	G	118	300	Y
E-1238	COKER	Coker	P-902B	V	GATE	2.00	HGO	Gas Oil	N	N	G	201	300	Y
E-1240	COKER	Coker	P-902B	C	FLANGE	2.00	HGO	Gas Oil	N	N	G	231	300	NA
E-1242	COKER	Coker	P-902B	V	GATE	10.00	HGO	Gas Oil	N	N	G	440	300	Y
E-1244	COKER	Coker	P-902B	C	CHECK	10.00	HGO	Gas Oil	N	N	G	496	300	NA
E-1246	COKER	Coker	P-902B	V	GATE	0.75	HGO	Gas Oil	N	N	G	137	300	Y
E-1248	COKER	Coker	P-902B	C	RED	0.75	HGO	Gas Oil	N	N	G	101	300	NA
E-1250	COKER	Coker	P-902B	V	GATE	0.75	HGO	Gas Oil	N	N	G	119	300	N
E-1252	COKER	Coker	P-902B	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	121	300	NA
E-1254	COKER	Coker	P-902B	V	GATE	0.75	HGO	Gas Oil	N	N	G	103	300	Y
E-1256	COKER	Coker	P-902B	V	GATE	1.00	HGO	Gas Oil	N	N	G	103	300	Y
E-1258	COKER	Coker	P-902B	C	FLANGE	1.00	HGO	Gas Oil	N	N	G	101	300	NA
E-1260	COKER	Coker	P-902B	V	GATE	1.00	HGO	Gas Oil	N	N	G	98	300	N
E-1262	COKER	Coker	P-902A	V	GATE	8.00	HGO	Gas Oil	L	N	G	122	91	Y
E-1264	COKER	Coker	P-902A	V	GATE	6.00	HGO	Gas Oil	L	N	G	81	91	Y
E-1266	COKER	Coker	P-902A	C	FLANGE	6.00	HGO	Gas Oil	L	N	G	144	91	NA
E-1268	COKER	Coker	P-902A	V	GATE	6.00	HGO	Gas Oil	L	N	G	163	91	Y
E-1270	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	L	N	G	83	91	Y
E-1272	COKER	Coker	P-902A	V	GATE	6.00	HGO	Gas Oil	L	N	G	109	91	Y
E-1274	COKER	Coker	P-902A	V	GATE	6.00	HGO	Gas Oil	L	N	G	244	91	Y
E-1276	COKER	Coker	P-902A	V	GATE	1.00	HGO	Gas Oil	L	N	G	155	91	N
E-1278	COKER	Coker	P-902A	C	BULL PLUG	1.00	HGO	Gas Oil	L	N	G	150	91	NA
E-1280	COKER	Coker	P-902A	V	GATE	1.00	HGO	Gas Oil	L	N	G	75	91	N
E-1282	COKER	Coker	P-902A	C	BULL PLUG	0.50	HGO	Gas Oil	L	N	G	80	91	NA
E-1284	COKER	Coker	P-902A	V	GATE	2.00	HGO	Gas Oil	L	N	G	199	91	Y
E-1286	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	L	N	G	79	91	N
E-1288	COKER	Coker	P-902A	V	GATE	0.75	HGO	Gas Oil	L	N	G	78	91	Y
E-1290	COKER	Coker	P-902B	V	GATE	4.00	LKGO	Gas Oil	N	N	G	213	210	Y
E-1292	COKER	Coker	P-902B	V	GATE	0.75	LKGO	Gas Oil	N	N	G	86	210	Y
E-1294	COKER	Coker	P-902B	C	ELBOW	0.75	LKGO	Gas Oil	N	N	G	78	210	NA
E-1296	COKER	Coker	P-902B	C	FLANGE	3.00	LKGO	Gas Oil	N	N	G	274	210	NA
E-1298	COKER	Coker	P-902B	V	GATE	0.75	LKGO	Gas Oil	N	N	G	235	210	Y
E-1300	COKER	Coker	P-907B	C	FLANGE	3.00	LKGO	Gas Oil	N	N	G	243	210	NA
E-1302	COKER	Coker	P-907B	V	GATE	0.75	LKGO	Gas Oil	N	N	G	286	210	N
E-1304	COKER	Coker	P-907B	V	GATE	3.00	LKGO	Gas Oil	N	N	G	255	210	Y
E-1306	COKER	Coker	P-907B	C	FLANGE	3.00	LKGO	Gas Oil	N	N	G	301	210	NA
E-1308	COKER	Coker	P-907A	V	GATE	3.00	LKGO	Gas Oil	N	N	G	135	0	Y
E-1310	COKER	Coker	P-907A	C	FLANGE	3.00	LKGO	Gas Oil	N	N	G	76	0	NA
E-1312	COKER	Coker	P-907A	V	GATE	0.75	LKGO	Gas Oil	N	N	G	69	0	N
E-1314	COKER	Coker	P-907A	C	CHECK	3.00	LKGO	Gas Oil	N	N	G	71	0	NA
E-1316	COKER	Coker	P-907A	V	GATE	0.75	LKGO	Gas Oil	N	N	G	65	0	Y
E-1318	COKER	Coker	P-907A	V	GATE	0.50	LKGO	Gas Oil	N	N	G	67	0	Y
E-1320	COKER	Coker	P-907A	C	FLANGE	4.00	LKGO	Gas Oil	N	N	G	66	0	NA
E-1322	COKER	Coker	P-907A	V	GATE	4.00	LKGO	Gas Oil	N	N	G	65	0	Y
E-1324	COKER	Coker	P-907A	V	GATE	2.00	LKGO	Gas Oil	N	N	G	66	0	Y
E-1326	COKER	Coker	P-908A	V	GATE	2.00	HGO	Gas Oil	L	N	G	143	253	N
E-1328	COKER	Coker	P-908A	V	GATE	8.00	HGO	Gas Oil	L	N	G	163	253	Y
E-1330	COKER	Coker	P-908A	V	GATE	8.00	HGO	Gas Oil	L	N	G	264	25	Y
E-1332	COKER	Coker	P-908A	C	FLANGE	8.00	HGO	Gas Oil	L	N	G	376	25	NA
E-1334	COKER	Coker	P-908A	V	GATE	0.75	HGO	Gas Oil	N	N	G	87	275	Y
E-1336	COKER	Coker	P-908A	C	ELBOW	0.75	HGO	Gas Oil	N	N	G	131	275	NA
E-1338	COKER	Coker	P-908A	V	GATE	0.75	HGO	Gas Oil	N	N	G	85	275	Y
E-1340	COKER	Coker	P-908A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	84	275	NA
E-1342	COKER	Coker	P-908A	V	GATE	0.75	HGO	Gas Oil	N	N	G	117	275	N
E-1344	COKER	Coker	P-908A	C	CHECK	4.00	HGO	Gas Oil	N	N	G	230	275	NA
E-1346	COKER	Coker	P-908A	V	GATE	1.00	HGO	Gas Oil	N	N	G	188	275	Y
E-1348	COKER	Coker	P-908A	V	GATE	1.00	HGO	Gas Oil	N	N	G	181	275	Y
E-1350	COKER	Coker	P-908A	V	GATE	0.75	HGO	Gas Oil	N	N	G	152	275	Y
E-1352	COKER	Coker	P-908A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	169	275	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-879	COKER	Coker	P-904B	P	SEAL	2.00	LGO	Gas Oil	L	N	G	136	20	NA
E-881	COKER	Coker	P-904B	C	Pump Housing	12.00	LGO	Gas Oil	L	N	G	294	20	NA
E-883	COKER	Coker	P-922B	P	SEAL	2.00	BPA	Gas Oil	L	N	G	157	90	NA
E-885	COKER	Coker	P-922B	C	Pump Housing	100.00	BPA	Gas Oil	L	N	G	370	90	NA
E-887	COKER	Coker	P-922A	C	Pump Housing	1.00	BPA	Gas Oil	L	N	G	279	40	NA
E-889	COKER	Coker	P-430B	P	SEAL	1.00	SLUDGE	Sludge	L	N	G	57	10	NA
E-891	COKER	Coker	P-430B	C	Pump Housing	10.00	SLUDGE	Sludge	L	N	G	59	10	NA
E-893	COKER	Coker	P-430A	P	SEAL	1.00	SLUDGE	Sludge	L	N	G	59	75	NA
E-895	COKER	Coker	P-430A	C	Pump Housing	10.00	SLUDGE	Sludge	L	N	G	59	75	NA
E-897	COKER	Coker	E-903	V	CONTROL	6.00	MPA	Gas Oil	L	N	G	211	45	Y
E-899	COKER	Coker	E-903	V	CONTROL	6.00	BPA	Gas Oil	L	N	G	320	100	Y
E-901	COKER	Coker	E-903	V	GATE	1.50	BPA	Gas Oil	L	N	G	74	100	N
E-903	COKER	Coker	E-903	C	FLANGE	6.00	BPA	Gas Oil	L	N	G	249	100	NA
E-905	COKER	Coker	E-903	V	GATE	6.00	BPA	Gas Oil	L	N	G	248	100	Y
E-907	COKER	Coker	E-903	V	GATE	6.00	BPA	Gas Oil	L	N	G	226	100	Y
E-851	COKER	Coker	P-902A	P	SEAL	2.00	HGO	Gas Oil	L	N	G	202	75	NA
E-853	COKER	Coker	P-902A	C	Pump Housing	10.00	HGO	Gas Oil	L	N	G	283	75	NA
E-855	COKER	Coker	P-902B	P	SEAL	2.00	HGO	Gas Oil	L	N	G	180	300	NA
E-857	COKER	Coker	P-902B	C	Pump Housing	10.00	HGO	Gas Oil	L	N	G	342	300	NA
E-859	COKER	Coker	P-907A	P	SEAL	2.00	LGO	Gas Oil	L	N	G	58	0	NA
E-861	COKER	Coker	P-907A	C	Pump Housing	6.00	LGO	Gas Oil	L	N	G	58	0	NA
E-863	COKER	Coker	P-907B	C	Pump Housing	6.00	LGO	Gas Oil	L	N	G	243	220	NA
E-865	COKER	Coker	P-908A	C	Pump Housing	10.00	HGO	Gas Oil	L	N	G	311	270	NA
E-867	COKER	Coker	P-908B	P	SEAL	2.00	HGO	Gas Oil	L	N	G	165	220	NA
E-869	COKER	Coker	P-908B	C	Pump Housing	10.00	HGO	Gas Oil	L	N	G	394	220	NA
E-871	COKER	Coker	P-903A	P	SEAL	2.00	HGO	Gas Oil	L	N	G	350	190	NA
E-873	COKER	Coker	P-903A	C	Pump Housing	10.00	HGO	Gas Oil	L	N	G	402	190	NA
E-875	COKER	Coker	P-903B	C	Pump Housing	10.00	HGO	Gas Oil	L	N	G	332	160	NA
E-877	COKER	Coker	P-904A	C	Pump Housing	12.00	LGO	Gas Oil	L	N	G	290	70	NA
E-1354	COKER	Coker	P-908B	V	GATE	0.75	HGO	Gas Oil	N	N	G	198	225	Y
E-1356	COKER	Coker	P-908B	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	169	225	NA
E-1358	COKER	Coker	P-908B	V	GATE	0.75	HGO	Gas Oil	N	N	G	115	225	N
E-1360	COKER	Coker	P-908B	C	FLANGE	8.00	HGO	Gas Oil	L	N	G	409	225	NA
E-1362	COKER	Coker	P-908B	V	GATE	3.00	HGO	Gas Oil	L	N	G	166	225	N
E-1364	COKER	Coker	P-908B	V	GATE	8.00	HGO	Gas Oil	L	N	G	463	18	Y
E-1366	COKER	Coker	P-908B	V	GATE	8.00	HGO	Gas Oil	L	N	G	263	27	Y
E-1368	COKER	Coker	P-908B	V	GATE	1.00	HGO	Gas Oil	N	N	G	83	225	N
E-1370	COKER	Coker	P-908B	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	85	225	NA
E-1372	COKER	Coker	P-908B	V	GATE	0.75	HGO	Gas Oil	N	N	G	67	225	N
E-1374	COKER	Coker	P-908B	C	FLANGE	3.00	HGO	Gas Oil	N	N	G	396	225	NA
E-1376	COKER	Coker	P-908B	V	GATE	0.75	HGO	Gas Oil	N	N	G	108	225	N
E-1378	COKER	Coker	P-908B	V	GATE	0.75	HGO	Gas Oil	N	N	G	255	225	N
E-1380	COKER	Coker	P-908B	V	GATE	0.75	HGO	Gas Oil	N	N	G	98	225	N
E-1382	COKER	Coker	P-908B	C	BULL PLUG	0.50	HGO	Gas Oil	N	N	G	91	225	NA
E-1384	COKER	Coker	P-903A	C	BULL PLUG	0.50	HGO	Gas Oil	L	N	G	65	190	NA
E-1386	COKER	Coker	P-903A	V	GATE	0.75	HGO	Gas Oil	L	N	G	89	190	Y
E-1388	COKER	Coker	P-903A	C	FLANGE	0.75	HGO	Gas Oil	L	N	G	81	190	NA
E-1390	COKER	Coker	P-903A	V	GATE	0.75	HGO	Gas Oil	L	N	G	136	190	N
E-1392	COKER	Coker	P-903A	V	GATE	0.75	HGO	Gas Oil	L	N	G	154	190	N
E-1394	COKER	Coker	P-903A	C	FLANGE	4.00	HGO	Gas Oil	L	N	G	303	190	NA
E-1396	COKER	Coker	P-903A	V	GATE	0.75	HGO	Gas Oil	N	N	G	97	190	Y
E-1398	COKER	Coker	P-903A	C	FLANGE	4.00	HGO	Gas Oil	N	N	G	308	17	NA
E-1400	COKER	Coker	P-903A	V	GATE	2.00	HGO	Gas Oil	N	N	G	249	17	Y
E-1402	COKER	Coker	P-903A	V	GATE	4.00	HGO	Gas Oil	N	N	G	261	17	Y
E-1404	COKER	Coker	P-903A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	133	190	NA
E-1406	COKER	Coker	P-903A	V	GATE	0.75	HGO	Gas Oil	N	N	G	89	190	Y
E-1408	COKER	Coker	P-903A	V	GATE	0.75	HGO	Gas Oil	N	N	G	92	190	N
E-1410	COKER	Coker	P-903A	V	GATE	0.75	HGO	Gas Oil	N	N	G	64	17	N
E-1412	COKER	Coker	P-903A	C	BULL PLUG	0.75	HGO	Gas Oil	N	N	G	68	17	NA
E-1414	COKER	Coker	P-903B	C	BULL PLUG	0.50	HGO	Gas Oil	L	N	G	73	163	NA
E-1416	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	101	163	Y
E-1418	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	116	163	Y
E-1420	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	84	163	Y
E-1422	COKER	Coker	P-903B	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	G	169	163	NA
E-1424	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	106	163	N
E-1426	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	281	163	N
E-1428	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	103	163	N
E-1430	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	70	18	N
E-1432	COKER	Coker	P-903B	V	GATE	2.00	HGO	Gas Oil	L	N	G	116	18	Y
E-1434	COKER	Coker	P-903B	C	FLANGE	2.00	HGO	Gas Oil	L	N	G	70	18	NA
E-1436	COKER	Coker	P-903B	V	GATE	4.00	HGO	Gas Oil	L	N	G	279	18	Y
E-1438	COKER	Coker	P-903B	C	FLANGE	4.00	HGO	Gas Oil	L	N	G	187	18	NA
E-1440	COKER	Coker	P-903B	V	GATE	0.75	HGO	Gas Oil	L	N	G	81	18	N

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1442	COKER	Coker	P-403B	V	GATE	0.75	HGO	Gas Oil	L	N	G	68	18	N
E-1444	COKER	Coker	P-403B	V	GATE	4.00	HGO	Gas Oil	L	N	G	75	165	Y
E-1446	COKER	Coker	STR-902B	V	GATE	2.00	HGO	Gas Oil	L	N	G	75	170	Y
E-1448	COKER	Coker	STR-902B	V	GATE	3.00	HGO	Gas Oil	L	N	G	429	170	Y
E-1450	COKER	Coker	STR-902B	V	GATE	3.00	HGO	Gas Oil	L	N	G	403	170	Y
E-1452	COKER	Coker	STR-902A	V	GATE	4.00	HGO	Gas Oil	L	N	G	181	170	Y
E-1454	COKER	Coker	STR-902A	V	GATE	2.00	HGO	Gas Oil	L	N	G	68	170	Y
E-1456	COKER	Coker	STR-902A	C	FLANGE	4.00	HGO	Gas Oil	L	N	G	74	170	NA
E-1458	COKER	Coker	STR-902A	V	GATE	2.00	HGO	Gas Oil	L	N	G	71	170	Y
E-1460	COKER	Coker	STR-902A	V	GATE	0.75	HGO	Gas Oil	L	N	G	70	170	N
E-1462	COKER	Coker	STR-902A	V	GATE	2.00	HGO	Gas Oil	L	N	G	70	170	Y
E-1464	COKER	Coker	STR-902A	V	GATE	2.00	HGO	Gas Oil	L	N	G	70	170	Y
E-1466	COKER	Coker	STR-902A	V	GATE	0.75	HGO	Gas Oil	L	N	G	87	170	Y
E-1468	COKER	Coker	STR-902A	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	G	78	170	NA
E-1470	COKER	Coker	STR-902A	C	FLANGE	4.00	HGO	Gas Oil	L	N	G	76	170	NA
E-1472	COKER	Coker	STR-902A	V	GATE	4.00	HGO	Gas Oil	L	N	G	79	170	Y
E-1474	COKER	Coker	STR-902A	V	GATE	0.75	HGO	Gas Oil	L	N	G	81	170	Y
E-1476	COKER	Coker	CV-9F044	V	CONTROL	3.00	HGO	Gas Oil	L	N	G	137	125	Y
E-1478	COKER	Coker	CV-9F044	V	GATE	2.00	HGO	Gas Oil	L	N	G	190	160	N
E-1480	COKER	Coker	CV-9F044	C	FLANGE	4.00	HGO	Gas Oil	L	N	G	249	160	NA
E-1482	COKER	Coker	CV-9F044	V	GATE	4.00	HGO	Gas Oil	L	N	G	202	160	Y
E-1484	COKER	Coker	CV-9F044	V	GATE	0.75	HGO	Gas Oil	L	N	G	73	160	N
E-1486	COKER	Coker	CV-9F044	C	FLANGE	4.00	HGO	Gas Oil	L	N	G	74	125	NA
E-1488	COKER	Coker	CV-9F044	V	GATE	4.00	HGO	Gas Oil	L	N	G	82	125	Y
E-1490	COKER	Coker	CV-9F044	V	GATE	4.00	HGO	Gas Oil	L	N	G	288	125	Y
E-1492	COKER	Coker	CV-9F044	V	GATE	2.00	HGO	Gas Oil	L	N	G	215	125	N
E-1494	COKER	Coker	STR-902B	V	GATE	4.00	HGO	Gas Oil	L	N	G	494	170	Y
E-1496	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	104	170	Y
E-1498	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	109	170	Y
E-1500	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	116	170	Y
E-1502	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	77	170	Y
E-1504	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	94	170	Y
E-1506	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	147	170	Y
E-1508	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	220	170	Y
E-1510	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	109	170	Y
E-1512	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	86	170	Y
E-1514	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	79	170	Y
E-1516	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	86	170	Y
E-1518	COKER	Coker	STR-902B	V	NEEDLE	0.50	HGO	Gas Oil	L	N	G	87	170	Y
E-1520	COKER	Coker	STR-902B	V	GATE	4.00	HGO	Gas Oil	L	N	G	312	170	Y
E-1522	COKER	Coker	STR-902B	C	FLANGE	4.00	HGO	Gas Oil	L	N	G	424	170	NA
E-1524	COKER	Coker	STR-902B	V	GATE	0.75	HGO	Gas Oil	L	N	G	171	170	Y
E-1526	COKER	Coker	STR-902B	C	Threaded Connector	0.75	HGO	Gas Oil	L	N	G	91	170	NA
E-1528	COKER	Coker	STR-902B	V	GATE	2.00	HGO	Gas Oil	L	N	G	210	170	Y
E-1530	COKER	Coker	STR-902B	V	GATE	3.00	HGO	Gas Oil	L	N	G	400	170	Y
E-1532	COKER	Coker	STR-902B	V	GATE	0.75	HGO	Gas Oil	L	N	G	111	170	N
E-1534	COKER	Coker	P-904A	V	GATE	0.75	HGO	Gas Oil	N	N	G	185	70	N
E-1536	COKER	Coker	P-904A	V	GATE	2.00	HGO	Gas Oil	N	N	G	163	70	Y
E-1538	COKER	Coker	P-904A	C	BULL PLUG	2.00	HGO	Gas Oil	N	N	G	106	70	NA
E-1540	COKER	Coker	P-904A	V	GATE	0.75	HGO	Gas Oil	N	N	G	115	70	Y
E-1542	COKER	Coker	P-904A	V	GATE	16.00	HGO	Gas Oil	N	N	G	338	70	Y
E-1544	COKER	Coker	P-904A	V	GATE	0.75	HGO	Gas Oil	N	N	G	180	70	Y
E-1546	COKER	Coker	P-904A	C	Threaded Connector	0.75	HGO	Gas Oil	N	N	G	207	70	NA
E-1548	COKER	Coker	P-904A	V	GATE	0.75	HGO	Gas Oil	N	N	G	229	70	Y
E-1550	COKER	Coker	P-904A	V	GATE	16.00	HGO	Gas Oil	N	N	G	309	70	Y
E-1552	COKER	Coker	P-904B	V	NEEDLE	0.50	HGO	Gas Oil	N	N	G	159	21	Y
E-1554	COKER	Coker	P-904B	C	Threaded Connector	0.50	HGO	Gas Oil	N	N	G	154	21	NA
E-1556	COKER	Coker	P-904B	V	GATE	0.75	HGO	Gas Oil	N	N	G	209	21	Y
E-1558	COKER	Coker	P-904B	V	GATE	16.00	HGO	Gas Oil	N	N	G	278	21	Y
E-1560	COKER	Coker	P-904B	V	GATE	2.00	HGO	Gas Oil	N	N	G	136	21	Y
E-1562	COKER	Coker	P-904B	C	FLANGE	2.00	HGO	Gas Oil	N	N	G	109	21	NA
E-1564	COKER	Coker	P-904B	V	GATE	16.00	HGO	Gas Oil	N	N	G	253	21	Y
E-1566	COKER	Coker	P-904B	V	GATE	0.75	HGO	Gas Oil	N	N	G	193	21	Y
E-1568	COKER	Coker	P-904B	C	Threaded Connector	0.75	HGO	Gas Oil	N	N	G	293	21	NA
E-1570	COKER	Coker	P-904B	V	GATE	0.75	HGO	Gas Oil	N	N	G	141	21	Y
E-1572	COKER	Coker	P-922B	V	GATE	16.00	BPA	Gas Oil	L	N	G	194	82	Y
E-1574	COKER	Coker	P-922B	V	GATE	1.00	BPA	Gas Oil	L	N	G	125	82	N
E-1576	COKER	Coker	P-922B	V	GATE	0.75	BPA	Gas Oil	L	N	G	115	82	N
E-1578	COKER	Coker	P-922B	V	GATE	1.00	BPA	Gas Oil	L	N	G	100	82	N
E-1580	COKER	Coker	P-922B	V	GATE	2.00	BPA	Gas Oil	L	N	G	134	82	N
E-1582	COKER	Coker	P-922B	V	GATE	2.00	BPA	Gas Oil	L	N	G	92	82	N
E-1584	COKER	Coker	P-922B	V	GATE	16.00	BPA	Gas Oil	L	N	G	250	82	Y
E-1786	COKER	Coker	P-922B	V	GATE	2.00	BPA	Gas Oil	N	N	G	208	82	N

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E-1788	COKER	Coker	P-922B	C	BULL PLUG	2.00	BPA	Gas Oil	N	N	G	252	82	NA
E-1790	COKER	Coker	P-922B	V	GATE	2.00	BPA	Gas Oil	N	N	G	108	82	Y
E-1792	COKER	Coker	P-922B	V	GATE	0.75	BPA	Gas Oil	N	N	G	94	82	Y
E-1794	COKER	Coker	P-922B	V	GATE	16.00	BPA	Gas Oil	N	N	G	414	82	Y
E-1796	COKER	Coker	P-922B	V	GATE	0.75	BPA	Gas Oil	N	N	G	93	82	N
E-879	COKER	Coker	E-903	V	GATE	6.00	BPA	Gas Oil	L	N	G	307	45	Y
E-881	COKER	Coker	E-903	C	FLANGE	6.00	BPA	Gas Oil	L	N	G	306	95	NA
E-883	COKER	Coker	E-903	V	GATE	1.50	BPA	Gas Oil	L	N	G	90	95	Y
E-885	COKER	Coker	E-928	V	NEEDLE	0.50	BPA	Gas Oil	L	N	G	78	9.9	Y
E-887	COKER	Coker	E-928	V	NEEDLE	0.50	BPA	Gas Oil	L	N	G	78	9.9	Y
E-889	COKER	Coker	E-928	V	NEEDLE	0.50	BPA	Gas Oil	L	N	G	78	9.9	Y
E-891	COKER	Coker	E-928	C	Threaded Connector	0.50	BPA	Gas Oil	L	N	G	78	9.9	NA
E-893	COKER	Coker	E-928	C	TUBE FITTING	0.50	BPA	Gas Oil	L	N	G	78	9.9	NA
E-895	COKER	Coker	E-928	V	GATE	1.50	BPA	Gas Oil	L	N	G	149	42	Y
E-897	COKER	Coker	E-928	C	BULL PLUG	1.00	BPA	Gas Oil	L	N	G	75	42	NA
E-899	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	130	42	Y
E-901	COKER	Coker	E-928	C	Threaded Connector	0.75	BPA	Gas Oil	L	N	G	130	42	NA
E-903	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	130	42	Y
E-905	COKER	Coker	E-928	C	TUBE FITTING	0.50	BPA	Gas Oil	L	N	G	130	42	NA
E-907	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	147	42	Y
E-909	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	109	42	N
E-911	COKER	Coker	E-928	V	GATE	6.00	BPA	Gas Oil	L	N	G	450	42	Y
E-913	COKER	Coker	E-928	C	FLANGE	6.00	BPA	Gas Oil	L	N	G	421	42	NA
E-915	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	196	42	N
E-917	COKER	Coker	E-928	C	Threaded Connector	0.75	BPA	Gas Oil	L	N	G	220	42	NA
E-919	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	196	42	N
E-921	COKER	Coker	E-928	C	BULL PLUG	0.75	BPA	Gas Oil	L	N	G	77	42	NA
E-923	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	183	42	N
E-925	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	115	42	N
E-927	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	104	70	N
E-929	COKER	Coker	E-928	C	FLANGE	2.00	BPA	Gas Oil	L	N	G	345	70	NA
E-931	COKER	Coker	E-928	V	GATE	0.75	BPA	Gas Oil	L	N	G	269	70	N
E-933	COKER	Coker	E-928	C	Threaded Connector	0.75	BPA	Gas Oil	L	N	G	350	70	NA
E-935	COKER	Coker	E-928	V	GATE	6.00	BPA	Gas Oil	L	N	G	436	70	Y
E-937	COKER	Coker	E-928	C	FLANGE	6.00	BPA	Gas Oil	L	N	G	465	70	NA
E-939	COKER	Coker	E-903	V	CONTROL	8.00	BPA	Gas Oil	L	N	G	445	95	Y
E-941	COKER	Coker	E-903	V	GATE	1.50	BPA	Gas Oil	L	N	G	233	95	Y
E-943	COKER	Coker	E-903	C	BULL PLUG	1.50	BPA	Gas Oil	L	N	G	81	95	NA
E-945	COKER	Coker	E-903	V	GATE	8.00	BPA	Gas Oil	L	N	G	453	95	Y
E-947	COKER	Coker	E-903	V	GATE	8.00	BPA	Gas Oil	L	N	G	227	95	Y
E-949	COKER	Coker	E-903	V	GATE	8.00	BPA	Gas Oil	L	N	G	221	95	Y
E-951	COKER	Coker	E-903	V	GATE	0.75	BPA	Gas Oil	L	N	G	128	95	Y
E-953	COKER	Coker	E-903	C	BULL PLUG	0.75	BPA	Gas Oil	L	N	G	128	95	NA
E-955	COKER	Coker	P-921B	C	Pump Housing	2.00	POLYSULFICE	Polysulfice	L	N	G	80	220	NA
E-957	COKER	Coker	P-921A	C	Pump Housing	2.00	POLYSULFICE	Polysulfice	L	N	G	79	50	NA
E-959	COKER	Coker	E-903	V	CONTROL	12.00	BPA	Gas Oil	L	N	G	425	95	Y
E-961	COKER	Coker	E-903	V	GATE	1.00	BPA	Gas Oil	L	N	G	165	95	N
E-963	COKER	Coker	E-903	C	Threaded Connector	1.00	BPA	Gas Oil	L	N	G	118	95	NA
E-965	COKER	Coker	E-903	V	GATE	12.00	BPA	Gas Oil	L	N	G	323	95	Y
E-967	COKER	Coker	E-903	V	GATE	0.75	BPA	Gas Oil	L	N	G	107	95	Y
E-969	COKER	Coker	E-903	V	GATE	12.00	BPA	Gas Oil	L	N	G	440	95	Y
E-971	COKER	Coker	E-903	V	GATE	0.75	BPA	Gas Oil	L	N	G	193	95	N
E-973	COKER	Coker	E-903	C	ELBOW	0.75	BPA	Gas Oil	L	N	G	193	95	NA
E-975	COKER	Coker	E-903	V	GATE	12.00	BPA	Gas Oil	L	N	G	225	95	Y
E-977	COKER	Coker	E-903	V	GATE	0.75	BPA	Gas Oil	L	N	G	110	95	N
E-979	COKER	Coker	E-903	C	BULL PLUG	0.75	BPA	Gas Oil	L	N	G	110	95	NA
E-981	COKER	Coker	E-903	V	GATE	0.75	MPA	Gas Oil	L	N	G	129	50	N
E-983	COKER	Coker	E-903	V	GATE	1.50	MPA	Gas Oil	L	N	G	151	50	Y
E-985	COKER	Coker	E-903	C	FLANGE	1.50	MPA	Gas Oil	L	N	G	151	50	NA
E-987	COKER	Coker	E-903	V	GATE	0.75	MPA	Gas Oil	L	N	G	117	50	Y
E-989	COKER	Coker	E-903	C	BULL PLUG	0.75	MPA	Gas Oil	L	N	G	117	50	NA
E-909	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	G	64	0	N
E-911	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	G	64	0	N
E-913	COKER	Coker	CV-M065	C	FLANGE	4.00	SLUDGE	Sludge	N	N	G	63	0	NA
E-915	COKER	Coker	CV-M065	V	GATE	4.00	SLUDGE	Sludge	N	N	G	62	0	Y
E-917	COKER	Coker	CV-M065	C	FLANGE	4.00	SLUDGE	Sludge	N	N	P	62	0	NA
E-919	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	P	63	0	N
E-921	COKER	Coker	CV-M065	V	CONTROL	4.00	SLUDGE	Sludge	N	N	P	62	0	Y
E-923	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	P	63	0	N
E-925	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	P	64	0	N
E-927	COKER	Coker	CV-M065	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	P	63	0	NA
E-929	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	P	64	0	N
E-931	COKER	Coker	CV-M065	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	P	77	0	NA

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E-933	COKER	Coker	CV-M065	C	HATCH	8.00	SLUDGE	Sludge	N	N	P	61	0	NA
E-935	COKER	Coker	CV-M065	V	GATE	8.00	SLUDGE	Sludge	N	N	P	62	0	Y
E-937	COKER	Coker	CV-M065	C	HATCH	8.00	SLUDGE	Sludge	N	N	P	63	0	NA
E-939	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	P	67	0	N
E-941	COKER	Coker	CV-M065	C	ELBOW	0.75	SLUDGE	Sludge	N	N	P	67	0	NA
E-943	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	G	68	0	N
E-945	COKER	Coker	CV-M065	V	GATE	1.00	SLUDGE	Sludge	N	N	G	66	0	N
E-947	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	G	68	0	N
E-949	COKER	Coker	CV-M065	C	Threaded Connector	0.75	SLUDGE	Sludge	N	N	G	66	0	NA
E-951	COKER	Coker	CV-M065	C	FLANGE	4.00	SLUDGE	Sludge	N	N	G	65	0	NA
E-953	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	G	70	0	N
E-955	COKER	Coker	CV-M065	C	CONTROL	4.00	SLUDGE	Sludge	N	N	G	66	0	NA
E-957	COKER	Coker	CV-M065	V	BALL VALVE	4.00	SLUDGE	Sludge	N	N	G	67	0	Y
E-959	COKER	Coker	CV-M065	V	GATE	4.00	SLUDGE	Sludge	N	N	G	64	0	Y
E-961	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	G	65	0	N
E-963	COKER	Coker	CV-M065	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	G	79	0	NA
E-965	COKER	Coker	CV-M065	V	GATE	0.75	SLUDGE	Sludge	N	N	G	77	0	N
E-967	COKER	Coker	CV-M065	C	ELBOW	0.75	SLUDGE	Sludge	N	N	G	21	0	NA
E-969	COKER	Coker	D-920	V	GATE	3.00	SLUDGE	Sludge	N	N	G	65	0	Y
E-971	COKER	Coker	D-920	V	GATE	0.75	SLUDGE	Sludge	N	N	G	67	0	N
E-973	COKER	Coker	D-920	C	TEE	0.75	SLUDGE	Sludge	N	N	G	66	0	NA
E-975	COKER	Coker	D-920	C	FLANGE	3.00	SLUDGE	Sludge	N	N	G	69	0	NA
E-977	COKER	Coker	P-930B	V	GATE	2.00	SLUDGE	Sludge	N	N	G	65	7.5	N
E-979	COKER	Coker	P-930B	C	COUPLING	0.75	SLUDGE	Sludge	N	N	G	73	7.5	NA
E-981	COKER	Coker	P-930B	V	GATE	2.00	SLUDGE	Sludge	N	N	G	65	7.5	N
E-983	COKER	Coker	P-930B	C	COUPLING	0.75	SLUDGE	Sludge	N	N	G	65	7.5	NA
E-985	COKER	Coker	P-930B	V	GATE	10.00	SLUDGE	Sludge	N	N	G	65	7.5	Y
E-987	COKER	Coker	P-930B	V	GATE	1.00	SLUDGE	Sludge	N	N	G	63	7.5	Y
E-989	COKER	Coker	P-930A	V	GATE	2.00	SLUDGE	Sludge	N	N	G	65	72	N
E-991	COKER	Coker	P-930A	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	G	64	72	NA
E-993	COKER	Coker	P-930A	V	GATE	10.00	SLUDGE	Sludge	N	N	G	66	72	Y
E-995	COKER	Coker	P-930A	V	GATE	2.00	SLUDGE	Sludge	N	N	G	63	72	N
E-997	COKER	Coker	P-930A	C	FLANGE	3.00	SLUDGE	Sludge	N	N	G	66	72	NA
E-999	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	64	72	N
E-1001	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	65	72	N
E-1003	COKER	Coker	P-930A	C	Threaded Connector	0.50	SLUDGE	Sludge	N	N	G	62	72	NA
E-1005	COKER	Coker	P-930A	C	TEE	0.50	SLUDGE	Sludge	N	N	G	65	72	NA
E-1007	COKER	Coker	P-930A	V	NEEDLE	0.50	SLUDGE	Sludge	N	N	G	66	72	Y
E-1009	COKER	Coker	P-930A	C	Threaded Connector	0.50	SLUDGE	Sludge	N	N	G	65	72	NA
E-1011	COKER	Coker	P-930A	C	COUPLING	0.50	SLUDGE	Sludge	N	N	G	65	72	NA
E-1013	COKER	Coker	P-930A	C	TEE	0.50	SLUDGE	Sludge	N	N	G	64	72	NA
E-1015	COKER	Coker	P-930A	V	NEEDLE	0.50	SLUDGE	Sludge	N	N	G	66	72	Y
E-1017	COKER	Coker	P-930A	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	65	72	Y
E-1019	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	65	72	N
E-1021	COKER	Coker	P-930A	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	G	64	72	NA
E-1023	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	66	72	N
E-1025	COKER	Coker	P-930A	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	G	66	72	NA
E-1027	COKER	Coker	P-930A	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	68	74	Y
E-1029	COKER	Coker	P-930A	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	67	74	Y
E-1031	COKER	Coker	P-930A	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	68	74	Y
E-1033	COKER	Coker	P-930A	C	FLANGE	3.00	SLUDGE	Sludge	N	N	G	68	74	NA
E-1035	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	69	74	N
E-1037	COKER	Coker	P-930A	C	BULL PLUG	0.50	SLUDGE	Sludge	N	N	G	68	74	NA
E-1039	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	69	74	N
E-1041	COKER	Coker	P-930A	V	BALL VALVE	2.00	SLUDGE	Sludge	N	N	G	69	74	Y
E-1043	COKER	Coker	P-930A	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	68	74	Y
E-1045	COKER	Coker	P-930A	V	BALL VALVE	2.00	SLUDGE	Sludge	N	N	G	68	74	Y
E-1047	COKER	Coker	P-930A	C	FLANGE	2.00	SLUDGE	Sludge	N	N	G	69	74	NA
E-1049	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	70	74	N
E-1051	COKER	Coker	P-930A	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	G	70	74	NA
E-1053	COKER	Coker	P-930A	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	67	0	Y
E-1055	COKER	Coker	P-930A	V	GATE	0.75	SLUDGE	Sludge	N	N	G	68	0	N
E-1057	COKER	Coker	P-930A	C	TEE	0.75	SLUDGE	Sludge	N	N	G	69	0	NA
E-1059	COKER	Coker	P-930B	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	68	0	Y
E-1061	COKER	Coker	P-930B	C	FLANGE	3.00	SLUDGE	Sludge	N	N	G	68	0	NA
E-1063	COKER	Coker	P-930B	V	GATE	0.75	SLUDGE	Sludge	N	N	G	70	0	N
E-1065	COKER	Coker	P-930B	V	GATE	0.75	SLUDGE	Sludge	N	N	G	68	0	N
E-1067	COKER	Coker	P-930B	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	G	68	0	NA
E-1069	COKER	Coker	P-930B	V	BALL VALVE	3.00	SLUDGE	Sludge	N	N	G	67	0	Y
E-1071	COKER	Coker	P-930B	V	GATE	0.75	SLUDGE	Sludge	N	N	G	67	0	Y
E-1073	COKER	Coker	P-930B	C	BULL PLUG	0.75	SLUDGE	Sludge	N	N	G	67	0	NA
E-1075	COKER	Coker	P-930B	V	GATE	0.75	SLUDGE	Sludge	N	N	G	67	0	N
E-1077	COKER	Coker	P-930B	C	TUBE FITTING	0.50	SLUDGE	Sludge	N	N	G	67	0	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1079	COKER	Coker	P-930B	V	NEEDLE	0.50	SLUDGE	Sludge	N	N	G	68	0	Y
E-1081	COKER	Coker	P-930B	C	Threaded Connector	0.50	SLUDGE	Sludge	N	N	G	68	0	NA
E-1083	COKER	Coker	P-930B	C	TEE	0.50	SLUDGE	Sludge	N	N	G	68	0	NA
E-1085	COKER	Coker	P-930B	V	NEEDLE	0.50	SLUDGE	Sludge	N	N	G	68	0	Y
E-1087	COKER	Coker	D-920	C	BULL PLUG	2.00	SLUDGE	Sludge	L	N	G	91	18	NA
E-1089	COKER	Coker	D-920	V	GATE	4.00	SLUDGE	Sludge	L	N	G	148	18	Y
E-1091	COKER	Coker	D-920	V	GATE	0.75	SLUDGE	Sludge	L	N	G	119	18	N
E-1093	COKER	Coker	D-920	C	BULL PLUG	0.75	SLUDGE	Sludge	L	N	G	104	18	NA
E-1095	COKER	Coker	CV-9F036	V	CONTROL	4.00	SLUDGE	Sludge	L	N	G	142	18	Y
E-1097	COKER	Coker	CV-9F036	V	GATE	6.00	SLUDGE	Sludge	L	N	G	258	18	Y
E-1099	COKER	Coker	CV-9F036	V	GATE	0.50	SLUDGE	Sludge	L	N	G	90	18	N
E-1101	COKER	Coker	CV-9F036	C	Threaded Connector	0.50	SLUDGE	Sludge	L	N	G	97	18	NA
E-1103	COKER	Coker	CV-9F036	V	GATE	0.75	SLUDGE	Sludge	L	N	G	120	18	Y
E-1105	COKER	Coker	CV-9F036	V	GATE	0.50	SLUDGE	Sludge	L	N	G	94	18	N
E-1107	COKER	Coker	CV-9F036	C	COUPLING	0.50	SLUDGE	Sludge	L	N	G	102	18	NA
E-1109	COKER	Coker	CV-9F036	C	FLANGE	6.00	SLUDGE	Sludge	L	N	G	255	18	NA
E-1111	COKER	Coker	CV-9F036	V	GATE	2.00	SLUDGE	Sludge	L	N	G	103	18	N
E-1113	COKER	Coker	CV-9F036	C	BULL PLUG	2.00	SLUDGE	Sludge	L	N	G	88	18	NA
E-1115	COKER	Coker	CV-9F036	C	FLANGE	6.00	SLUDGE	Sludge	L	N	G	291	18	NA
E-1117	COKER	Coker	CV-9F036	V	MOV	10.00	SLUDGE	Sludge	L	N	G	315	21	Y
E-1119	COKER	Coker	CV-9F036	V	GATE	0.75	SLUDGE	Sludge	L	N	G	95	21	Y
E-1121	COKER	Coker	CV-9F036	C	TEE	0.75	SLUDGE	Sludge	L	N	G	91	21	NA
E-1123	COKER	Coker	CV-9F036	C	ELBOW	0.75	SLUDGE	Sludge	L	N	G	88	21	NA
E-1125	COKER	Coker	CV-9F036	C	ELBOW	0.75	SLUDGE	Sludge	L	N	G	93	21	NA
E-1127	COKER	Coker	CV-9F036	V	GATE	0.75	SLUDGE	Sludge	L	N	G	101	21	Y
E-1129	COKER	Coker	CV-9F036	V	GATE	0.75	SLUDGE	Sludge	L	N	G	94	21	Y
E-1131	COKER	Coker	CV-9F036	C	BULL PLUG	0.75	SLUDGE	Sludge	L	N	G	100	21	NA
E-1133	COKER	Coker	CV-9F036	V	GATE	0.75	SLUDGE	Sludge	L	N	G	140	21	Y
E-1135	COKER	Coker	CV-9F036	C	FLANGE	10.00	SLUDGE	Sludge	L	N	G	298	21	NA
E-1137	COKER	Coker	CV-9F036	V	GATE	0.75	SLUDGE	Sludge	L	N	G	136	21	N
E-1139	COKER	Coker	T-902	V	GATE	10.00	SLUDGE	Sludge	L	N	P	307	42	Y
E-1141	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	151	42	N
E-1143	COKER	Coker	T-902	C	UNION	0.75	SLUDGE	Sludge	L	N	P	119	42	NA
E-1145	COKER	Coker	T-902	V	BALL VALVE	2.00	SLUDGE	Sludge	L	N	P	124	42	Y
E-1147	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	106	42	N
E-1149	COKER	Coker	T-902	C	BULL PLUG	0.50	SLUDGE	Sludge	L	N	P	103	42	NA
E-1151	COKER	Coker	T-902	C	CONTROL	0.75	SLUDGE	Sludge	L	N	P	103	42	NA
E-1153	COKER	Coker	T-902	V	GATE	3.00	SLUDGE	Sludge	L	N	P	143	42	Y
E-1155	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	133	42	N
E-1157	COKER	Coker	T-902	C	BULL PLUG	0.75	SLUDGE	Sludge	L	N	P	105	42	NA
E-1159	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	100	42	Y
E-1161	COKER	Coker	T-902	C	FLANGE	3.00	SLUDGE	Sludge	L	N	P	215	42	NA
E-1163	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	174	42	N
E-1165	COKER	Coker	T-902	C	TEE	0.75	SLUDGE	Sludge	L	N	P	138	42	NA
E-1167	COKER	Coker	T-902	C	BULL PLUG	0.75	SLUDGE	Sludge	L	N	P	316	42	NA
E-1169	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	118	42	Y
E-1171	COKER	Coker	T-902	V	GATE	3.00	SLUDGE	Sludge	L	N	P	265	42	Y
E-1173	COKER	Coker	T-902	C	FLANGE	3.00	SLUDGE	Sludge	L	N	P	244	42	NA
E-1175	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	127	42	N
E-1177	COKER	Coker	T-902	V	CONTROL	3.00	SLUDGE	Sludge	L	N	P	211	42	Y
E-1179	COKER	Coker	T-902	V	GATE	3.00	SLUDGE	Sludge	L	N	P	286	44	Y
E-1181	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	133	44	Y
E-1183	COKER	Coker	T-902	C	BULL PLUG	0.75	SLUDGE	Sludge	L	N	P	259	44	NA
E-1185	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	124	44	Y
E-1187	COKER	Coker	T-902	V	CONTROL	3.00	SLUDGE	Sludge	L	N	P	274	44	Y
E-1189	COKER	Coker	T-902	C	FLANGE	3.00	SLUDGE	Sludge	L	N	P	266	44	NA
E-1191	COKER	Coker	T-902	V	GATE	2.00	SLUDGE	Sludge	L	N	P	128	285	Y
E-1193	COKER	Coker	T-902	C	FLANGE	2.00	SLUDGE	Sludge	L	N	P	120	285	NA
E-1195	COKER	Coker	T-902	V	GATE	2.00	SLUDGE	Sludge	L	N	P	123	285	Y
E-1197	COKER	Coker	T-902	V	BALL VALVE	2.00	SLUDGE	Sludge	L	N	P	123	285	Y
E-1199	COKER	Coker	T-902	V	GATE	2.00	SLUDGE	Sludge	L	N	P	222	285	Y
E-1201	COKER	Coker	T-902	C	FLANGE	2.00	SLUDGE	Sludge	L	N	P	195	285	NA
E-1203	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	119	285	N
E-1205	COKER	Coker	T-902	V	GATE	10.00	SLUDGE	Sludge	L	N	P	105	285	Y
E-1207	COKER	Coker	T-902	C	FLANGE	10.00	SLUDGE	Sludge	L	N	P	106	285	NA
E-1209	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	186	285	Y
E-1211	COKER	Coker	T-902	V	GATE	0.75	HOT SOLIDS	Coke	L	N	P	181	85	Y
E-1213	COKER	Coker	T-902	C	BULL PLUG	0.75	HOT SOLIDS	Coke	L	N	P	583	85	NA
E-1215	COKER	Coker	T-902	V	GATE	0.75	HOT SOLIDS	Coke	L	N	P	152	85	Y
E-1217	COKER	Coker	T-902	V	GATE	0.75	HOT SOLIDS	Coke	L	N	P	289	85	Y
E-1219	COKER	Coker	T-902	V	GATE	0.75	HOT SOLIDS	Coke	L	N	P	142	85	Y
E-1221	COKER	Coker	T-902	C	BULL PLUG	0.75	HOT SOLIDS	Coke	L	N	P	150	85	NA
E-1223	COKER	Coker	T-902	V	GATE	0.75	HOT SOLIDS	Coke	L	N	P	122	85	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1225	COKER	Coker	T-902	V	MOV	10.00	HOT SOLIDS	Coke	L	N	P	413	85	N
E-1227	COKER	Coker	T-902	V	GATE	2.00	HOT SOLIDS	Coke	L	N	P	243	85	Y
E-1229	COKER	Coker	T-902	V	GATE	2.00	HOT SOLIDS	Coke	L	N	P	211	85	Y
E-1231	COKER	Coker	T-902	C	FLANGE	2.00	HOT SOLIDS	Coke	L	N	P	194	85	NA
E-1233	COKER	Coker	T-902	V	GATE	2.00	HOT SOLIDS	Coke	L	N	P	117	85	N
E-1798	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	H	N	P	130	150	N
E-1800	COKER	Coker	R-901	C	FLANGE	0.75	PITCH	Asphalt	H	N	P	325	150	NA
E-1802	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	H	N	P	288	150	N
E-1804	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	H	N	P	166	150	N
E-1806	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	H	N	P	199	150	Y
E-1808	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	H	N	P	147	150	Y
E-1810	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	H	N	P	161	150	Y
E-1812	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	H	N	P	168	150	NA
E-1814	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	H	N	P	426	150	Y
E-1816	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	255	150	N
E-1818	COKER	Coker	R-901	V	GATE	2.00	PITCH	Asphalt	L	N	P	269	150	Y
E-1820	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	186	150	Y
E-1822	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	196	150	Y
E-1824	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	146	150	NA
E-1826	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	222	150	Y
E-1828	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	160	150	Y
E-1830	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	183	150	Y
E-1832	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	258	150	N
E-1834	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	151	150	NA
E-1836	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	190	150	Y
E-1838	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	214	150	Y
E-1840	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	172	150	Y
E-1842	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	169	150	N
E-1844	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	148	150	NA
E-1846	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	237	150	Y
E-1848	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	149	150	Y
E-1850	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	122	150	Y
E-1852	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	160	150	NA
E-1854	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	22	150	Y
E-1856	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	149	150	N
E-1858A	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	299	150	Y
E-1860A	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	275	150	Y
E-1862A	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	157	150	NA
E-1864A	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	219	150	Y
E-1866A	COKER	Coker	R-901	V	GATE	1.50	PITCH	Asphalt	L	N	P	217	150	N
E-1868A	COKER	Coker	R-901	C	FLANGE	1.50	PITCH	Asphalt	L	N	P	119	150	NA
E-1870A	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	110	150	N
E-1872A	COKER	Coker	R-901	C	Threaded Connector	0.75	PITCH	Asphalt	L	N	P	137	150	NA
E-1874A	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	228	150	Y
E-1876A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	283	150	Y
E-1878A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	255	150	Y
E-1880A	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	160	150	NA
E-1882A	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	206	150	Y
E-1884A	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	309	150	N
E-1886A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	291	150	N
E-1888A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	194	150	Y
E-1890A	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	147	150	NA
E-1892A	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	155	150	Y
E-1894A	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	199	150	N
E-1896A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	294	150	Y
E-1898A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	283	150	Y
E-1900A	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	163	150	NA
E-1902A	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	219	150	Y
E-1904A	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	153	150	N
E-1906A	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	266	180	N
E-1908A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	305	180	Y
E-1910A	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	259	180	Y
E-1912A	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	192	180	NA
E-1914A	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	219	180	Y
E-1916A	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	210	180	Y
E-1858B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	295	180	Y
E-1860B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	225	180	Y
E-1862B	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	111	180	NA
E-1864B	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	144	180	Y
E-1866B	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	189	180	N
E-1868B	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	181	180	N
E-1870B	COKER	Coker	R-901	V	BELLOW SEAL	0.75	PITCH	Asphalt	L	N	P	211	180	N
E-1872B	COKER	Coker	R-901	C	Threaded Connector	0.75	PITCH	Asphalt	L	N	P	150	180	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1874B	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	252	180	N
E-1876B	COKER	Coker	R-901	V	BELLOW SEAL	0.75	PITCH	Asphalt	L	N	P	201	180	N
E-1878B	COKER	Coker	R-901	C	BULL PLUG	0.75	PITCH	Asphalt	L	N	P	123	180	NA
E-1880B	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	200	170	Y
E-1882B	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	190	170	NA
E-1884B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	239	170	Y
E-1886B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	239	170	N
E-1888B	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	285	170	N
E-1890B	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	188	180	Y
E-1892B	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	496	180	N
E-1894B	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	146	180	NA
E-1896B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	199	180	Y
E-1898B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	203	180	Y
E-1900B	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	170	150	Y
E-1902B	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	174	150	NA
E-1904B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	282	150	Y
E-1906B	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	315	150	Y
E-1908B	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	253	150	N
E-1910B	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	222	40	Y
E-1912B	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	246	40	N
E-1914B	COKER	Coker	R-901	C	Threaded Connector	0.75	PITCH	Asphalt	L	N	P	191	40	NA
E-1916B	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	227	40	N
E-1918	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	196	40	N
E-1920	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	182	40	N
E-1922	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	247	40	N
E-1924	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	162	40	N
E-1926	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	96	40	Y
E-1928	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	115	40	N
E-1930	COKER	Coker	R-901	C	Threaded Connector	0.75	PITCH	Asphalt	L	N	P	129	40	NA
E-1932	COKER	Coker	R-901	C	Threaded Connector	0.75	PITCH	Asphalt	L	N	P	137	40	NA
E-1934	COKER	Coker	R-901	C	FLANGE	0.75	PITCH	Asphalt	L	N	P	88	40	NA
E-1936	COKER	Coker	R-901	C	BULL PLUG	0.75	PITCH	Asphalt	L	N	P	165	40	NA
E-1938	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	228	170	Y
E-1940	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	176	170	NA
E-1942	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	290	170	N
E-1944	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	254	170	Y
E-1946	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	303	170	Y
E-1948	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	137	180	Y
E-1950	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	153	180	NA
E-1952	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	271	180	N
E-1954	COKER	Coker	R-901	C	FLANGE	1.50	PITCH	Asphalt	L	N	P	400	180	NA
E-1956	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	178	180	Y
E-1958	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	190	180	N
E-1960	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	159	190	Y
E-1962	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	288	190	Y
E-1964	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	124	190	NA
E-1966	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	131	190	Y
E-1968	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	168	190	N
E-1970	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	142	180	Y
E-1972	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	124	180	NA
E-1974	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	299	180	Y
E-1976	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	283	180	Y
E-1978	COKER	Coker	R-901	V	GATE	6.00	PITCH	Asphalt	L	N	P	266	150	Y
E-1980	COKER	Coker	R-901	C	FLANGE	6.00	PITCH	Asphalt	L	N	P	233	150	NA
E-1982	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	257	180	N
E-1984	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	219	180	Y
E-1986	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	189	180	NA
E-1988	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	263	180	Y
E-1990	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	279	180	Y
E-1992	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	295	170	Y
E-1994	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	211	170	Y
E-1996	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	158	170	NA
E-1998	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	223	170	Y
E-2000	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	286	170	N
E-2002	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	141	500	Y
E-2004	COKER	Coker	R-901	V	GATE	0.75	PITCH	Asphalt	L	N	P	201	500	Y
E-2006	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	273	500	N
E-2008	COKER	Coker	R-901	V	BELLOW SEAL	1.00	PITCH	Asphalt	L	N	P	138	500	N
E-2010	COKER	Coker	R-901	C	BULL PLUG	1.00	PITCH	Asphalt	L	N	P	127	500	NA
E-2012	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	194	500	N
E-2014	COKER	Coker	R-901	V	BELLOW SEAL	0.75	PITCH	Asphalt	L	N	P	195	500	N
E-2016	COKER	Coker	R-901	C	ELBOW	0.75	PITCH	Asphalt	L	N	P	142	500	NA
E-2018	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	324	120	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-2020	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	291	120	Y
E-2022	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	170	120	NA
E-2024	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	147	120	Y
E-2026	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	261	120	N
E-2028	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	217	450	Y
E-2030	COKER	Coker	R-901	V	GATE	1.00	PITCH	Asphalt	L	N	P	334	450	Y
E-2032	COKER	Coker	R-901	C	BULL PLUG	1.50	PITCH	Asphalt	L	N	P	186	450	NA
E-2034	COKER	Coker	R-901	V	GATE	3.00	PITCH	Asphalt	L	N	P	165	450	N
E-2036	COKER	Coker	R-901	V	BELLOW SEAL	1.50	PITCH	Asphalt	L	N	P	210	450	N
E-1531	JHT	Hydrotreater	D-106	C	BULL PLUG	0.75	JET	Jet	N	N	P	144	32	NA
E-1533	JHT	Hydrotreater	D-106	V	GATE	6.00	JET	Jet	N	N	P	345	32	Y
E-1535	JHT	Hydrotreater	D-106	V	GATE	6.00	JET	Jet	N	N	P	223	32	Y
E-1537	JHT	Hydrotreater	D-106	C	FLANGE	6.00	JET	Jet	N	N	P	225	32	NA
E-1539	JHT	Hydrotreater	D-106	V	GATE	6.00	JET	Jet	N	N	P	340	32	Y
E-1541	JHT	Hydrotreater	D-106	V	GATE	2.00	JET	Jet	N	N	P	214	32	Y
E-1543	JHT	Hydrotreater	D-106	C	FLANGE	2.00	JET	Jet	N	N	P	180	32	NA
E-1545	JHT	Hydrotreater	D-106	V	GATE	0.75	JET	Jet	N	N	P	123	32	Y
E-1548	JHT	Hydrotreater	P-133	V	GATE	0.75	JET	Jet	N	N	G	81	45	N
E-1549	JHT	Hydrotreater	P-133	C	BULL PLUG	0.75	JET	Jet	N	N	G	81	45	NA
E-1551	JHT	Hydrotreater	P-133	V	GATE	4.00	JET	Jet	N	N	G	80	45	Y
E-1553	JHT	Hydrotreater	P-133	V	GATE	3.00	JET	Jet	N	N	G	85	45	Y
E-1555	JHT	Hydrotreater	P-133	C	FLANGE	3.00	JET	Jet	N	N	G	84	45	NA
E-1557	JHT	Hydrotreater	P-133	V	GATE	3.00	JET	Jet	N	N	G	80	45	Y
E-1559	JHT	Hydrotreater	P-133	V	GATE	0.75	JET	Jet	N	N	G	84	45	N
E-2038	JHT	Hydrotreater	E-110	C	FLANGE	6.00	JET	Jet	L	N	G	94	80	NA
E-2040	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	71	80	Y
E-2042	JHT	Hydrotreater	E-110	V	GATE	6.00	JET	Jet	L	N	G	79	80	Y
E-2044	JHT	Hydrotreater	E-110	V	GATE	6.00	JET	Jet	L	N	G	70	80	Y
E-2046	JHT	Hydrotreater	E-110	V	GATE	6.00	JET	Jet	L	N	G	74	80	Y
E-2048	JHT	Hydrotreater	E-110	V	GATE	6.00	JET	Jet	L	N	G	94	80	Y
E-2050	JHT	Hydrotreater	E-110	C	FLANGE	6.00	JET	Jet	L	N	G	95	80	NA
E-2052	JHT	Hydrotreater	E-110	V	GATE	4.00	JET	Jet	L	N	G	101	80	Y
E-2054	JHT	Hydrotreater	E-110	V	CONTROL	4.00	JET	Jet	L	N	G	95	80	Y
E-2056	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	78	80	N
E-2058	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	76	80	N
E-2060	JHT	Hydrotreater	E-110	C	FLANGE	0.75	JET	Jet	L	N	G	75	80	NA
E-2062	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	74	80	Y
E-2064	JHT	Hydrotreater	E-110	V	BALL VALVE	0.75	JET	Jet	L	N	G	74	80	N
E-2066	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	72	80	N
E-2068	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	73	80	Y
E-2070	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	76	80	N
E-2072	JHT	Hydrotreater	E-110	C	BULL PLUG	0.75	JET	Jet	L	N	G	73	80	NA
E-2074	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	74	80	N
E-2076	JHT	Hydrotreater	E-110	V	GATE	6.00	JET	Jet	L	N	G	93	80	Y
E-2078	JHT	Hydrotreater	E-110	V	GLOBE	4.00	JET	Jet	L	N	G	100	80	Y
E-2080	JHT	Hydrotreater	E-110	C	FLANGE	4.00	JET	Jet	L	N	G	98	80	NA
E-2082	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	102	80	Y
E-2084	JHT	Hydrotreater	E-110	C	Threaded Connector	0.75	JET	Jet	L	N	G	94	80	NA
E-2086	JHT	Hydrotreater	E-110	C	TEE	0.75	JET	Jet	L	N	G	88	80	NA
E-2088	JHT	Hydrotreater	E-110	V	G	0.75	JET	Jet	L	N	G	86	80	Y
E-2090	JHT	Hydrotreater	E-110	C	TUBE FITTING	0.25	JET	Jet	L	N	G	86	80	NA
E-2092	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	86	80	N
E-2094	JHT	Hydrotreater	E-110	V	GATE	0.75	JET	Jet	L	N	G	84	80	N
E-2096	JHT	Hydrotreater	E-110	C	BULL PLUG	0.75	JET	Jet	L	N	G	84	80	NA
E-2098	JHT	Hydrotreater	E-107	V	NEEDLE	0.25	JET	Jet	N	N	G	108	150	Y
E-2100	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	N	N	G	122	150	Y
E-2102	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	N	N	G	112	150	Y
E-2104	JHT	Hydrotreater	E-107	C	FLANGE	0.75	JET	Jet	N	N	G	113	150	NA
E-2106	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	N	N	G	105	150	N
E-2108	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	N	N	G	108	150	Y
E-2110	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	N	N	G	143	150	Y
E-2112	JHT	Hydrotreater	E-107	V	GATE	4.00	JET	Jet	N	N	G	242	150	Y
E-2114	JHT	Hydrotreater	E-107	V	GATE	4.00	JET	Jet	N	N	G	268	150	Y
E-1235	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	268	285	Y
E-1237	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	257	285	Y
E-1239	COKER	Coker	T-902	C	ELBOW	0.50	SLUDGE	Sludge	L	N	P	128	285	NA
E-1241	COKER	Coker	T-902	C	TUBE FITTING	0.50	SLUDGE	Sludge	L	N	P	135	285	NA
E-1243	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	161	285	Y
E-1245	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	165	285	Y
E-1247	COKER	Coker	T-902	V	GATE	2.00	SLUDGE	Sludge	L	N	P	209	285	Y
E-1249	COKER	Coker	T-902	C	BULL PLUG	2.00	SLUDGE	Sludge	L	N	P	153	285	NA
E-1251	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	249	285	Y
E-1253	COKER	Coker	T-902	C	ELBOW	0.50	SLUDGE	Sludge	L	N	P	378	285	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1255	COKER	Coker	T-902	C	REDUCER	0.50	SLUDGE	Sludge	L	N	P	283	285	NA
E-1257	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	224	285	Y
E-1259	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	276	285	Y
E-1261	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	113	285	Y
E-1263	COKER	Coker	T-902	C	FLANGE	0.75	SLUDGE	Sludge	L	N	P	70	285	NA
E-1265	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	107	285	Y
E-1267	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	75	285	Y
E-1269	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	174	285	Y
E-1271	COKER	Coker	T-902	C	FLANGE	0.75	SLUDGE	Sludge	L	N	P	189	285	NA
E-1273	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	174	285	Y
E-1275	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	135	285	Y
E-1277	COKER	Coker	T-902	C	FLANGE	2.00	SLUDGE	Sludge	L	N	P	171	285	NA
E-1279	COKER	Coker	T-902	V	GATE	20.00	SLUDGE	Sludge	L	N	P	601	285	Y
E-1281	COKER	Coker	T-902	V	GATE	0.50	SLUDGE	Sludge	L	N	P	158	70	Y
E-1283	COKER	Coker	T-902	C	BULL PLUG	0.50	SLUDGE	Sludge	L	N	P	119	70	NA
E-1285	COKER	Coker	T-902	V	GATE	2.00	SLUDGE	Sludge	L	N	P	244	70	Y
E-1287	COKER	Coker	T-902	C	CONTROL	2.00	SLUDGE	Sludge	L	N	P	168	70	NA
E-1289	COKER	Coker	T-902	V	GATE	2.00	SLUDGE	Sludge	L	N	P	280	70	Y
E-1291	COKER	Coker	T-902	V	GATE	0.75	SLUDGE	Sludge	L	N	P	307	70	Y
E-1293	COKER	Coker	T-902	C	FLANGE	0.75	SLUDGE	Sludge	L	N	P	317	70	NA
E-1295	COKER	Coker	R-902	V	GATE	0.75	PITCH	Asphalt	L	N	P	192	180	Y
E-1297	COKER	Coker	R-902	C	BULL PLUG	0.75	PITCH	Asphalt	L	N	P	88	180	NA
E-1299	COKER	Coker	R-902	V	GATE	2.00	PITCH	Asphalt	L	N	P	140	180	Y
E-1301	COKER	Coker	R-902	V	GATE	2.00	PITCH	Asphalt	L	N	P	211	180	Y
E-1303	COKER	Coker	R-902	V	GATE	0.75	PITCH	Asphalt	L	N	P	282	170	Y
E-1305	COKER	Coker	R-902	C	BULL PLUG	2.00	PITCH	Asphalt	L	N	P	156	170	NA
E-1307	COKER	Coker	R-902	V	GATE	2.00	PITCH	Asphalt	L	N	P	170	170	Y
E-1309	COKER	Coker	R-902	V	GATE	0.75	PITCH	Asphalt	L	N	P	278	450	Y
E-1311	COKER	Coker	R-902	C	BULL PLUG	2.00	PITCH	Asphalt	L	N	P	127	450	NA
E-1313	COKER	Coker	R-902	V	GATE	2.00	PITCH	Asphalt	L	N	P	106	450	Y
E-1315	COKER	Coker	R-902	V	GATE	2.00	PITCH	Asphalt	L	N	P	132	450	Y
E-1317	COKER	Coker	R-902	V	GATE	0.75	PITCH	Asphalt	L	N	P	201	180	Y
E-1319	COKER	Coker	R-902	C	BULL PLUG	2.00	PITCH	Asphalt	L	N	P	118	180	NA
E-1321	COKER	Coker	R-902	V	GATE	2.00	PITCH	Asphalt	L	N	P	145	180	Y
E-1323	COKER	Coker	R-902	V	GATE	2.00	PITCH	Asphalt	L	N	P	133	180	Y
E-1325	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	L	N	P	112	14	Y
E-1327	COKER	Coker	T-903	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	79	14	NA
E-1329	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	L	N	P	211	14	Y
E-1331	COKER	Coker	T-903	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	119	14	NA
E-1333	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	L	N	P	72	14	N
E-1335	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	L	N	P	66	14	N
E-1337	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	L	N	P	102	14	N
E-1339	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	L	N	P	115	14	Y
E-1341	COKER	Coker	T-903	C	BULL PLUG	0.75	HGO	Gas Oil	L	N	P	76	14	NA
E-1343	COKER	Coker	T-903	V	NEEDLE	0.50	HGO	Gas Oil	L	N	P	74	14	Y
E-1345	COKER	Coker	T-903	V	NEEDLE	0.50	HGO	Gas Oil	L	N	P	77	14	Y
E-1347	COKER	Coker	T-903	V	NEEDLE	0.50	HGO	Gas Oil	L	N	P	79	14	Y
E-1349	COKER	Coker	T-903	V	GATE	0.75	HGO	Gas Oil	L	N	P	123	14	Y
E-1351	COKER	Coker	T-903	V	NEEDLE	0.50	HGO	Gas Oil	L	N	P	99	34	Y
E-1353	JHT	Hydrotreater	T-106C	V	CONTROL	3.00	JET	Jet	L	N	G	291	34	Y
E-1355	JHT	Hydrotreater	T-106C	C	FLANGE	3.00	JET	Jet	L	N	G	281	34	NA
E-1357	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	L	N	G	154	34	N
E-1359	JHT	Hydrotreater	T-106C	V	GATE	4.00	JET	Jet	L	N	G	351	34	Y
E-1361	JHT	Hydrotreater	T-106C	C	FLANGE	4.00	JET	Jet	L	N	G	340	34	NA
E-1363	JHT	Hydrotreater	T-106C	V	GATE	2.00	JET	Jet	L	N	G	176	34	Y
E-1365	JHT	Hydrotreater	T-106C	V	GATE	2.00	JET	Jet	L	N	G	160	34	Y
E-1367	JHT	Hydrotreater	T-106C	C	FLANGE	2.00	JET	Jet	L	N	G	310	34	NA
E-1369	JHT	Hydrotreater	T-106C	V	GATE	3.00	JET	Jet	L	N	G	206	47	Y
E-1371	JHT	Hydrotreater	T-106C	V	GATE	3.00	JET	Jet	L	N	G	342	47	Y
E-1373	JHT	Hydrotreater	T-106C	C	FLANGE	3.00	JET	Jet	L	N	G	310	47	NA
E-1375	JHT	Hydrotreater	T-106C	V	GATE	2.00	JET	Jet	L	N	G	268	47	Y
E-1377	JHT	Hydrotreater	T-106C	C	FLANGE	2.00	JET	Jet	L	N	G	159	47	NA
E-1379	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	L	N	G	135	47	N
E-1381	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	L	N	G	106	47	N
E-1383	JHT	Hydrotreater	T-106C	V	CONTROL	2.00	JET	Jet	N	N	G	357	32	Y
E-1385	JHT	Hydrotreater	T-106C	V	GATE	1.00	JET	Jet	N	N	G	138	32	N
E-1387	JHT	Hydrotreater	T-106C	C	BULL PLUG	1.00	JET	Jet	N	N	G	187	32	NA
E-1389	JHT	Hydrotreater	T-106C	V	GATE	4.00	JET	Jet	N	N	G	370	32	Y
E-1391	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	168	32	N
E-1393	JHT	Hydrotreater	T-106C	C	FLANGE	0.75	JET	Jet	N	N	G	105	32	NA
E-1395	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	82	32	N
E-1397	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	173	32	N
E-1399	JHT	Hydrotreater	T-106C	V	GATE	1.00	JET	Jet	N	N	G	261	32	N

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E-1401	JHT	Hydrotreater	T-106C	C	FLANGE	6.00	JET	Jet	N	N	G	317	32	NA
E-1403	JHT	Hydrotreater	T-106C	V	GATE	6.00	JET	Jet	N	N	G	343	32	Y
E-1405	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	260	32	N
E-1407	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	166	32	N
E-1409	JHT	Hydrotreater	T-106C	C	BULL PLUG	0.75	JET	Jet	N	N	G	124	32	NA
E-1411	JHT	Hydrotreater	T-106C	V	GATE	2.00	JET	Jet	N	N	G	85	32	Y
E-1413	JHT	Hydrotreater	T-106C	V	CONTROL	0.75	JET	Jet	N	N	G	81	32	N
E-1415	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	77	32	N
E-1417	JHT	Hydrotreater	T-106C	C	BULL PLUG	0.75	JET	Jet	N	N	G	77	32	NA
E-1419	JHT	Hydrotreater	T-106C	V	GATE	1.00	JET	Jet	N	N	G	82	32	Y
E-1421	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	74	32	N
E-1423	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	75	32	N
E-1425	JHT	Hydrotreater	T-106C	C	BULL PLUG	0.75	JET	Jet	N	N	G	77	32	NA
E-1427	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	78	32	N
E-1429	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	77	32	Y
E-1431	JHT	Hydrotreater	T-106C	V	GATE	1.00	JET	Jet	N	N	G	83	32	N
E-1433	JHT	Hydrotreater	T-106C	C	FLANGE	1.00	JET	Jet	N	N	G	82	32	NA
E-1435	JHT	Hydrotreater	T-106C	V	GATE	1.00	JET	Jet	N	N	G	82	32	Y
E-1437	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	G	77	32	N
E-1439	JHT	Hydrotreater	T-106C	C	BULL PLUG	0.75	JET	Jet	N	N	G	78	32	NA
E-1441	JHT	Hydrotreater	T-106C	C	FLANGE	0.75	JET	Jet	N	N	G	79	32	NA
E-1443	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	124	32	Y
E-1445	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	87	32	N
E-1447	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	93	32	Y
E-1449	JHT	Hydrotreater	T-106C	C	BULL PLUG	0.75	JET	Jet	N	N	P	86	32	NA
E-1451	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	79	32	N
E-1453	JHT	Hydrotreater	T-106C	C	Sight Glass	Unknown	JET	Jet	N	N	P	79	32	NA
E-1455	JHT	Hydrotreater	T-106C	V	GATE	1.00	JET	Jet	N	N	P	78	32	Y
E-1457	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	86	32	N
E-1459	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	85	32	N
E-1461	JHT	Hydrotreater	T-106C	C	BULL PLUG	0.75	JET	Jet	N	N	P	81	32	NA
E-1463	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	83	32	Y
E-1465	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	122	32	Y
E-1467	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	109	32	N
E-1469	JHT	Hydrotreater	T-106C	C	FLANGE	0.75	JET	Jet	N	N	P	136	32	NA
E-1471	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	99	32	Y
E-1473	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	77	32	N
E-1475	JHT	Hydrotreater	T-106C	C	BULL PLUG	0.75	JET	Jet	N	N	P	74	32	NA
E-1477	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	75	32	N
E-1479	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	79	32	N
E-1481	JHT	Hydrotreater	T-106C	C	FLANGE	0.75	JET	Jet	N	N	P	77	32	NA
E-1483	JHT	Hydrotreater	T-106C	V	GATE	0.75	JET	Jet	N	N	P	88	32	Y
E-1485	JHT	Hydrotreater	E-101	V	GATE	0.75	JET	Jet	N	N	G	143	82	N
E-1487	JHT	Hydrotreater	E-101	C	FLANGE	6.00	JET	Jet	N	N	G	231	82	NA
E-1489	JHT	Hydrotreater	E-101	C	BULL PLUG	2.00	JET	Jet	N	N	G	245	82	NA
E-1491	JHT	Hydrotreater	E-101	C	BULL PLUG	1.00	JET	Jet	N	N	G	239	82	NA
E-1493	JHT	Hydrotreater	E-101	V	GATE	0.75	JET	Jet	N	N	G	118	82	N
E-1495	JHT	Hydrotreater	E-101	C	FLANGE	6.00	JET	Jet	N	N	G	124	82	NA
E-1497	JHT	Hydrotreater	E-101	V	GATE	6.00	JET	Jet	N	N	G	196	82	Y
E-1499	JHT	Hydrotreater	E-101	V	GATE	0.75	JET	Jet	N	N	G	115	82	N
E-1501	JHT	Hydrotreater	E-101	V	GATE	0.75	DIESEL	Diesel	N	N	G	137	82	N
E-1503	JHT	Hydrotreater	E-101	C	TUBE FITTING	0.50	DIESEL	Diesel	N	N	G	95	82	NA
E-1505	JHT	Hydrotreater	E-101	C	ELBOW	0.50	DIESEL	Diesel	N	N	G	99	82	NA
E-1507	JHT	Hydrotreater	E-101	V	GATE	0.75	DIESEL	Diesel	N	N	G	121	82	N
E-1509	JHT	Hydrotreater	E-101	V	GATE	0.75	DIESEL	Diesel	N	N	G	90	82	N
E-1511	JHT	Hydrotreater	E-101	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	90	82	NA
E-1513	JHT	Hydrotreater	E-101	V	GATE	2.00	DIESEL	Diesel	N	N	G	84	82	Y
E-1515	JHT	Hydrotreater	E-101	V	GATE	0.75	DIESEL	Diesel	N	N	G	96	82	N
E-1517	JHT	Hydrotreater	E-101	V	GATE	6.00	DIESEL	Diesel	N	N	G	86	82	Y
E-1519	JHT	Hydrotreater	E-101	C	FLANGE	6.00	DIESEL	Diesel	N	N	G	88	82	NA
E-1521	JHT	Hydrotreater	E-101	V	GATE	0.75	DIESEL	Diesel	N	N	G	180	82	N
E-1523	JHT	Hydrotreater	E-101	V	GATE	6.00	DIESEL	Diesel	N	N	G	147	82	Y
E-1525	JHT	Hydrotreater	P-133	V	GATE	2.00	JET	Jet	N	N	G	81	45	Y
E-1527	JHT	Hydrotreater	D-106	V	CONTROL	3.00	JET	Jet	N	N	P	332	32	Y
E-1529	JHT	Hydrotreater	D-106	V	GATE	0.75	JET	Jet	N	N	P	140	32	N
E-2116	JHT	Hydrotreater	E-129	V	GLOBE	2.00	JET	Jet	N	N	P	74	70	Y
E-2118	JHT	Hydrotreater	E-129	C	FLANGE	2.00	JET	Jet	N	N	P	76	70	NA
E-2120	JHT	Hydrotreater	E-129	V	GATE	0.75	JET	Jet	N	N	P	103	70	Y
E-2122	JHT	Hydrotreater	E-129	C	FLANGE	6.00	JET	Jet	N	N	P	208	70	NA
E-2124	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	207	70	NA
E-2126	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	91	70	NA
E-2128	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	96	70	NA
E-2130	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	88	70	NA

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E-2132	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	143	70	NA
E-2134	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	150	70	NA
E-2136	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	121	70	NA
E-2138	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	122	70	NA
E-2140	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	121	70	NA
E-2142	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	126	70	NA
E-2144	JHT	Hydrotreater	E-129	C	BULL PLUG	0.75	JET	Jet	N	N	P	77	70	NA
E-2146	JHT	Hydrotreater	E-129	V	GATE	6.00	JET	Jet	N	N	P	77	70	Y
E-2148	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	202	70	NA
E-2150	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	185	70	NA
E-2152	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	129	70	NA
E-2154	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	144	70	NA
E-2156	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	201	70	NA
E-2158	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	176	70	NA
E-2160	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	117	70	NA
E-2162	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	133	70	NA
E-2164	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	196	70	NA
E-2166	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	181	70	NA
E-2168	JHT	Hydrotreater	E-101	C	BULL PLUG	0.75	JET	Jet	N	N	P	136	70	NA
E-2170	JHT	Hydrotreater	E-101	C	FLANGE	6.00	JET	Jet	N	N	P	211	70	NA
E-2172	JHT	Hydrotreater	E-101	C	FLANGE	6.00	JET	Jet	N	N	P	119	70	NA
E-2174	JHT	Hydrotreater	E-101	C	BULL PLUG	1.00	JET	Jet	N	N	P	112	70	NA
E-2176	JHT	Hydrotreater	E-107	V	GATE	1.00	JET	Jet	L	N	G	114	150	N
E-2178	JHT	Hydrotreater	E-107	V	CONTROL	6.00	JET	Jet	L	N	G	298	150	Y
E-2180	JHT	Hydrotreater	E-107	C	FLANGE	6.00	JET	Jet	L	N	G	283	150	NA
E-2182	JHT	Hydrotreater	E-107	V	GATE	1.00	JET	Jet	L	N	G	98	150	N
E-2184	JHT	Hydrotreater	E-107	V	GATE	3.00	JET	Jet	L	N	G	264	150	N
E-2186	JHT	Hydrotreater	E-107	V	GATE	3.00	JET	Jet	L	N	G	260	150	N
E-2188	JHT	Hydrotreater	E-107	V	GLOBE	3.00	JET	Jet	L	N	G	242	150	N
E-2190	JHT	Hydrotreater	E-107	C	FLANGE	3.00	JET	Jet	L	N	G	285	150	NA
E-2192	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	L	N	G	150	150	Y
E-2194	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	L	N	G	85	150	Y
E-2196	JHT	Hydrotreater	E-107	C	FLANGE	0.75	JET	Jet	L	N	G	79	150	NA
E-2198	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	L	N	G	96	150	N
E-2200	JHT	Hydrotreater	E-107	C	BULL PLUG	0.75	JET	Jet	L	N	G	105	150	NA
E-2202	JHT	Hydrotreater	E-105A	V	GATE	0.75	JET	Jet	L	N	G	142	150	Y
E-2204	JHT	Hydrotreater	E-105A	V	GATE	1.50	JET	Jet	L	N	G	163	150	Y
E-2206	JHT	Hydrotreater	E-105A	C	Threaded Connector	0.75	JET	Jet	L	N	G	109	150	NA
E-2208	JHT	Hydrotreater	E-105A	C	COUPLING	0.75	JET	Jet	L	N	G	135	150	NA
E-2210	JHT	Hydrotreater	E-105A	C	BULL PLUG	0.75	JET	Jet	L	N	G	106	150	NA
E-2212	JHT	Hydrotreater	E-105A	V	GATE	1.00	JET	Jet	L	N	G	106	150	N
E-2214	JHT	Hydrotreater	E-105A	C	FLANGE	4.00	JET	Jet	L	N	G	270	150	NA
E-2216	JHT	Hydrotreater	E-105A	V	GATE	0.75	JET	Jet	L	N	G	89	150	N
E-2218	JHT	Hydrotreater	E-105A	C	BULL PLUG	0.75	JET	Jet	L	N	G	89	150	NA
E-2220	JHT	Hydrotreater	E-105A	C	FLANGE	0.75	JET	Jet	L	N	G	117	150	NA
E-2222	JHT	Hydrotreater	E-105A	V	GATE	0.75	JET	Jet	L	N	G	103	150	Y
E-2224	JHT	Hydrotreater	E-105A	C	BULL PLUG	0.75	JET	Jet	L	N	G	100	150	NA
E-2226	JHT	Hydrotreater	E-105A	V	GLOBE	1.00	JET	Jet	L	N	G	166	150	N
E-2228	JHT	Hydrotreater	E-105A	C	FLANGE	6.00	JET	Jet	L	N	G	281	150	NA
E-2230	JHT	Hydrotreater	E-105A	V	GATE	6.00	JET	Jet	L	N	G	309	150	Y
E-2232	JHT	Hydrotreater	E-105A	V	GATE	0.75	JET	Jet	L	N	G	111	150	N
E-2234	JHT	Hydrotreater	E-105A	C	BULL PLUG	0.75	JET	Jet	L	N	G	270	150	NA
E-2236	JHT	Hydrotreater	E-105A	V	GATE	6.00	JET	Jet	L	N	G	270	150	N
E-2238	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	L	N	G	116	1500	N
E-2240	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	L	N	G	105	1500	NA
E-2242	JHT	Hydrotreater	P-107B	C	FLANGE	1.50	JET	Jet	L	N	G	115	1500	NA
E-2244	JHT	Hydrotreater	P-107B	V	GLOBE	1.50	JET	Jet	L	N	G	163	1500	N
E-2246	JHT	Hydrotreater	P-107B	C	FLANGE	3.00	JET	Jet	L	N	G	281	1500	NA
E-2248	JHT	Hydrotreater	P-107B	V	GATE	3.00	JET	Jet	L	N	G	262	1500	Y
E-1561	JHT	Hydrotreater	P-133	V	GATE	0.75	JET	Jet	N	N	G	72	26	Y
E-1563	JHT	Hydrotreater	P-133	V	GATE	0.75	JET	Jet	N	N	G	75	26	N
E-1565	JHT	Hydrotreater	P-133	V	GATE	0.75	JET	Jet	N	N	G	77	26	Y
E-1567	JHT	Hydrotreater	P-133	C	FLANGE	2.00	JET	Jet	N	N	G	76	26	NA
E-1569	JHT	Hydrotreater	P-133	V	GATE	0.75	JET	Jet	N	N	G	77	26	N
E-1571	JHT	Hydrotreater	P-133	C	REDUCER	0.50	JET	Jet	N	N	G	76	26	NA
E-1573	JHT	Hydrotreater	P-133	V	GATE	0.75	JET	Jet	N	N	G	76	26	N
E-1575	JHT	Hydrotreater	P-133	V	CONTROL	3.00	JET	Jet	N	N	G	72	26	Y
E-1577	JHT	Hydrotreater	P-133	V	CONTROL	3.00	JET	Jet	N	N	G	75	26	Y
E-1579	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	156	1500	Y
E-1581	JHT	Hydrotreater	P-107A	C	BULL PLUG	0.75	JET	Jet	N	N	G	121	1500	NA
E-1583	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	241	1500	N
E-1585	JHT	Hydrotreater	P-107A	C	REDUCER	0.50	JET	Jet	N	N	G	104	1500	NA
E-1587	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	141	1500	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1589	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	94	1500	Y
E-1591	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	176	1500	Y
E-1593	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	229	1500	N
E-1595	JHT	Hydrotreater	P-107A	C	FLANGE	0.75	JET	Jet	N	N	G	209	1500	NA
E-1597	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	99	1500	Y
E-1599	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	104	1500	Y
E-1601	JHT	Hydrotreater	P-107A	V	GATE	6.00	JET	Jet	N	N	G	113	1500	Y
E-1603	JHT	Hydrotreater	P-107A	C	FLANGE	6.00	JET	Jet	N	N	G	111	1500	NA
E-1605	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	114	1500	Y
E-1607	JHT	Hydrotreater	P-107A	C	BULL PLUG	0.75	JET	Jet	N	N	G	127	1500	NA
E-1609	JHT	Hydrotreater	P-107A	V	GATE	2.00	JET	Jet	N	N	G	137	1500	Y
E-1611	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	100	1500	N
E-1613	JHT	Hydrotreater	P-107A	V	CONTROL	6.00	JET	Jet	N	N	G	140	1500	Y
E-1615	JHT	Hydrotreater	P-107A	C	FLANGE	0.75	JET	Jet	N	N	G	172	1500	NA
E-1617	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	159	1500	Y
E-1619	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	145	1500	Y
E-1621	JHT	Hydrotreater	P-107A	C	FLANGE	0.75	JET	Jet	N	N	G	153	1500	NA
E-1623	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	123	1500	Y
E-1625	JHT	Hydrotreater	P-107A	C	FLANGE	3.00	JET	Jet	N	N	G	159	1500	NA
E-1627	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	103	1500	N
E-1629	JHT	Hydrotreater	P-107A	C	TUBE FITTING	0.50	JET	Jet	N	N	G	226	1500	NA
E-1631	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	116	1500	N
E-1633	JHT	Hydrotreater	P-107A	C	ELBOW	0.50	JET	Jet	N	N	G	227	1500	NA
E-1635	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	N	N	G	187	1500	N
E-1637	JHT	Hydrotreater	P-107A	C	BULL PLUG	0.75	JET	Jet	N	N	G	136	1500	NA
E-1639	JHT	Hydrotreater	P-107A	V	GATE	6.00	JET	Jet	N	N	G	228	1500	Y
E-1641	JHT	Hydrotreater	SV-120-SP	V	GATE	2.00	JET	Jet	N	N	G	146	175	Y
E-1643	JHT	Hydrotreater	SV-120-SP	V	GATE	0.75	JET	Jet	N	N	G	94	175	Y
E-1645	JHT	Hydrotreater	SV-120-SP	V	GATE	4.00	JET	Jet	N	N	G	303	175	Y
E-1647	JHT	Hydrotreater	SV-120-SP	V	GATE	0.75	JET	Jet	N	N	G	127	175	Y
E-1649	JHT	Hydrotreater	SV-120-SP	V	GATE	2.00	JET	Jet	N	N	G	150	175	Y
E-1651	JHT	Hydrotreater	SV-120-SP	V	GATE	0.75	JET	Jet	N	N	G	250	175	Y
E-1653	JHT	Hydrotreater	SV-120-SP	V	GATE	2.00	JET	Jet	N	N	G	86	175	Y
E-1655	JHT	Hydrotreater	SV-120-SP	V	GATE	0.75	JET	Jet	N	N	G	97	175	N
E-1657	JHT	Hydrotreater	SV-120-SP	C	BULL PLUG	0.75	JET	Jet	N	N	G	94	175	NA
E-1659	JHT	Hydrotreater	SV-120-SP	V	GATE	6.00	JET	Jet	N	N	G	147	175	Y
E-1661	JHT	Hydrotreater	SV-120-SP	V	GATE	0.75	JET	Jet	N	N	G	101	175	N
E-1663	JHT	Hydrotreater	SV-120-SP	V	Safety Valve	4.00	JET	Jet	N	N	G	98	175	Y
E-1665	JHT	Hydrotreater	D-148B KO	C	FLANGE	0.75	JET	Jet	N	N	G	95	26	NA
E-1667	JHT	Hydrotreater	D-148B KO	V	GATE	0.75	JET	Jet	N	N	G	91	26	Y
E-1669	JHT	Hydrotreater	D-148B KO	V	GATE	0.75	JET	Jet	N	N	G	91	26	N
E-1671	JHT	Hydrotreater	D-148B KO	C	BULL PLUG	0.75	JET	Jet	N	N	G	92	26	NA
E-1673	JHT	Hydrotreater	D-148B KO	V	GATE	0.75	JET	Jet	N	N	G	83	26	Y
E-1675	JHT	Hydrotreater	D-148B KO	V	GATE	0.75	JET	Jet	N	N	G	85	26	N
E-1677	JHT	Hydrotreater	D-148B KO	C	BULL PLUG	0.75	JET	Jet	N	N	G	79	26	NA
E-1679	JHT	Hydrotreater	D-148B KO	V	GATE	0.75	JET	Jet	N	N	G	78	26	N
E-1681	JHT	Hydrotreater	D-148B KO	C	BULL PLUG	0.75	JET	Jet	N	N	G	78	26	NA
E-1683	JHT	Hydrotreater	D-148B KO	V	GATE	0.75	JET	Jet	N	N	G	77	26	Y
E-1685	JHT	Hydrotreater	D-148B KO	C	FLANGE	0.75	JET	Jet	N	N	G	77	26	NA
E-1687	JHT	Hydrotreater	D-148B KO	V	BALL VALVE	0.75	JET	Jet	N	N	G	79	26	Y
E-1689	JHT	Hydrotreater	D-148B KO	C	Threaded Connector	0.75	JET	Jet	N	N	G	81	26	NA
E-1691	JHT	Hydrotreater	D-148B KO	V	NEEDLE	0.75	JET	Jet	N	N	G	85	26	Y
E-1693	JHT	Hydrotreater	D-148B KO	C	TUBE FITTING	0.50	JET	Jet	N	N	G	79	26	NA
E-1695	JHT	Hydrotreater	D-148A KO	C	FLANGE	0.75	JET	Jet	N	N	G	79	0	NA
E-1697	JHT	Hydrotreater	D-148A KO	V	GATE	0.75	JET	Jet	N	N	G	114	0	Y
E-1699	JHT	Hydrotreater	D-148A KO	V	GATE	0.75	JET	Jet	N	N	G	89	0	N
E-1701	JHT	Hydrotreater	D-148A KO	C	BULL PLUG	0.75	JET	Jet	N	N	G	88	0	NA
E-1703	JHT	Hydrotreater	D-148A KO	V	GATE	0.75	JET	Jet	N	N	G	81	0	N
E-1705	JHT	Hydrotreater	D-148A KO	C	BULL PLUG	0.75	JET	Jet	N	N	G	77	0	NA
E-1707	JHT	Hydrotreater	D-148A KO	V	GATE	0.75	JET	Jet	N	N	G	77	0	Y
E-1709	JHT	Hydrotreater	D-148A KO	C	FLANGE	0.75	JET	Jet	N	N	G	77	0	NA
E-1711	JHT	Hydrotreater	D-148A KO	C	UNION	0.75	JET	Jet	N	N	G	93	0	NA
E-1713	JHT	Hydrotreater	D-148A KO	V	BALL VALVE	0.75	JET	Jet	N	N	G	81	0	Y
E-1715	JHT	Hydrotreater	D-148A KO	C	Threaded Connector	0.75	JET	Jet	N	N	G	83	0	NA
E-1717	JHT	Hydrotreater	D-148A KO	V	NEEDLE	0.50	JET	Jet	N	N	G	80	0	Y
E-1719	JHT	Hydrotreater	D-148A KO	C	TUBE FITTING	0.50	JET	Jet	N	N	G	84	0	NA
E-1721	JHT	Hydrotreater	E-107A	V	GATE	0.75	JET	Jet	N	N	G	83	175	Y
E-1723	JHT	Hydrotreater	E-107A	C	BULL PLUG	0.75	JET	Jet	N	N	G	93	175	NA
E-1725	JHT	Hydrotreater	E-107A	C	Threaded Connector	0.50	JET	Jet	N	N	G	164	1500	NA
E-1727	JHT	Hydrotreater	E-107A	C	FLANGE	0.50	JET	Jet	N	N	G	140	1500	NA
E-1729	JHT	Hydrotreater	E-107A	C	TUBE FITTING	0.50	JET	Jet	N	N	G	134	1500	NA
E-1731	JHT	Hydrotreater	E-107A	C	TUBE FITTING	0.50	JET	Jet	N	N	G	105	1500	NA
E-1733	JHT	Hydrotreater	E-107A	C	TEE	0.50	JET	Jet	N	N	G	104	1500	NA

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1735	JHT	Hydrotreater	E-107A	C	TUBE FITTING	0.50	JET	Jet	N	N	G	100	1500	NA
E-1737	JHT	Hydrotreater	E-107A	V	NEEDLE	0.50	JET	Jet	N	N	G	100	1500	Y
E-1739	JHT	Hydrotreater	P-107A	C	Threaded Connector	0.50	JET	Jet	N	N	G	104	1500	NA
E-1741	JHT	Hydrotreater	P-107A	C	TUBE FITTING	0.50	JET	Jet	N	N	G	101	1500	NA
E-1743	JHT	Hydrotreater	CV-F161B	V	CONTROL	0.75	JET	Jet	N	N	G	107	25	Y
E-1745	JHT	Hydrotreater	CV-F161B	C	FLANGE	0.75	JET	Jet	N	N	G	147	175	NA
E-1747	JHT	Hydrotreater	CV-F161B	V	GATE	0.75	JET	Jet	N	N	G	112	175	N
E-1749	JHT	Hydrotreater	CV-F161B	C	UNION	0.75	JET	Jet	N	N	G	124	175	NA
E-1751	JHT	Hydrotreater	CV-F161B	C	FLANGE	2.00	JET	Jet	N	N	G	222	175	NA
E-1753	JHT	Hydrotreater	CV-F161B	V	CONTROL	2.00	JET	Jet	N	N	G	189	175	Y
E-1755	JHT	Hydrotreater	CV-F161B	V	GATE	2.00	JET	Jet	N	N	G	186	175	Y
E-1757	JHT	Hydrotreater	P-107B	V	GATE	8.00	JET	Jet	N	N	G	269	39	Y
E-1759	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	N	N	G	209	39	N
E-2340	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	L	N	G	106	40	NA
E-2342	JHT	Hydrotreater	P-107B	C	CAP	0.50	JET	Jet	L	N	G	110	40	NA
E-2344	JHT	Hydrotreater	P-107B	C	ELBOW	0.75	JET	Jet	L	N	G	211	40	NA
E-2346	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.75	JET	Jet	L	N	G	91	40	NA
E-2348	JHT	Hydrotreater	P-107B	C	ELBOW	0.75	JET	Jet	L	N	G	144	40	NA
E-2350	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.75	JET	Jet	L	N	G	150	40	NA
E-2352	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	L	N	G	135	40	NA
E-2354	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.75	JET	Jet	L	N	G	84	40	NA
E-2356	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	L	N	G	103	40	NA
E-2358	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	L	N	G	117	40	NA
E-2360	JHT	Hydrotreater	P-108C	V	GATE	0.75	JET	Jet	L	N	G	139	90	Y
E-2362	JHT	Hydrotreater	P-108C	C	Pressure Gauge	0.50	JET	Jet	L	N	G	162	90	NA
E-2364	JHT	Hydrotreater	P-108C	V	GATE	0.75	JET	Jet	L	N	G	166	90	Y
E-2366	JHT	Hydrotreater	P-108C	C	FLANGE	2.00	JET	Jet	L	N	G	377	90	NA
E-2368	JHT	Hydrotreater	P-108C	V	GATE	0.75	JET	Jet	L	N	G	228	90	Y
E-2310	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.50	JET	Jet	N	Y	G	93	1500	NA
E-2312	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.50	JET	Jet	N	Y	G	86	1500	NA
E-2314	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.50	JET	Jet	N	Y	G	112	1500	NA
E-2316	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.50	JET	Jet	N	Y	G	119	1500	NA
E-2318	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.50	JET	Jet	N	Y	G	115	1500	NA
E-2320	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.25	JET	Jet	N	Y	G	90	40	NA
E-2322	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.25	JET	Jet	N	Y	G	83	40	NA
E-2324	JHT	Hydrotreater	P-107B	V	NEEDLE	0.25	JET	Jet	N	Y	G	83	40	N
E-2326	JHT	Hydrotreater	P-107B	V	GATE	2.00	JET	Jet	N	Y	G	161	40	Y
E-2328	JHT	Hydrotreater	P-107B	C	FLANGE	2.00	JET	Jet	N	Y	G	127.8	40	NA
E-2330	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.50	JET	Jet	N	Y	G	120	40	NA
E-2332	JHT	Hydrotreater	P-107B	C	REDUCER	0.50	JET	Jet	N	Y	G	137	40	NA
E-2334	JHT	Hydrotreater	P-107B	C	BULL PLUG	0.75	JET	Jet	N	Y	G	187	40	NA
E-2336	JHT	Hydrotreater	P-107B	V	NEEDLE	0.50	JET	Jet	N	Y	G	100	40	Y
E-2338	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.50	JET	Jet	N	Y	G	102	40	NA
E-2280	JHT	Hydrotreater	P-107B	C	BULL PLUG	0.75	JET	Jet	N	Y	G	102	1500	NA
E-2282	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	N	Y	G	97	1500	N
E-2284	JHT	Hydrotreater	P-107B	C	FLANGE	0.75	JET	Jet	N	Y	G	97	1500	NA
E-2286	JHT	Hydrotreater	P-107B	C	FLANGE	0.75	JET	Jet	N	Y	G	108	1500	NA
E-2288	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	N	Y	G	116	1500	Y
E-2290	JHT	Hydrotreater	P-107B	C	FLANGE	0.75	JET	Jet	N	Y	G	106	1500	NA
E-2292	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	N	Y	G	151	1500	N
E-2294	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	N	Y	G	96	1500	Y
E-2296	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	N	Y	G	87	1500	NA
E-2298	JHT	Hydrotreater	P-107B	C	ELBOW	0.75	JET	Jet	N	Y	G	88	1500	NA
E-2300	JHT	Hydrotreater	P-107B	C	BULL PLUG	0.75	JET	Jet	N	Y	G	95	1500	NA
E-2302	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.75	JET	Jet	N	Y	G	122	1500	NA
E-2304	JHT	Hydrotreater	P-107B	C	FLANGE	0.75	JET	Jet	N	Y	G	152	1500	NA
E-2306	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	N	Y	G	165	1500	NA
E-2308	JHT	Hydrotreater	P-107B	V	NEEDLE	0.50	JET	Jet	N	Y	G	98	1500	Y
E-2250	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	L	N	G	100	1500	Y
E-2252	JHT	Hydrotreater	P-107B	C	BULL PLUG	0.75	JET	Jet	L	N	G	131	1500	NA
E-2254	JHT	Hydrotreater	P-107B	V	GATE	4.00	JET	Jet	L	N	G	199	1500	Y
E-2256	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	L	N	G	227	1500	N
E-2258	JHT	Hydrotreater	P-107B	C	FLANGE	0.75	JET	Jet	L	N	G	245	1500	NA
E-2260	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	L	N	G	240	1500	N
E-2262	JHT	Hydrotreater	P-107B	V	GATE	4.00	JET	Jet	L	N	G	241	1500	Y
E-2264	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	L	N	G	127	1500	Y
E-2266	JHT	Hydrotreater	P-107B	C	BULL PLUG	0.75	JET	Jet	L	N	G	113	1500	NA
E-2268	JHT	Hydrotreater	P-107B	C	Threaded Connector	0.75	JET	Jet	L	N	G	126	1500	NA
E-2270	JHT	Hydrotreater	P-107B	C	FLANGE	0.75	JET	Jet	L	N	G	112	1500	NA
E-2272	JHT	Hydrotreater	P-107B	C	TUBE FITTING	0.75	JET	Jet	L	N	G	105	1500	NA
E-2274	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	L	N	G	162	1500	N
E-2276	JHT	Hydrotreater	P-107B	C	FLANGE	0.75	JET	Jet	L	N	G	102	1500	NA
E-2278	JHT	Hydrotreater	P-107B	V	GATE	0.75	JET	Jet	L	N	G	108	1500	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1851	JHT	Hydrotreater	P-108A	V	CONTROL	2.00	DIESEL	Diesel	N	N	G	364	48	Y
E-1853	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	135	48	Y
E-1855	JHT	Hydrotreater	P-108A	C	BULL PLUG	0.75	DIESEL	Diesel	N	N	G	105	48	NA
E-1857	JHT	Hydrotreater	P-108A	V	GATE	1.00	DIESEL	Diesel	N	N	G	194	48	N
E-1859	JHT	Hydrotreater	P-108A	V	GATE	1.00	DIESEL	Diesel	N	N	G	252	48	Y
E-1861	JHT	Hydrotreater	P-108A	V	GATE	1.00	DIESEL	Diesel	N	N	G	206	48	N
E-1863	JHT	Hydrotreater	P-108A	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	360	48	NA
E-1821	JHT	Hydrotreater	P-108B	V	GATE	6.00	DIESEL	Diesel	N	N	G	381	35	Y
E-1823	JHT	Hydrotreater	P-108B	V	GATE	0.75	DIESEL	Diesel	N	N	G	207	35	Y
E-1825	JHT	Hydrotreater	P-108B	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	121	35	NA
E-1827	JHT	Hydrotreater	P-108B	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	93	35	NA
E-1829	JHT	Hydrotreater	P-108B	V	GATE	0.75	DIESEL	Diesel	N	N	G	118	35	Y
E-1831	JHT	Hydrotreater	P-108B	V	GATE	4.00	DIESEL	Diesel	N	N	G	441	35	Y
E-1833	JHT	Hydrotreater	P-108B	V	GATE	0.75	DIESEL	Diesel	N	N	G	174	35	Y
E-1835	JHT	Hydrotreater	P-108B	C	BULL PLUG	0.75	DIESEL	Diesel	N	N	G	173	35	NA
E-1837	JHT	Hydrotreater	P-108B	C	CHECK	4.00	DIESEL	Diesel	N	N	G	387	35	NA
E-1839	JHT	Hydrotreater	P-108B	V	GATE	0.75	DIESEL	Diesel	N	N	G	128	35	Y
E-1841	JHT	Hydrotreater	P-108B	C	FLANGE	3.00	DIESEL	Diesel	N	N	G	378	35	NA
E-1843	JHT	Hydrotreater	P-108B	V	GATE	0.75	DIESEL	Diesel	N	N	G	127	35	Y
E-1845	JHT	Hydrotreater	P-108B	C	COUPLING	0.75	DIESEL	Diesel	N	N	G	154	35	NA
E-1847	JHT	Hydrotreater	P-108B	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	306	35	NA
E-1849	JHT	Hydrotreater	P-108B	C	BULL PLUG	0.75	DIESEL	Diesel	N	N	G	175	35	NA
E-1761	JHT	Hydrotreater	P-108A	V	GATE	0.50	DIESEL	Diesel	N	N	G	133	440	Y
E-1763	JHT	Hydrotreater	P-108A	C	FLANGE	3.00	DIESEL	Diesel	N	N	G	366	440	NA
E-1765	JHT	Hydrotreater	P-108A	V	CONTROL	3.00	DIESEL	Diesel	N	N	G	111	440	Y
E-1767	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	129	440	N
E-1769	JHT	Hydrotreater	P-108A	C	BULL PLUG	0.75	DIESEL	Diesel	N	N	G	123	440	NA
E-1771	JHT	Hydrotreater	P-108A	V	GATE	3.00	DIESEL	Diesel	N	N	G	141	440	Y
E-1773	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	369	440	Y
E-1775	JHT	Hydrotreater	P-108A	C	BULL PLUG	0.75	DIESEL	Diesel	N	N	G	391	440	NA
E-1777	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	229	440	N
E-1779	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	99	440	Y
E-1781	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	91	440	Y
E-1783	JHT	Hydrotreater	P-108A	V	GATE	4.00	DIESEL	Diesel	N	N	G	415	440	Y
E-1785	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	100	440	Y
E-1787	JHT	Hydrotreater	P-108A	C	FLANGE	2.00	DIESEL	Diesel	N	N	G	99	440	NA
E-1789	JHT	Hydrotreater	P-108A	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	181	440	NA
E-1791	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	154	440	Y
E-1793	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	122	36	Y
E-1795	JHT	Hydrotreater	P-108A	C	ELBOW	0.50	DIESEL	Diesel	N	N	G	113	36	NA
E-1797	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	108	36	Y
E-1799	JHT	Hydrotreater	P-108A	C	ELBOW	0.50	DIESEL	Diesel	N	N	G	95	36	NA
E-1801	JHT	Hydrotreater	P-108A	V	GATE	6.00	DIESEL	Diesel	N	N	G	398	36	Y
E-1803	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	121	36	N
E-1805	JHT	Hydrotreater	P-108A	V	GATE	3.00	DIESEL	Diesel	N	N	G	162	36	Y
E-1807	JHT	Hydrotreater	P-108A	C	FLANGE	3.00	DIESEL	Diesel	N	N	G	131	36	NA
E-1809	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	121	36	N
E-1811	JHT	Hydrotreater	P-108A	V	GATE	0.75	DIESEL	Diesel	N	N	G	122	36	N
E-1813	JHT	Hydrotreater	P-108A	C	BULL PLUG	0.75	DIESEL	Diesel	N	N	G	121	36	NA
E-1815	JHT	Hydrotreater	P-108A	V	GATE	3.00	DIESEL	Diesel	N	N	G	315	36	Y
E-1817	JHT	Hydrotreater	P-108B	V	GATE	0.75	DIESEL	Diesel	N	N	G	135	36	Y
E-1819	JHT	Hydrotreater	P-108B	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	212	36	NA
E-1761	OM-13	Tank Farm	TK-1772	V	BALL VALVE	1.00	JET A	Jet	N	N	G	51.6	0	Y
E-1763	OM-13	Tank Farm	TK-1772	V	GATE	0.75	JET A	Jet	N	N	G	61.9	0	N
E-1765	OM-13	Tank Farm	TK-1772	C	Threaded Connector	0.75	JET A	Jet	N	N	G	60.1	0	NA
E-1767	OM-13	Tank Farm	TK-1772	V	PRD	0.75	JET A	Jet	N	N	G	59.5	0	NA
E-1769	OM-13	Tank Farm	TK-1772	V	BALL VALVE	1.00	JET A	Jet	N	N	G	59.9	0	N
E-1771	OM-13	Tank Farm	TK-1772	C	FLANGE	3.00	JET A	Jet	N	N	G	66.6	0	NA
E-1773	OM-13	Tank Farm	TK-1772	V	GATE	3.00	JET A	Jet	N	N	G	62.4	0	Y
E-1775	OM-13	Tank Farm	TK-1772	V	GATE	1.00	JET A	Jet	N	N	G	64.6	0	Y
E-1777	OM-13	Tank Farm	TK-1772	V	GATE	0.75	JET A	Jet	N	N	G	65.7	0	Y
E-1779	OM-13	Tank Farm	TK-1772	V	TWIN SEAL	3.00	JET A	Jet	N	N	G	84.5	0	Y
E-1781	OM-13	Tank Farm	TK-1772	V	MOV-17MV663	20.00	JET A	Jet	N	N	G	60.3	0	Y
E-1783	OM-13	Tank Farm	TK-1772	V	GATE	20.00	JET A	Jet	N	N	G	57.9	0	Y
E-1785	OM-13	Tank Farm	TK-1773	V	GATE	12.00	JP5	Jet	N	N	G	49.8	0	Y
E-1787	OM-13	Tank Farm	TK-1773	V	GATE	0.75	JP5	Jet	N	N	G	58.8	0	N
E-1789	OM-13	Tank Farm	TK-1773	V	GATE	0.75	JP5	Jet	N	N	G	69.1	0	Y
E-1791	OM-13	Tank Farm	TK-1773	V	GATE	0.75	JP5	Jet	N	N	G	58.3	0	Y
E-1793	OM-13	Tank Farm	TK-1773	V	GATE	1.00	JP5	Jet	N	N	G	60.2	0	Y
E-1795	OM-13	Tank Farm	TK-1773	V	GATE	0.75	JP5	Jet	N	N	G	59.2	0	Y
E-1797	OM-13	Tank Farm	TK-1773	V	GATE	0.75	JP5	Jet	N	N	G	59.2	0	Y
E-1799	OM-13	Tank Farm	TK-1773	V	TWIN SEAL	3.00	JP5	Jet	N	N	G	58.8	0	Y
E-1801	OM-13	Tank Farm	TK-1773	V	TWIN SEAL	6.00	JP5	Jet	N	N	G	59.5	0	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1803	OM-13	Tank Farm	TK-1773	V	GATE	0.75	JP5	Jet	N	N	G	61.3	0	N
E-1805	OM-13	Tank Farm	TK-1773	V	GATE	20.00	JP5	Jet	N	N	G	71.4	0	Y
E-1807	OM-13	Tank Farm	TK-1773	V	GATE	20.00	JP5	Jet	N	N	G	62.8	0	Y
E-1809	OM-13	Tank Farm	TK-1775	V	GATE	1.00	DIESEL	Diesel	N	N	G	75.4	0	Y
E-1811	OM-13	Tank Farm	TK-1775	V	GATE	2.00	DIESEL	Diesel	N	N	G	68.5	0	Y
E-1813	OM-13	Tank Farm	TK-1775	V	GATE	0.75	DIESEL	Diesel	N	N	G	64.6	0	Y
E-1815	OM-13	Tank Farm	TK-1775	V	PRD	0.75	DIESEL	Diesel	N	N	G	66.4	0	NA
E-1817	OM-13	Tank Farm	TK-1775	C	UNION	0.75	DIESEL	Diesel	N	N	G	68.1	0	NA
E-1819	OM-13	Tank Farm	TK-1775	V	GATE	6.00	DIESEL	Diesel	N	N	G	74.2	0	Y
E-1821	OM-13	Tank Farm	TK-1775	V	GATE	6.00	DIESEL	Diesel	N	N	G	71.4	0	Y
E-1823	OM-13	Tank Farm	TK-1775	C	FLANGE	6.00	DIESEL	Diesel	N	N	G	77.4	0	NA
E-1825	OM-13	Tank Farm	TK-1775	V	GATE	1.00	DIESEL	Diesel	N	N	G	68.7	0	Y
E-1827	OM-13	Tank Farm	TK-1775	V	GATE	20.00	DIESEL	Diesel	N	N	G	67.8	0	Y
E-1829	OM-13	Tank Farm	TK-1775	V	GATE	0.75	DIESEL	Diesel	N	N	G	65.3	0	Y
E-1831	OM-13	Tank Farm	TK-1775	V	PRD	0.75	DIESEL	Diesel	N	N	G	64.9	0	NA
E-1833	OM-13	Tank Farm	TK-1774	V	GATE	1.00	DIESEL	Diesel	N	N	G	71.4	0	Y
E-1835	OM-13	Tank Farm	TK-1774	V	GATE	6.00	DIESEL	Diesel	N	N	G	72.9	0	Y
E-1837	OM-13	Tank Farm	TK-1774	C	FLANGE	6.00	DIESEL	Diesel	N	N	G	76.1	0	NA
E-1839	OM-13	Tank Farm	TK-1774	V	GATE	1.00	DIESEL	Diesel	N	N	G	69.6	0	Y
E-1841	OM-13	Tank Farm	TK-1774	V	GATE	0.75	DIESEL	Diesel	N	N	G	68.9	0	N
E-1843	OM-13	Tank Farm	TK-1774	C	P	0.75	DIESEL	Diesel	N	N	G	71.4	0	NA
E-1845	OM-13	Tank Farm	TK-1774	V	PRD	0.75	DIESEL	Diesel	N	N	G	69.3	0	NA
E-1847	OM-13	Tank Farm	TK-1774	C	FLANGE	0.75	DIESEL	Diesel	N	N	G	69.6	0	NA
E-1849	OM-13	Tank Farm	TK-1774	V	GATE	0.75	DIESEL	Diesel	N	N	G	71.1	0	N
E-1851	OM-13	Tank Farm	TK-1774	V	GATE	16.00	DIESEL	Diesel	N	N	G	72.3	0	Y
E-1853	OM-13	Tank Farm	TK-1774	V	GATE	0.75	DIESEL	Diesel	N	N	G	70.5	0	N
E-1855	OM-13	Tank Farm	TK-1774	V	GATE	6.00	DIESEL	Diesel	N	N	G	71.6	0	Y
E-1857	OM-13	Tank Farm	TK-1778	C	Flange	2.00	JET A	Jet	N	N	G	90	0	NA
E-1859	OM-13	Tank Farm	TK-1778	V	GATE	0.75	JET A	Jet	N	N	G	79	0	N
E-1861	OM-13	Tank Farm	TK-1778	V	GATE	3.00	JET A	Jet	N	N	G	81.1	0	Y
E-1863	OM-13	Tank Farm	TK-1778	C	Flange	3.00	JET A	Jet	N	N	G	84.2	0	NA
E-1865	OM-13	Tank Farm	TK-1778	V	TWIN SEAL	2.00	JET A	Jet	N	N	G	86.3	0	Y
E-1867	OM-13	Tank Farm	TK-1778	C	Flange	6.00	JET A	Jet	N	N	G	77.7	0	NA
E-1869	OM-13	Tank Farm	TK-1778	V	TWIN SEAL	4.00	JET A	Jet	N	N	G	73.4	0	Y
E-1871	OM-13	Tank Farm	TK-1778	V	MOV	18.00	JET A	Jet	N	N	G	74.5	0	N
E-1873	OM-13	Tank Farm	TK-1778	V	GATE	4.00	JET A	Jet	N	N	G	73.4	0	Y
E-1875	OM-13	Tank Farm	TK-1778	V	TWIN SEAL	6.00	JET A	Jet	N	N	G	73.4	0	Y
E-1877	OM-13	Tank Farm	TK-1778	V	GATE	1.00	JET A	Jet	N	N	G	71.6	0	Y
E-1879	OM-13	Tank Farm	TK-1778	V	GATE	6.00	JET A	Jet	N	N	G	70.5	0	Y
E-1881	OM-13	Tank Farm	TK-1779	V	GATE	0.75	JET A	Jet	N	N	G	74.1	0	N
E-1883	OM-13	Tank Farm	TK-1779	V	TWIN SEAL	3.00	JET A	Jet	N	N	G	73.8	0	Y
E-1885	OM-13	Tank Farm	TK-1779	V	NEEDLE	0.50	JET A	Jet	N	N	G	77	0	N
E-1887	OM-13	Tank Farm	TK-1779	V	NEEDLE	0.50	JET A	Jet	N	N	G	73.4	0	N
E-1889	OM-13	Tank Farm	TK-1779	V	GATE	0.75	JET A	Jet	N	N	G	72.7	0	N
E-1891	OM-13	Tank Farm	TK-1779	C	Flange	4.00	JET A	Jet	N	N	G	71.6	0	NA
E-1893	OM-13	Tank Farm	TK-1779	V	TWIN SEAL	4.00	JET A	Jet	N	N	G	70.2	0	Y
E-1895	OM-13	Tank Farm	TK-1779	V	NEEDLE	0.50	JET A	Jet	N	N	G	70.5	0	Y
E-1897	OM-13	Tank Farm	TK-1779	V	NEEDLE	0.50	JET A	Jet	N	N	G	73.1	0	Y
E-1899	OM-13	Tank Farm	TK-1779	V	GATE	0.75	JET A	Jet	N	N	G	70.5	0	N
E-1901	OM-13	Tank Farm	TK-1779	V	PRD	0.75	JET A	Jet	N	N	G	79.4	0	NA
E-1903	OM-13	Tank Farm	TK-1779	C	Flange	0.75	JET A	Jet	N	N	G	69.1	0	NA
E-1905	OM-13	Tank Farm	TK-1713	V	GATE	1.00	RESID	Resid	N	N	G	76.1	0	Y
E-1907	OM-13	Tank Farm	TK-1713	V	GATE	10.00	RESID	Resid	N	N	G	77.2	0	Y
E-1909	OM-13	Tank Farm	TK-1713	V	GATE	1.00	RESID	Resid	N	N	G	81.5	0	Y
E-1911	OM-13	Tank Farm	TK-1713	V	GATE	4.00	RESID	Resid	N	N	G	72.1	0	Y
E-1913	OM-13	Tank Farm	TK-1713	V	GATE	0.75	RESID	Resid	N	N	G	73.9	0	N
E-1915	OM-13	Tank Farm	TK-1713	C	TEE	0.75	RESID	Resid	N	N	G	72.9	0	NA
E-1917	OM-13	Tank Farm	TK-1713	V	GATE	3.00	RESID	Resid	N	N	G	136.9	0	Y
E-1919	OM-13	Tank Farm	TK-1713	V	GATE	0.75	RESID	Resid	N	N	G	129.9	0	N
E-1921	OM-13	Tank Farm	TK-1713	V	GATE	0.75	RESID	Resid	N	N	G	77.5	0	N
E-1923	OM-13	Tank Farm	TK-1713	C	BULL PLUG	0.75	RESID	Resid	N	N	G	81.1	0	NA
E-1925	OM-13	Tank Farm	TK-1717	V	GATE	10.00	RESID	Resid	N	N	G	169.7	0	Y
E-1927	OM-13	Tank Farm	TK-1717	V	GATE	4.00	RESID	Resid	N	N	G	121.1	0	Y
E-1929	OM-13	Tank Farm	TK-1717	V	GATE	1.00	RESID	Resid	N	N	G	94.6	0	Y
E-1931	OM-13	Tank Farm	TK-1717	V	GATE	10.00	RESID	Resid	N	N	G	252.7	0	Y
E-1933	OM-13	Tank Farm	TK-1717	V	GATE	4.00	RESID	Resid	N	N	G	154.8	0	Y
E-1935	OM-13	Tank Farm	TK-1717	V	GATE	8.00	RESID	Resid	N	N	G	126.7	0	Y
E-1937	OM-13	Tank Farm	TK-1717	V	GATE	0.75	RESID	Resid	N	N	G	127.9	0	N
E-1939	OM-13	Tank Farm	TK-1717	C	BULL PLUG	0.75	RESID	Resid	N	N	G	127.9	0	NA
E-1941	OM-13	Tank Farm	TK-1717	C	MANWAY	42.00	RESID	Resid	N	N	G	172.6	0	NA
E-1943	OM-13	Tank Farm	TK-1717	V	GATE	20.00	RESID	Resid	N	N	G	129.7	0	Y
E-1945	OM-13	Tank Farm	TK-1714	V	GATE	6.00	GAS OIL	Gas Oil	N	N	G	64.9	0	Y
E-1947	OM-13	Tank Farm	TK-1714	V	GATE	0.75	GAS OIL	Gas Oil	N	N	G	67.8	0	Y

Data Point ID	Process Unit/Area	Generalized Process Unit/Area Category	Sub-Area	Component Type	Component Subtype	Size (inches)	Refinery Stream Service	Generalized Stream Service	Vibration Amount (N, L, H)	Cyclic Vibration? (Y/N)	Elevation (G, P, T, O)	External Component Temp (deg. F)	Operating Pressure (psig)	Valve Bonnet (Y, N)
E-1949	OM-13	Tank Farm	TK-1714	C	BULL PLUG	0.75	GAS OIL	Gas Oil	N	N	G	67.8	0	NA
E-1951	OM-13	Tank Farm	TK-1714	V	GATE	0.75	GAS OIL	Gas Oil	N	N	G	75	0	Y
E-1953	OM-13	Tank Farm	TK-1714	V	GATE	16.00	GAS OIL	Gas Oil	N	N	G	75.7	0	Y
E-1955	OM-13	Tank Farm	TK-1714	C	BULL PLUG	0.75	GAS OIL	Gas Oil	N	N	G	75.4	0	NA
E-1957	OM-13	Tank Farm	TK-1714	V	GATE	0.75	GAS OIL	Gas Oil	N	N	G	78.6	0	Y
E-1959	OM-13	Tank Farm	TK-1714	C	BULL PLUG	0.75	GAS OIL	Gas Oil	N	N	G	78.6	0	NA

Table B-1-2

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1	Unknown	NA	2.2	3.8	1.6	A	D	11/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	not operating (inop)
A-3	Unknown	NA	2	1.9	0	A	D	11/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	inop
A-5	Unknown	NA	2	37	35	A	D	11/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	pulsing leak at pump seal 10-37 ppm
A-7	Unknown	NA	2.6	31.3	28.7	A	D	11/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	non-pulsing leak, TVA plugged
A-9	Unknown	NA	1.9	2.3	0.4	A	D	11/14/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-11	Unknown	NA	2.2	2.3	0.1	U	D	11/14/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	inop - steam interference
A-13	Unknown	NA	2.2	5.8	3.6	A	D	11/14/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	outboard pump seal, non-pulsing
A-15	Unknown	NA	2.1	5	2.9	A	D	11/14/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	inop
A-17	Unknown	NA	2.1	3.1	1	A	D	11/14/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-19	Unknown	NA	2	Blank	NA	U	D	11/14/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	inop - TVA plugged line
A-21	4	25.5	0.5	0.7	0.2	A	D	11/15/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	N/O -
A-23	0.5	3.2	0.5	Blank	NA	U	D	11/15/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	Too much steam to monitor
A-25	4	25.5	0.5	5.2	4.7	A	D	11/15/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	Changed filter due to moisture. Leak @ 0950
A-27	6	38.2	0.8	38	37.2	A	D	11/15/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	Changed filter - moisture leak @ 100
A-29	Unknown	NA	0.1	Blank	NA	U	D	11/15/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	Too much steam to monitor
A-31	Unknown	NA	1.2	1.2	0	A	D	11/15/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	N/O - no shaft
A-33	Unknown	NA	1.2	Blank	NA	U	D	11/15/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	Too much steam
A-35	Unknown	NA	1.2	Blank	NA	U	D	11/15/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	Too much steam
A-37	6	14.3	1.6	1.5	0	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Connected to N/O pump
A-39	8	19.1	1.4	137	135.6	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	On P-3801 leak @ 1043 hrs., Tesoro found 247 ppm 1056 hrs.
A-41	8	38.2	0	36	36	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	On P-3801 - 1056 hrs. cleaned filter - scaling
A-43	12	76.4	1.5	27.1	25.6	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Leak @ 1126 hrs.
A-45	4	76.4	1.5	8.1	6.6	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Leak @ 1325 hrs. Tagged.
A-47	1	19.1	1.7	1.9	0.2	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-49	2	38.2	1.7	1.8	0.1	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-51	3	57.3	1.6	1.7	0.1	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-53	4	76.4	1.6	20.3	18.7	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Leak found @ 1340. Cleaned Filter @1353 - Background
A-55	8	152.8	1.9	80	78.1	A	D	11/15/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-57	Unknown	NA	0	0	0	A	D	11/15/16	AD-1 / AD-2 / AD-3	14	Blank	Blank	
A-59	5	23.9	-0.1	0.2	0.3	A	D	11/15/16	AD-1 / AD-2 / AD-3	14	Blank	Blank	N/O tagged out
A-61	3	14.3	-0.1	0	0.1	A	D	11/15/16	AD-1 / AD-2 / AD-3	14	Blank	Blank	
A-63	3	9.5	0	0	0	A	D	11/15/16	AD-1 / AD-2 / AD-3	14	Blank	Blank	
A-65	3	28.6	0	0	0	A	D	11/15/16	AD-1 / AD-2 / AD-3	14	Blank	Blank	
A-67	1	Unknown	-0.1	0	0.1	A	D	11/15/16	AD-1 / AD-2 / AD-3	14	Blank	Blank	
A-69	4	Unknown	-0.1	2.1	2.2	A	D	11/15/16	AD-1 / AD-2 / AD-3	14	Blank	Blank	
A-71	4	9.5	1.2	1.2	0	P	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	40% accessible
A-73	2	9.5	1.2	1.2	0	P	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Heavy insulation
A-75	2	38.2	1.2	1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-77	3	57.3	1	1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-79	2	38.2	0.9	0.9	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-81	1	19.1	0.9	1	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Cleaned filter and probe
A-83	2	76.4	0.7	0.8	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Cleaned probe
A-85	1	19.1	0.7	0.7	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-87	1	19.1	0.6	0.6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-89	1	19.1	0.6	0.6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-91	1	25.5	0.6	0.6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-93	1	25.5	0.6	0.6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-95	1	25.5	0.6	0.6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	To pressure gauge
A-97	1	19.1	0.6	0.6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Cleaned filter and probe
A-99	1	38.2	0.5	0.5	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-101	1	19.1	0.5	0.5	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-103	2	38.2	0.4	0.4	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-105	1	19.1	0.4	0.4	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-107	2	9.5	0.4	1.2	0.8	P	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Insulated
A-109	1	19.1	0.3	0.3	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	
A-111	1	19.1	0.3	0.3	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Valve has welded bonnet
A-113	2	38.2	0.2	0.2	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Cleaned filter and probe
A-115	2	38.2	0.2	0.2	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	60	Blank	Cleaned probe
A-117	1	19.1	1.2	0.6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	16	60	Blank	
A-119	1	25.5	0.2	0.1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	16	60	Blank	
A-121	1	38.2	0.1	0	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	16	60	Blank	
A-123	3	7.2	0	0	0	P	D	11/17/16	AD-1 / AD-2 / AD-3	16	60	Blank	80% inaccessible
A-125	Blank	NA	0	0	0	U	D	11/17/16	AD-1 / AD-2 / AD-3	16	60	Blank	Insulated, inaccessible
A-127	2	38.2	0	0.6	0.6	A	D	11/17/16	AD-1 / AD-2 / AD-3	16	60	Blank	
A-129	1	19.1	0	0	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	16	65	Blank	
A-131	8	38.2	0	6	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	16	65	Blank	Leak @ 1038
A-133	4	76.4	0	2.2	2.2	A	D	11/17/16	AD-1 / AD-2 / AD-3	16	65	Blank	
A-135	1	19.1	1.4	1.7	0.3	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Welded bonnet - TVA #21
A-137	2	50.9	1.4	2.2	0.8	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-139	1	19.1	1.4	1.6	0.2	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-141	1	19.1	1.4	1.4	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-143	1	19.1	1.3	1.3	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-145	1	25.5	1.3	1.7	0.4	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-147	1	19.1	1.4	1.3	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-149	3	7.2	1.3	1.5	0.2	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-151	1	19.1	1.2	1.2	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-153	1	19.1	1.2	2.9	1.7	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-155	1	19.1	1.2	1.5	0.3	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-157	1	25.5	1.6	1.5	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	TVA #21
A-159	1	19.1	1.2	1.4	0.2	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-161	2	38.2	1.4	1.6	0.2	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-163	5	95.5	1.1	1.8	0.7	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-165	1	25.5	1.3	2.6	1.3	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-167	1	19.1	1.4	2	0.6	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Welded bonnet
A-169	1	19.1	1.6	1.1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-171	1	4.8	1.1	1.2	0.1	P	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Under insulation
A-173	2	4.8	1.2	3.4	2.2	P	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	~60% inaccessible
A-175	1	19.1	1.4	1.5	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-177	1	19.1	1.4	1.5	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-179	1	19.1	1.5	1.8	0.3	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-181	1	19.1	1.2	1.4	0.2	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-183	0.5	9.5	1.1	1.1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-185	1	25.5	1.1	1.2	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-187	3	57.3	0.9	1.2	0.3	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-189	4	76.4	1.6	2.4	0.8	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Cleaned probe
A-191	2	38.2	1.7	1.5	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Welded bonnet; opened filter and probe
A-193	2	9.5	1.2	1.3	0.1	P	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Heavily insulated
A-195	2	4.8	1.2	1.3	0.1	P	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	50% inaccessible
A-197	1	19.1	1.2	1.2	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-199	1	19.1	1.1	1.1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Tagged out
A-201	2	9.5	1	1.1	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-203	1	19.1	1	1.1	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-205	1	19.1	1	1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	Tagged out
A-207	1	19.1	1	1.1	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	21	65	Blank	
A-209	4	76.4	1.1	2.3	1.2	A	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	
A-211	1	19.1	1.5	1.2	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	
A-213	1	19.1	1.1	1.2	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	
A-215	1	19.1	1.1	1.1	0	A	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	Welded bonnet
A-217	2	38.2	1.1	1.2	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	
A-219	1	19.1	1.1	1.2	0.1	A	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	
A-221	3	7.2	1.1	1.2	0.1	P	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	60% inaccessible
A-223	Unknown	NA	1	3.4	2.4	A	D	11/17/16	AD-1 / AD-2 / AD-3	15	65	Blank	
A-225	4	76.4	1	2.2	1.2	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	Background leak possible
A-227	3	57.3	0.7	1.8	1.1	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-229	6	28.6	0.6	2	1.4	P	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	Bonnet under insulation
A-231	4	76.4	0.4	1.9	1.5	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-233	2	38.2	0.4	0.6	0.2	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-235	3	76.4	0.6	1	0.4	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-237	4	76.4	0.7	2	1.3	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	Cleaned nozzle
A-239	2	50.9	0.6	0.6	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-241	1	25.5	0.6	0.6	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-243	5	11.9	0.6	0.6	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-245	2	38.2	0.3	1.7	1.4	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-247	2	38.2	0.3	0.4	0.1	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-249	2	38.2	0.1	0.1	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-251	2	38.2	0.2	0.2	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-253	3	14.3	0.1	0.1	0	P	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	Bonnet under insulation
A-255	2	38.2	0.1	0.3	0.2	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-257	1	25.5	0.1	0.1	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-259	1	25.5	0.1	0.1	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-261	1	19.1	0	0.2	0.2	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-263	2	50.9	0.1	1	0.9	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-265	2	50.9	0.6	1.2	0.6	A	D	11/22/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-267	24	57.3	1.9	2.3	0.4	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	TVA #18 @ 1035; Cleaned probe & filter (16)
A-269	3	57.3	1.8	1.8	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	Feed riser ring; Tagged out
A-271	2	38.2	1.8	2.2	0.4	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-273	3	57.3	1.8	1.8	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-275	2	38.2	1.6	1.8	0.2	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-277	1	19.1	1.6	1.8	0.2	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-279	2	38.2	1.8	1.6	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-281	2	38.2	1.4	1.4	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	Cleaned filter and probe
A-283	3	57.3	1.4	1.4	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-285	4	19.1	1.3	1.3	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	
A-287	20	15.9	1.2	1346	1344.8	A	D	11/22/16	AD-1 / AD-2 / AD-3	18	Blank	Blank	Leak found @ 1132 hrs; Pulsing 55 ppm; Avg 50-200 ppm
A-289	3	11.5	1.3	1.3	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-291	8	6.4	1.3	1.3	0	A	D	11/22/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	5th deck
A-293	25	19.9	1.2	13	11.8	A	D	11/22/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	7th deck - leak found @ 1340 hrs; Pulsing leak - Tagged
A-295	28	13.4	1.5	3.7	2.2	A	D	11/22/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	Cleaned filter and probe
A-297	10	95.5	0.8	1.2	0.4	A	D	11/22/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-299	9	4.8	0.8	1.5	0.7	A	D	11/22/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	E-404

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-301	3	57.3	0.8	1.9	1.1	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-303	3	57.3	0.8	0.8	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-305	0.5	9.5	0.8	0.8	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-307	2	38.2	0.2	0.5	0.3	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-309	2	38.2	0.1	0.1	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	Welded bonnet
A-311	2	38.2	0	0	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-313	7	33.4	0	0	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-315	7	33.4	0	0.7	0.7	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-317	8	38.2	-0.2	2	2.2	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-319	2	38.2	-0.3	-0.3	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-321	2	50.9	-0.3	0.1	0.4	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-323	7	33.4	-0.4	0	0.4	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	
A-325	13	82.8	-0.6	3,550.0	3550.6	A	D	11/28/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	Leak @ 1018-1025 - Range: 1200-1400, Peak:3550
A-327	2	38.2	1.6	1.6	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-329	2	38.2	1.5	1.7	0.2	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-331	3	14.3	1.6	2.2	0.6	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-333	15	71.6	1.6	54	52.4	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	Leak @ 1057-1108; Avg range 20-30ppm
A-335	7	33.4	1.7	3.2	1.5	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	High background interference
A-337	3	5.7	1.9	2.2	0.3	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-339	2	38.2	1.9	1.9	0	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	Cleaned filter and probe
A-341	6	11.5	1.7	3.5	1.8	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-343	10	191	1.6	18.2	16.6	A	D	11/28/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	Cleaned filter and probe
A-345	3	14.3	-0.3	0.3	0.6	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-347	4	19.1	-0.3	0.5	0.8	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-349	2	9.5	0	0.2	0.2	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-351	3	57.3	-0.2	0.5	0.7	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-353	2	38.2	-0.3	0.5	0.8	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-355	4	9.5	-0.2	1	1.2	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-357	3	19.1	0.1	0.3	0.2	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-359	6	14.3	0.1	0.4	0.3	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	Cleaned filter and probe
A-361	3	7.2	-0.1	0.8	0.9	A	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-363	Blank	NA	Blank	Blank	Blank	U	D	11/28/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-365	10	63.7	0.9	2.2	1.3	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-367	4	25.5	1	1.9	0.9	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-369	2	38.2	0.7	0.7	0	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	Elevated bkrd interference 0927 reinspect @ 0934
A-371	4	76.4	0.9	1.4	0.5	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-373	7	44.6	0.9	1.1	0.2	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-375	7	11.1	0.4	0.7	0.3	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-377	36	57.3	0.2	35.2	35	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	1001 - 35.2, pulsing range 13-15ppm max
A-379	3	57.3	2.5	3.9	1.4	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-381	6	9.5	2.5	4.4	1.9	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Welded bonnet
A-383	8	12.7	1.9	3.8	1.9	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-385	4	76.4	2.2	3.8	1.6	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-387	14	22.3	2.1	4.3	2.2	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	VA with extended probe
A-389	3	14.3	1.5	1.9	0.4	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	N/O
A-391	2	9.5	1.5	1.5	0	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-393	6	11.5	1.5	1.9	0.4	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	
A-395	13	24.8	1.4	9.4	8	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	N/O 1352 hrs found leak
A-397	9	28.6	1.4	4.6	3.2	A	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Regular probe
A-399	11	35	1.4	21.9	20.5	A	D	11/29/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	1415 Stopped due to steam
A-401	5	15.9	1.5	2.2	0.7	P	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Stopped due to steam
A-403	4	12.7	1.5	1.6	0.1	P	D	11/29/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	Stopped due to steam
A-405	29	138.5	1.7	563	561.3	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	0928: 563ppm
A-407	5	23.9	-0.4	-0.4	0	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	
A-409	4	19.1	-0.4	-0.4	0	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	
A-411	3	57.3	-0.4	-0.4	0	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	
A-413	10	191	-0.4	30.4	30.8	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	Ladder
A-415	16	305.6	0.4	242	241.6	A	D	11/30/16	AD-1 / AD-2 / AD-3	21	55	5/S	Ladder
A-417	21	33.4	2.3	18.1	15.8	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	
A-419	8	38.2	0	56.7	56.7	A	D	11/30/16	AD-1 / AD-2 / AD-3	21	55	5/S	1329 - 56.7ppm
A-421	3	14.3	0.9	0.9	0	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	Not running
A-423	8	38.2	0.7	292	291.3	A	D	11/30/16	AD-1 / AD-2 / AD-3	13	55	5/S	Not running; Spare leak 1352-292ppm
A-425	9	43	-0.3	64.1	64.4	A	D	11/30/16	AD-1 / AD-2 / AD-3	21	55	Blank	1408 - 64.1ppm
A-427	9	43	0.7	41	40.3	A	D	11/30/16	AD-1 / AD-2 / AD-3	21	55	Blank	1429 hrs - 41ppm
A-429	11	42	2.5	2.5	0	A	D	11/30/16	AD-1 / AD-2 / AD-3	21	55	Blank	Elevated background in the area
A-431	5	19.1	1.3	1.5	0.2	A	D	11/30/16	AD-1 / AD-2 / AD-3	21	55	Blank	Not running
A-433	11	35	1.3	34.4	33.1	A	D	12/01/16	AD-1 / AD-2 / AD-3	21	62	Blank	0928-34.4ppm
A-435	6	19.1	1.2	2	0.8	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	
A-437	6	19.1	1	1.5	0.5	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	
A-439	6	19.1	0.9	2.1	1.2	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	
A-441	14	44.6	0.7	2	1.3	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	Not running
A-443	4	12.7	0.6	1.1	0.5	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	Heavy insulation
A-445	7	33.4	0.5	1.3	0.8	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	
A-447	9	43	0.6	1.3	0.7	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	Not running
A-449	13	62.1	0.3	1.6	1.3	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-451	14	44.6	0.1	8	7.9	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	1131 hrs - 8ppm ladder
A-453	27	128.9	0.9	212	211.1	A	D	12/01/16	AD-1 / AD-2 / AD-3	15	62	Blank	
A-455	28	133.7	0.9	161	160.1	A	D	12/01/16	AD-1 / AD-2 / AD-3	13	62	Blank	TVA #13 not running
A-457	9	28.6	1.3	2	0.7	A	D	12/05/16	AD-1 / AD-2 / AD-3	13	50	Blank	
A-459	6	19.1	1.3	1.4	0.1	A	D	12/05/16	AD-1 / AD-2 / AD-3	13	50	Blank	Not running; Pump casing only (steam)
A-461	18	57.3	1	3	2	A	D	12/05/16	AD-1 / AD-2 / AD-3	13	50	Blank	Pump housing only (steam)
A-463	25	159.2	1.3	7.2	5.9	A	D	12/05/16	AD-1 / AD-2 / AD-3	13	50	Blank	Elevated background; Pump housing only (steam)
A-465	30	191	0.5	14.2	13.7	A	D	12/05/16	AD-1 / AD-2 / AD-3	13	50	Blank	Pump housing only (steam); High background at times; Pulsing leak, 9-12ppm range
A-467	16	76.4	1.3	1	0	A	D	12/05/16	AD-1 / AD-2 / AD-3	13	50	Blank	Pump housing only (steam)
A-469	12	57.3	1.7	8	6.3	A	D	12/05/16	AD-1 / AD-2 / AD-3	16	50	Blank	Pump housing only (steam); Steam leak at 1305 @ 8ppm
A-471	7	16.7	1.2	2.2	1	A	D	12/05/16	AD-1 / AD-2 / AD-3	16	50	Blank	Housing only - steam
A-473	7	13.4	1.2	2.6	1.4	A	D	12/05/16	AD-1 / AD-2 / AD-3	16	50	Blank	Housing only - steam
A-475	5	11.9	1.1	1.1	0	A	D	12/05/16	AD-1 / AD-2 / AD-3	16	50	Blank	Not running; Housing only - steam
A-477	10	23.9	1	760	759	A	D	12/05/16	AD-1 / AD-2 / AD-3	16	50	Blank	1349 - 760ppm @ housing of shaft; Housing only - steam
A-479	11	Unknown	1.8	2.3	0.5	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	50	Blank	Housing only - steam
A-481	6	9.5	1.5	1.8	0.3	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	Not running; Housing only - steam
A-483	7	22.3	1.2	2	0.8	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	
A-485	2	38.2	1.3	1.4	0.1	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	Welded bonnet
A-487	2	50.9	1.4	1.4	0	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	
A-489	6	19.1	1.2	3.3	2.1	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	
A-491	4	12.7	1.1	2.1	1	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	
A-493	1	19.1	1.2	1.2	0	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	Welded bonnet
A-495	2	50.9	1.2	1.8	0.6	A	D	12/05/16	AD-1 / AD-2 / AD-3	15	60	Blank	
A-497	10	19.1	1.5	3.1	1.6	A	D	12/06/16	AD-1 / AD-2 / AD-3	16	60	Blank	Pump housing only (steam)
A-499	8	15.3	1.3	1.4	0.1	A	D	12/06/16	AD-1 / AD-2 / AD-3	16	60	Blank	Pump housing only (steam); Not running
A-501	18	114.6	1	88.6	87.6	A	D	12/06/16	AD-1 / AD-2 / AD-3	16	60	Blank	Leak at pump seal
A-503	15	95.5	1.5	135	133.5	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	60	Blank	Not running; TVA #13, switch
A-505	3	9.5	0.7	1	0.3	A	D	12/06/16	AD-1 / AD-2 / AD-3	16	60	Blank	Not running
A-507	8	25.5	0.8	0.8	0	A	D	12/06/16	AD-1 / AD-2 / AD-3	16	60	Blank	Not running
A-509	14	26.7	1	9.1	8.1	A	D	12/06/16	AD-1 / AD-2 / AD-3	16	60	Blank	
A-511	5	95.5	0.3	0.7	0.4	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	60	Blank	
A-513	1	25.5	0.3	0.7	0.4	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	60	Blank	
A-515	Unknown	NA	0.3	0.6	0.3	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	60	Blank	
A-517	4	76.4	0.4	0.5	0.1	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	60	Blank	
A-519	3	57.3	0.3	0.3	0	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	60	Blank	
A-521	4	38.2	0.4	0.5	0.1	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	60	Blank	
A-523	6	11.5	0.2	0.8	0.6	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	55	Blank	
A-525	3	57.3	0.4	0.4	0	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	55	Blank	
A-527	1	19.1	0.2	0.2	0	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	55	Blank	
A-529	2	38.2	0.1	0.1	0	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	55	Blank	Welded bonnet
A-531	3	57.3	0	0.2	0.2	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	55	Blank	Welded bonnet
A-533	2	38.2	0.1	0.3	0.2	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	55	Blank	
A-535	10	31.8	0.1	183	182.9	A	D	12/06/16	AD-1 / AD-2 / AD-3	13	55	Blank	Leak on valve stem
A-537	13	41.4	1.9	65	63.1	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	39	Blank	Not running; Leak on pump seal @ 0930
A-539	9	28.6	1.7	12.4	10.7	A	D	12/07/16	AD-1 / AD-2 / AD-3	13	39	Blank	Housing only - steam; Leak @ 0946
A-541	9	28.6	1.3	3.3	2	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	
A-543	5	31.8	1.1	2.1	1	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	
A-545	7	44.6	1	3	2	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	
A-547	10	63.7	1.1	2.5	1.4	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	
A-549	9	57.3	1	41	40	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	Leak @ 1041 - 41ppm; Top of valve stem
A-551	3	57.3	1.2	2.9	1.7	P	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	Bonnet insulated
A-553	6	114.6	1.2	5.5	4.3	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	Welded bonnet
A-555	3	57.3	0.6	1.5	0.9	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	
A-557	2	38.2	0.9	1.9	1	P	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	Insulated bonnet
A-559	2	38.2	0.5	1.5	1	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	Welded bonnet
A-561	2	38.2	0.5	1.5	1	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	
A-563	5	95.5	0.5	11.4	10.9	P	D	12/07/16	AD-1 / AD-2 / AD-3	15	39	Blank	Insulated bonnet; 1128 hrs - 11.4
A-565	7	133.7	2.3	11.4	9.1	A	D	12/07/16	AD-1 / AD-2 / AD-3	21	49	Blank	Welded bonnet
A-567	4	76.4	2.5	3.3	0.8	A	D	12/07/16	AD-1 / AD-2 / AD-3	21	49	Blank	
A-569	3	57.3	2.3	3.6	1.3	P	D	12/07/16	AD-1 / AD-2 / AD-3	21	49	Blank	Insulated bonnet
A-571	1	19.1	2.3	3.2	0.9	A	D	12/07/16	AD-1 / AD-2 / AD-3	21	49	Blank	Welded bonnet
A-573	5	127.3	2.3	312	309.7	A	D	12/07/16	AD-1 / AD-2 / AD-3	21	49	Blank	TC to gauge; Leak @ 1325
A-575	4	25.5	1.6	2.1	0.5	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	49	Blank	
A-577	4	25.5	1.8	2.3	0.5	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	49	Blank	
A-579	5	15.9	1.8	2.2	0.4	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	49	Blank	
A-581	7	5.6	1.5	1.7	0.2	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	49	Blank	
A-583	6	57.3	1.2	35	33.8	A	D	12/07/16	AD-1 / AD-2 / AD-3	15	49	Blank	Leak @ 1409
A-585	1	19.1	2.1	2.6	0.5	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	
A-587	1	19.1	2.1	2.1	0	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	
A-589	2	38.2	2	2	0	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	
A-591	3	57.3	2.1	3	0.9	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	
A-593	1	9.5	2	2	0	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	
A-595	3	28.6	2	2	0	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	
A-597	2	19.1	2	2.4	0.4	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	
A-599	2	19.1	1.9	1.9	0	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-601	7	66.8	1.9	26.2	24.3	A	D	12/07/16	AD-1 / AD-2 / AD-3	16	49	Blank	1449 hrs
A-603	5	95.5	1.3	3.6	2.3	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-605	2	50.9	1.7	2.2	0.5	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-607	2	50.9	0.9	2.1	1.2	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-609	34	865.8	0.5	43	42.5	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	Pulsing leak rg: 4-10, pk:45
A-611	8	76.4	0.1	269	268.9	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-613	8	76.4	0.4	180	179.6	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-615	6	114.6	0	55.6	55.6	A	D	12/12/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-617	10	47.7	0.3	13.3	13	A	D	12/12/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-619	6	28.6	0.1	7.6	7.5	A	D	12/12/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	
A-621	6	19.1	1.7	2	0.3	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-623	4	25.5	1.6	2.2	0.6	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	Welded bonnet
A-625	6	38.2	1.6	20.2	18.6	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-627	2	12.7	1.8	1.8	0	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	1346 - valve stem
A-629	2	38.2	1.6	2	0.4	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-631	5	95.5	1.5	23.5	22	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-633	8	19.1	1.7	17	15.3	A	D	12/12/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	
A-635	6	14.3	1.9	3.1	1.2	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-637	5	11.9	2	3	1	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-639	1	19.1	2	2	0	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-641	4	38.2	2	2.7	0.7	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-643	2	19.1	2	2.5	0.5	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-645	3	28.6	2.1	3.1	1	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-647	2	38.2	2	2.9	0.9	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-649	2	38.2	2	3.1	1.1	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-651	3	57.3	2	3	1	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-653	5	31.8	2	2.5	0.5	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-655	3	57.3	2.1	2.2	0.1	A	D	12/12/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	
A-657	9	57.3	3.5	4.4	0.9	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	TVA #21
A-659	7	66.8	2.5	2.9	0.4	A	D	12/14/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	TVA #17
A-661	5	47.7	2	2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	T17
A-663	6	38.2	3.4	3.4	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-665	4	38.2	0.3	0.6	0.3	A	D	12/14/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	T17
A-667	2	50.9	3.2	3.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-669	2	50.9	2.9	3.6	0.7	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-671	3	76.4	0.1	0.5	0.4	A	D	12/14/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	T17
A-673	2	50.9	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-675	5	47.7	0	0.2	0.2	A	D	12/14/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	T17
A-677	2	9.5	2.3	2.3	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-679	1	19.1	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-681	4	38.2	0.5	0.5	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	17	Blank	Blank	T17
A-683	2	38.2	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-685	5	23.9	2.1	2.1	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-687	2	38.2	2.1	2.1	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-689	2	19.1	2.5	2.6	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-691	2	19.1	2	2.1	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-693	2	19.1	2.4	2.7	0.3	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-695	8	152.8	2	2.4	0.4	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-697	2	38.2	2.1	2.1	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-699	3	28.6	2.4	2.4	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-701	4	38.2	1.9	1.9	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-703	5	47.7	2.3	2.4	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-705	2	38.2	1.9	1.9	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-707	5	31.8	1.9	1.9	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-709	8	76.4	2.3	2.3	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-711	13	124.1	2.3	2.4	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-713	3	28.6	1.8	1.9	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-715	2	19.1	2.3	2.4	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-717	2	19.1	1.8	1.8	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-719	3	28.6	2.3	2.5	0.2	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-721	4	38.2	1.8	2	0.2	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-723	8	38.2	2.3	2.3	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-725	3	57.3	1.9	1.9	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-727	3	57.3	1.8	1.8	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-729	3	57.3	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-731	3	57.3	1.8	1.8	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-733	2	50.9	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-735	2	38.2	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-737	4	19.1	1.8	1.8	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-739	1	19.1	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-741	2	50.9	1.8	1.8	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-743	3	57.3	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-745	5	23.9	1.7	1.7	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-747	2	38.2	2.1	2.2	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-749	2	38.2	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-751	6	28.6	1.7	1.7	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	21	Blank	Blank	T21
A-753	2	6.4	2.2	2.2	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	16	Blank	Blank	T16
A-755	5	23.9	1.5	2	0.5	A	D	12/14/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	T15
A-757	5	23.9	1.3	1.7	0.4	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-759	5	23.9	1.5	2.2	0.7	A	D	12/14/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	T15
A-761	4	19.1	1.3	1.8	0.5	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-763	6	114.6	1.3	2.4	1.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-765	3	19.1	1.5	1.7	0.2	A	D	12/14/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	T15
A-767	8	38.2	1.3	2.6	1.3	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-769	5	23.9	1.5	2.1	0.6	A	D	12/14/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	T15
A-771	5	31.8	1.2	2.6	1.4	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-773	8	8.5	1	2.6	1.6	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-775	6	38.2	1	2.3	1.3	A	D	12/14/16	AD-1 / AD-2 / AD-3	15	Blank	Blank	T15
A-777	8	38.2	1.1	3.1	2	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-779	7	33.4	1.6	1.5	0	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-781	8	38.2	1.2	1.5	0.3	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-783	9	43	1.1	1.3	0.2	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-785	5	23.9	1.1	1.2	0.1	A	D	12/14/16	AD-1 / AD-2 / AD-3	13	Blank	Blank	T13
A-787	7	133.7	0.6	14.9	14.3	A	D	01/05/17	AD-1 / AD-2 / AD-3	21	45	Blank	
A-789	24	458.4	1.0	80	79	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	45	Blank	TVA #13 - flow line plugged (13); Flow line plugged (21)
A-791	3	28.6	1.5	1.6	0.1	A	D	01/05/17	AD-1 / AD-2 / AD-3	16	45	Blank	
A-793	2	19.1	1.5	1.5	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	16	45	Blank	Welded bonnet
A-795	3	57.3	1.5	1.5	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	16	45	Blank	
A-797	3	57.3	1.5	1.5	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	16	45	Blank	
A-799	2	19.1	1.4	1.4	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	16	45	Blank	
A-801	2	19.1	1.4	1.5	0.1	A	D	01/05/17	AD-1 / AD-2 / AD-3	16	45	Blank	
A-803	4	76.4	1.4	115	113.6	A	D	01/05/17	AD-1 / AD-2 / AD-3	16	45	Blank	Flow line plugged (16)
A-805	7	33.4	0.3	2.6	2.3	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	45	Blank	
A-807	6	28.6	0.5	1.7	1.2	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	45	Blank	
A-809	3	14.3	0.7	0.8	0.1	P	D	01/05/17	AD-1 / AD-2 / AD-3	15	45	Blank	50% accessible
A-811	8	38.2	0.6	17.2	16.6	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	45	Blank	
A-813	4	19.1	1.6	2.1	0.5	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	
A-815	3	14.3	1.6	2	0.4	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	
A-817	3	57.3	1.6	3.2	1.6	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	
A-819	2	19.1	1.7	1.8	0.1	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	
A-821	2	19.1	1.5	1.5	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	Welded bonnet
A-823	1	38.2	1.4	3.2	1.8	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	
A-825	2	76.4	1.7	1.7	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	
A-827	2	38.2	1.6	1.6	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	
A-829	8	152.8	1.3	30.1	28.8	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	1325 @ sample station
A-831	6	114.6	1	21.3	20.3	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	1337 @ sample station
A-833	4	76.4	1.3	10	8.7	A	D	01/05/17	AD-1 / AD-2 / AD-3	13	50	Blank	1347 @ sample station
A-835	3	57.3	1.7	1.7	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	
A-837	3	114.6	1.6	1.6	0	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	
A-839	7	16.7	1.6	2	0.4	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	
A-841	5	23.9	0.9	1.5	0.6	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	
A-843	4	19.1	0.8	1.2	0.4	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	
A-845	14	33.4	0.8	9.3	8.5	A	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	1428
A-847	2	4.8	1.2	1.8	0.6	P	D	01/05/17	AD-1 / AD-2 / AD-3	15	50	Blank	Insulated
A-849	1	2.4	-0.2	0.4	0.6	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	TVA #19
A-851	6	7.2	-0.1	-0.1	0	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-853	4	76.4	-0.1	-0.1	0	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-855	4	4.8	-0.4	-0.3	0.1	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-857	1	9.5	-0.4	-0.3	0.1	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-859	10	23.9	-0.5	10.7	11.2	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-861	3	28.6	-0.2	-0.2	0	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-863	1	19.1	-0.4	-0.3	0.1	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	Welded bonnet
A-865	1	19.1	-0.4	-0.4	0	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-867	4	76.4	-0.4	40.9	41.3	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-869	6	114.6	1	7.2	6.2	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	TVA #19
A-871	0.5	9.5	1.9	2	0.1	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-873	1	19.1	1.7	2	0.3	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-875	1	19.1	1.7	1.8	0.1	A	D	01/11/17	AD-4 / AD-5	19	54	5/SW	
A-877	3	57.3	1.5	4.1	2.6	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	TVA #19
A-879	3	28.6	1.5	2.1	0.6	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-881	1	9.5	1.5	1.5	0	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-883	2	38.2	1.3	1.4	4.6	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-885	4	76.4	1.2	5.8	4.6	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-887	6	114.6	1.2	21.7	20.5	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-889	5	95.5	1.6	207.7	206.1	A	D	01/11/17	AD-4 / AD-5	20	54	Blank	TVA #20
A-891	1	19.1	1.9	2	0.1	A	D	01/11/17	AD-4 / AD-5	20	54	Blank	
A-893	2	38.2	1.8	2.2	0.4	A	D	01/11/17	AD-4 / AD-5	20	54	Blank	
A-895	2	38.2	1.7	1.8	0.1	A	D	01/11/17	AD-4 / AD-5	20	54	Blank	
A-897	1	19.1	1.7	1.7	0	A	D	01/11/17	AD-4 / AD-5	20	54	Blank	
A-899	4	76.4	1.7	9.8	8.1	A	D	01/11/17	AD-4 / AD-5	20	54	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-901	9	7.2	2.5	465	462.5	A	D	01/11/17	AD-4 / AD-5	20	54	Blank	
A-903	3	57.3	1.7	2.9	1.2	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	TVA #19
A-905	1	19.1	1.9	1.9	0	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	Welded bonnet
A-907	1	19.1	1.8	1.8	0	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-909	4	76.4	1.6	7.8	6.2	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-911	2	38.2	1.7	1.8	0.1	A	D	01/11/17	AD-4 / AD-5	19	54	Blank	
A-913	4	9.5	1.7	1.7	0	A	D	01/17/17	AD-1 / AD-2 / AD-3	16	45	Blank	TVA #16
A-915	3	57.3	0.9	0.9	0	A	D	01/17/17	AD-1 / AD-2 / AD-3	21	45	Blank	TVA #21
A-917	7	22.3	0.9	1.1	0.2	A	D	01/17/17	AD-1 / AD-2 / AD-3	21	45	Blank	TVA #21
A-919	11	35	1.7	2.7	1	A	D	01/17/17	AD-1 / AD-2 / AD-3	16	45	Blank	TVA #16
A-921	6	19.1	0.8	1.1	0.3	A	D	01/17/17	AD-3	21	45	Blank	J21
A-923	3	57.3	0.7	0.9	0.2	A	D	01/17/17	AD-3	21	45	Blank	J21
A-925	4	12.7	0.6	0.7	0.1	A	D	01/17/17	AD-3	21	45	Blank	J21
A-927	10	23.9	1.5	2.4	0.9	A	D	01/17/17	AD-2	16	45	Blank	R16
A-929	9	28.6	0.6	0.9	0.3	A	D	01/17/17	AD-3	21	45	Blank	J21
A-931	3	7.2	2.2	2.3	0.1	A	D	01/17/17	AD-6	18	45	Blank	L18
A-933	3	7.2	2.1	2.5	0.4	A	D	01/17/17	AD-6	18	45	Blank	L18
A-935	6	11.5	0.5	2.2	1.7	A	D	01/17/17	AD-3	21	45	Blank	J21
A-937	2	38.2	2.3	2.6	0.3	A	D	01/17/17	AD-6	18	45	Blank	L18
A-939	14	33.4	1.6	8.1	6.5	A	D	01/17/17	AD-2	16	45	Blank	R16
A-941	12	229.2	2.4	2.4	0	A	D	01/17/17	AD-6	18	45	Blank	L18
A-943	6	11.5	2.3	3.5	1.2	A	D	01/17/17	AD-6	18	45	Blank	L18
A-945	3	57.3	0.7	0.7	0	A	D	01/17/17	AD-3	21	45	Blank	J21
A-947	2	38.2	0.5	0.5	0	A	D	01/17/17	AD-3	21	45	Blank	J21
A-949	2	4.8	2.2	2.4	0.2	A	D	01/17/17	AD-6	18	45	Blank	L18
A-951	3	7.2	2.2	2.3	0.1	A	D	01/17/17	AD-6	18	45	Blank	L18
A-953	10	23.9	1.7	2.1	0.4	A	D	01/17/17	AD-2	16	45	Blank	R16
A-957	2	38.2	0.3	0.3	0	A	D	01/17/17	AD-3	21	45	Blank	J21
A-959	1	19.1	2	2	0	A	D	01/17/17	AD-6	18	45	Blank	L18
A-961	1	19.1	2	2	0	A	D	01/17/17	AD-6	18	45	Blank	L18
A-963	3	28.6	2	2.1	0.1	A	D	01/17/17	AD-6	18	45	Blank	L18
A-965	3	57.3	0.2	0.3	0.1	A	D	01/17/17	AD-3	21	45	Blank	J21
A-967	8	9.5	1.5	1.5	0	A	D	01/17/17	AD-2	16	45	Blank	R16
A-969	1	9.5	2	2.1	0.1	A	D	01/17/17	AD-6	18	45	Blank	L18
A-971	2	38.2	1.2	0.2	0	A	D	01/17/17	AD-3	21	45	Blank	J21
A-973	3	28.6	2	2.1	0.1	A	D	01/17/17	AD-6	18	45	Blank	L18 E4653
A-975	2	25.5	2	2	0	A	D	01/17/17	AD-6	18	45	Blank	L18 E4654
A-977	4	6.4	1.4	1.4	0	A	D	01/17/17	AD-2	16	45	Blank	R18
A-979	1	19.1	2	2	0	A	D	01/17/17	AD-6	18	45	Blank	L Gas oil
A-981	6	Unknown	1.4	1.4	0	A	D	01/17/17	AD-2	16	45	Blank	R
A-983	4	12.7	0.7	0.8	0.1	A	D	01/17/17	AD-3	22	45	Blank	J
A-985	1	19.1	1.9	2.1	0.2	A	D	01/17/17	AD-6	18	45	Blank	L
A-987	1	19.1	2	2.1	0.1	A	D	01/17/17	AD-6	18	45	Blank	L
A-989	4	19.1	0.6	0.7	0.1	A	D	01/17/17	AD-3	22	45	Blank	J
A-991	1	19.1	1.9	2.1	0.2	A	D	01/17/17	AD-6	18	45	Blank	L
A-993	1	19.1	1.9	2	0.1	A	D	01/17/17	AD-6	18	45	Blank	L welded bonnet
A-995	5	23.9	1.2	1.6	0.4	A	D	01/17/17	AD-2	16	45	Blank	R
A-997	4	19.1	0.6	1	0.4	A	D	01/17/17	AD-3	18	45	Blank	J
A-999	3	5.7	2.1	2.4	0.3	A	D	01/17/17	AD-6	18	45	Blank	L
A-1001	4	19.1	1.3	1.6	0.3	A	D	01/17/17	AD-2	16	45	Blank	R
A-1003	2	3.8	1.9	2.3	0.4	A	D	01/17/17	AD-6	18	50	Blank	L
A-1005	2	3.8	1.9	2.2	0.3	A	D	01/17/17	AD-6	18	50	Blank	L
A-1007	4	76.4	0.7	0.9	0.2	A	D	01/17/17	AD-3	NA	50	Blank	J
A-1009	4	19.1	1.3	1.3	0	A	D	01/17/17	AD-2	16	50	Blank	R
A-1011	2	3.8	2.2	2.2	0	A	D	01/17/17	AD-6	18	50	Blank	L
A-1013	4	3.8	1.8	1.9	0.1	A	D	01/17/17	AD-6	18	50	Blank	L
A-1015	2	38.2	1.7	1.7	0	A	D	01/17/17	AD-1	22	50	Blank	A
A-1017	7	13.4	1.6	2	0.4	A	D	01/17/17	AD-3	15	50	Blank	J
A-1019	3	57.3	1.6	1.6	0	A	D	01/17/17	AD-1	22	50	Blank	A
A-1021	5	9.5	1.9	2	0.1	A	D	01/17/17	AD-1 / AD-2 / AD-3	18	50	Blank	L
A-1023	4	9.5	1.6	1.6	0	A	D	01/17/17	AD-1	22	50	Blank	A
A-1025	1	19.1	1.9	1.9	0	A	D	01/17/17	AD-6	18	50	Blank	L
A-1027	1	19.1	1.9	2	0.1	A	D	01/17/17	AD-6	18	50	Blank	L
A-1029	8	15.3	1.6	3.7	2.1	A	D	01/17/17	AD-3	15	50	Blank	J
A-1031	3	5.7	1.9	1.9	0	A	D	01/17/17	AD-6	18	50	Blank	L
A-1033	4	7.6	1.6	1.9	0.3	A	D	01/17/17	AD-1	22	50	Blank	A
A-1035	6	11.5	1.9	1.9	0	A	D	01/17/17	AD-6	21	50	Blank	L
A-1037	6	11.5	1.6	1.8	0.2	A	D	01/17/17	AD-1	22	50	Blank	A
A-1039	4	76.4	1.9	1.9	0	A	D	01/17/17	AD-6	21	50	Blank	L
A-1041	4	76.4	1.9	1.9	0	A	D	01/17/17	AD-6	21	50	Blank	L
A-1043	5	11.9	2.1	2.1	0	A	D	01/17/17	AD-3	15	50	Blank	J
A-1045	2	3.8	2.1	2.2	0.1	A	D	01/17/17	AD-6	21	50	Blank	L
A-1047	8	15.3	1.6	27.9	26.3	A	D	01/17/17	AD-1	22	50	Blank	A
A-1049	2	38.2	1.8	2	0.2	A	D	01/17/17	AD-3	15	50	Blank	J
A-1051	4	7.6	1.8	1.9	0.1	A	D	01/17/17	AD-3	16	50	Blank	L & TVA #16 - heavy dirt on stem

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1053	2	38.2	1.6	1.7	0.1	A	D	01/17/17	AD-1	15	50	Blank	A & TVA #15
A-1055	4	7.6	1.8	2	0.2	A	D	01/17/17	AD-6	21	50	Blank	L
A-1057	4	9.5	1.5	1.7	0.2	A	D	01/17/17	AD-1	22	50	Blank	A
A-1059	3	14.3	1.8	2.2	0.4	A	D	01/17/17	AD-6	21	50	Blank	L
A-1061	3	7.2	1.5	1.7	0.2	A	D	01/17/17	AD-1	22	50	Blank	A
A-1063	2	12.7	1.9	1.9	0	A	D	01/17/17	AD-6	16	50	Blank	L
A-1065	3	19.1	1.9	2	0.1	A	D	01/17/17	AD-6	16	50	Blank	L
A-1067	5	23.9	1.6	28	26.4	A	D	01/17/17	AD-1	15	50	Blank	A
A-1069	4	19.1	2	2.4	0.4	A	D	01/17/17	AD-6	16	50	Blank	L
A-1071	3	19.1	2	2	0	A	D	01/17/17	AD-6	16	50	Blank	L
A-1073	2	12.7	2	2	0	A	D	01/17/17	AD-6	16	50	Blank	L
A-1075	3	14.3	2	3.8	1.8	A	D	01/17/17	AD-6	16	50	Blank	L
A-1077	1	19.1	2	2.1	0.1	A	D	01/17/17	AD-6	16	50	Blank	L
A-1079	1	19.1	2	2.1	0.1	A	D	01/17/17	AD-6	16	50	Blank	L
A-1081	2	12.7	2	2.1	0.1	A	D	01/17/17	AD-6	16	50	Blank	L
A-1083	7	16.7	2	12.1	10.1	A	D	01/17/17	AD-6	16	50	Blank	L
A-1085	8	19.1	2.1	3	0.9	A	D	01/17/17	AD-1	15	50	Blank	A
A-1087	6	14.3	2	2	0	A	D	01/17/17	AD-1	15	50	Blank	A
A-1089	2	19.1	1.5	1.6	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1091	2	19.1	1.4	1.7	0.3	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1093	1	9.5	1.4	1.4	0	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1095	2	19.1	1	1.3	0.3	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1097	2	19.1	1.1	1.1	0	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1099	1	38.2	0.9	1	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1101	1	38.2	0.8	1	0.2	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1103	1	9.5	0.8	0.9	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1105	1	9.5	0.8	0.9	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1107	1	9.5	0.6	0.8	0.2	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1109	0.5	38.2	0.7	0.7	0	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1111	1	38.2	0.6	0.7	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1113	1	19.1	0.7	0.8	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1115	2	38.2	0.7	0.7	0	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1117	1	19.1	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1119	1	19.1	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	TVA #19
A-1121	1	19.1	0.7	0.7	0	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	Welded bonnet
A-1123	2	25.5	0.5	0.5	0	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1125	1	19.1	0.3	0.4	0.1	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	
A-1127	1	19.1	0.3	0.3	0	A	D	01/25/17	AD-4 / AD-5	19	45	Blank	76-PV-507
A-1129	0.5	9.5	0.7	0.7	0	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1131	1	19.1	0.6	1	0.4	P	D	01/25/17	AD-4 / AD-5	15	45	Blank	Painted bonnet
A-1133	1	19.1	0.8	1.1	0.3	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1135	2	38.2	0.7	1.4	0.7	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1137	2	38.2	0.8	0.8	0	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1139	1	19.1	0.6	1	0.4	P	D	01/25/17	AD-4 / AD-5	15	45	Blank	Painted bonnet
A-1141	1	9.5	0.7	0.8	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1143	1	19.1	0.6	0.6	0	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1145	1	76.4	0.7	0.7	0	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1147	1	76.4	0.6	0.7	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	TVA #15
A-1149	1	38.2	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1151	1	38.2	0.5	0.7	0.2	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1153	1	76.4	0.7	0.8	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1155	1	19.1	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1157	1	19.1	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1159	1	19.1	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1161	2	38.2	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	76-PV-505
A-1163	3	9.5	0.4	0.5	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1165	3	9.5	0.5	0.6	0.1	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1167	1	19.1	0.5	0.7	0.2	A	D	01/25/17	AD-4 / AD-5	15	45	Blank	
A-1169	1	3.2	1.4	1.5	0.1	A	D	01/25/17	AD-4 / AD-5	13	45	Blank	
A-1171	2	38.2	1.4	1.6	0.2	A	D	01/25/17	AD-4 / AD-5	13	45	Blank	
A-1173	1	19.1	1.5	1.6	0.1	A	D	01/25/17	AD-4 / AD-5	13	45	Blank	
A-1175	2	50.9	1.5	1.7	0.2	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	TVA #13
A-1177	0.5	19.1	1.5	1.6	0.1	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1179	0.5	19.1	1.5	1.5	0	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1181	1	38.2	1.5	1.5	0	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1183	1	38.2	1.5	1.5	0	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	Welded bonnet
A-1185	1	38.2	1.5	1.6	0.1	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1187	0.5	19.1	1.4	1.6	0.2	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1189	1	38.2	1.4	1.6	0.2	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1191	1	38.2	1.3	1.7	0.4	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1193	2	38.2	1.4	1.7	0.3	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1195	2	38.2	1.4	1.7	0.3	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1197	1	19.1	1.4	1.5	0.1	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1199	1	19.1	1.4	1.5	0.1	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1201	2	38.2	1.5	1.7	0.2	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1203	1	19.1	1.4	1.5	0.1	A	D	01/25/17	AD-4 / AD-5	13	42	Blank	
A-1205	1	19.1	0.9	1.2	0.3	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1207	2	38.2	1	1.1	0.1	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1209	1	19.1	0.9	1.1	0.2	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1211	1	38.2	1	1.3	0.3	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1213	1	76.4	1	1.1	0.1	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1215	1	19.1	1	1.1	0.1	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1217	1	19.1	1	1	0	P	D	01/25/17	AD-4 / AD-5	19	42	Blank	Painted bonnet
A-1219	1	19.1	1	1	0	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1221	1	25.5	0.9	1	0.1	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1223	3	57.3	0.9	1	0.1	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1225	6	14.3	0.7	5.3	4.6	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1227	2	76.4	1.6	1.7	0.1	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1229	2	19.1	1.5	1.5	0	A	D	01/25/17	AD-4 / AD-5	19	42	Blank	
A-1231	2	38.2	0.9	1	0.1	A	D	01/25/17	AD-4 / AD-5	19	54	Blank	TVA #19
A-1233	9	28.6	0.8	100.3	99.5	A	D	01/25/17	AD-4 / AD-5	19	54	Blank	
A-1235	2	38.2	0.5	0.7	0.2	A	D	01/25/17	AD-4 / AD-5	13	54	Blank	TVA #13
A-1237	1	19.1	0.5	0.7	0.2	A	D	01/25/17	AD-4 / AD-5	13	54	Blank	
A-1239	7	33.4	0.6	510	509.4	A	D	01/25/17	AD-4 / AD-5	13	54	Blank	
A-1241	6	28.6	0.2	393	392.8	A	D	01/25/17	AD-4 / AD-5	15	54	Blank	TVA #15
A-1243	2	38.2	1.5	2.6	1.1	A	D	01/25/17	AD-4 / AD-5	16	54	Blank	TVA #16
A-1245	5	15.9	1.7	3579	3577.3	A	D	01/25/17	AD-4 / AD-5	16	54	Blank	
A-1247	4	12.7	1.5	31.3	29.8	A	D	01/25/17	AD-4 / AD-5	22	54	Blank	TVA #22
A-1249	1	19.1	2.5	2.5	0	A	D	01/25/17	AD-4 / AD-5	22	54	Blank	
A-1251	1	19.1	2.4	2.4	0	A	D	01/25/17	AD-4 / AD-5	22	54	Blank	
A-1253	1	19.1	2.2	2.2	0	A	D	01/25/17	AD-4 / AD-5	22	55	Blank	TVA #22
A-1255	3	14.3	2.1	10.4	8.3	A	D	01/25/17	AD-4 / AD-5	22	55	Blank	FV-107 Control valve
A-1257	3	9.5	0.9	3.9	3	A	D	01/25/17	AD-4 / AD-5	19	55	Blank	TVA #19 Flange
A-1259	8	25.5	1.6	499	497.4	A	D	01/25/17	AD-4 / AD-5	19	55	Blank	
A-1261	4	9.5	1	1.3	0.3	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1263	4	9.5	0.8	1.3	0.5	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1265	3	7.2	0.8	1.1	0.3	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1267	4	7.6	0.8	1.4	0.6	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1269	2	3.8	0.7	1.2	0.5	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1271	2	38.2	0.7	1.2	0.5	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1273	1	19.1	0.7	0.8	0.1	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1275	2	38.2	0.7	1	0.3	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1277	1	19.1	0.6	1	0.4	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1279	3	7.2	0.6	0.8	0.2	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1281	4	9.5	0.5	0.9	0.4	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1283	3	7.2	0.6	1	0.4	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1285	3	7.2	0.5	0.8	0.3	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1287	2	4.8	0.4	1	0.6	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1289	1	19.1	0.5	0.7	0.2	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1291	4	9.5	0.5	0.8	0.3	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	TVA #20
A-1293	1	19.1	0.4	0.8	0.4	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1295	0.5	9.5	0.4	0.9	0.5	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1297	3	7.2	0.5	0.8	0.3	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	
A-1299	5	11.9	0.8	1.5	0.7	A	D	01/26/17	AD-4 / AD-5	19	45	Blank	TVA #19
A-1301	1	19.1	0.7	0.8	0.1	A	D	01/26/17	AD-4 / AD-5	19	45	Blank	
A-1303	1	19.1	0.7	0.7	0	A	D	01/26/17	AD-4 / AD-5	19	45	Blank	
A-1305	15	71.6	1	400.1	399.1	A	D	01/26/17	AD-4 / AD-5	19	45	Blank	White visible emissions observed
A-1307	9	43	1.3	321	319.7	A	D	01/26/17	AD-4 / AD-5	21	45	Blank	White visible emissions observed TVA #21
A-1309	9	43	1.5	73.5	72	A	D	01/26/17	AD-4 / AD-5	16	45	Blank	TVA #16
A-1311	10	47.7	1.9	86.6	84.7	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	TVA #20
A-1313	2	9.5	1.1	1.3	0.2	A	D	01/26/17	AD-4 / AD-5	20	45	Blank	TVA #20
A-1315	7	33.4	1.2	88	86.8	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1317	1	19.1	2.5	2.5	0	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	TVA #22
A-1319	0.5	9.5	2.2	2.2	0	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1321	2	38.2	2.2	2.5	0.3	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1323	2	9.5	2.1	3.3	1.2	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1325	2	12.7	2.1	2.2	0.1	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1327	2	9.5	2.1	2.3	0.2	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1329	1	4.8	2	2.1	0.1	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1331	1	6.4	2	2.2	0.2	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1333	1	4.8	2	2.3	0.3	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1335	2	9.5	2	2	0	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1337	1	4.8	2	2	0	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1339	1	19.1	2	2	0	A	D	01/26/17	AD-4 / AD-5	20	56	7/N	
A-1341	2	4.8	1.7	2	0.3	A	D	01/26/17	AD-4	20	56	7/N	#18
A-1343	1	9.5	2.1	2.1	0	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1345	11	26.3	1.7	6	4.3	A	D	01/26/17	AD-4	20	56	7/N	#18
A-1347	2	19.1	1.8	2	0.2	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1349	0.5	4.8	1.8	1.9	0.1	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1351	1	9.5	1.9	1.9	0	A	D	01/26/17	AD-5	22	56	7/N	#22 excessive soiling dried product

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1353	1	9.5	1.8	1.8	0	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1355	1	9.5	1.8	1.8	0	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1357	1	9.5	1.8	1.8	0	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1359	0.5	4.8	1.8	1.8	0	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1361	1	9.5	1.7	1.7	0	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1363	4	9.5	2.2	5.9	3.7	A	D	01/26/17	AD-4	20	56	7/N	#18
A-1365	4	38.2	1.8	2.8	1	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1367	1	9.5	2	2	0	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1369	1	9.5	1.8	2	0.2	A	D	01/26/17	AD-5	22	56	7/N	#22
A-1371	1	9.5	2	2.1	0.1	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	TVA #18 * Face plate rating
A-1373	1	9.5	2	2.1	0.1	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1375	1	9.5	2	2.1	0.1	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1377	0.5	4.8	1.9	2.1	0.2	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1379	1	9.5	1.9	1.9	0	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1381	1	9.5	1.9	2	0.1	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1383	1	9.5	1.9	2	0.1	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1385	1	9.5	1.9	2.1	0.2	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1387	1	9.5	2	2	0	A	D	01/26/17	AD-4 / AD-5	18	57	6/ENE	
A-1389	1	9.5	1.9	1.9	0	A	D	01/26/17	AD-4 / AD-5	24	57	6/ENE	TVA #24
A-1391	1	9.5	1.8	1.9	0.1	A	D	01/26/17	AD-4 / AD-5	24	57	6/ENE	
A-1393	1	9.5	1.9	1.9	0	A	D	01/26/17	AD-4 / AD-5	24	57	6/ENE	
A-1395	2	19.1	1.8	2.2	0.4	A	D	01/26/17	AD-4 / AD-5	24	57	6/ENE	
A-1397	1	9.5	1.8	1.8	0	A	D	01/26/17	AD-4 / AD-5	24	57	6/ENE	
A-1399	1	9.5	1.8	2	0.2	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	* Face plate rating
A-1401	1	9.5	1.8	1.9	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1403	1	19.1	1.8	1.8	0	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1405	0.5	9.5	1.8	1.8	0	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1407	0.5	9.5	1.8	1.8	0	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1409	1	19.1	1.7	1.8	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1411	0.5	9.5	1.8	1.8	0	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1413	1	19.1	1.8	1.8	0	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1415	1	19.1	1.7	2	0.3	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1417	0.5	9.5	1.7	1.9	0.2	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1419	1	19.1	1.8	1.9	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1421	0.5	9.5	1.8	1.9	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1423	0.5	9.5	1.8	1.9	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1425	1	19.1	1.8	1.9	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1427	0.5	9.5	1.8	1.9	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1429	0.5	9.5	1.7	1.8	0.1	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	TVA #24
A-1431	1	19.1	1.9	1.9	0	A	D	01/26/17	AD-4 / AD-5	24	Blank	Blank	
A-1433	0.5	9.5	1.2	1.2	0	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	TVA #20 Fin fan
A-1435	1	19.1	1.1	1.1	0	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1437	1	19.1	1.1	1.2	0.1	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1439	0.5	9.5	1.1	1.2	0.1	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1441	0.5	9.5	1	1.1	0.1	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1443	1	19.1	1	1	0	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1445	0.5	9.5	1	1.1	0.1	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1447	1	19.1	1.1	1.1	0	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1449	0.5	9.5	1	1	0	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1451	1	19.1	1	1.1	0.1	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1453	1	19.1	1	1	0	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1455	0.5	9.5	1	1.1	0.1	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1457	1	19.1	1	1.1	0.1	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1459	1	19.1	1.1	1	0	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1461	0.5	9.5	0.9	1.1	0.2	A	D	01/30/17	AD-4 / AD-5	20	41	3/N	
A-1463	4	76.4	1	11.2	10.2	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	TVA #20
A-1465	0.5	9.5	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1467	1	19.1	1.8	1.8	0	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1469	0.5	9.5	1.6	1.6	0	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1471	1	19.1	1.5	1.6	0.1	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1473	1	19.1	1.5	1.5	0	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1475	1	19.1	1.4	1.5	0.1	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1477	0.5	9.5	1.3	1.3	0	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1479	0.5	9.5	1.2	1.3	0.1	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1481	1	19.1	1.2	1.3	0.1	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1483	3	57.3	1.2	125.5	124.3	A	D	01/30/17	AD-4 / AD-5	20	53	5/N	
A-1485	1	19.1	1.5	1.5	0	A	D	01/30/17	AD-4 / AD-5	19	53	5/N	TVA #20
A-1487	0.5	4.8	1.3	1.3	0	A	D	01/30/17	AD-4 / AD-5	19	53	5/N	
A-1489	0.5	9.5	1.2	1.3	0.1	A	D	01/30/17	AD-4 / AD-5	19	53	5/N	
A-1491	1	9.5	1.3	1.4	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1493	1	19.1	1.3	1.4	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1495	1	19.1	1.3	1.4	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1497	1	9.5	1.2	1.3	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1499	0.5	4.8	1.3	1.4	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1501	1	9.5	1.2	1.9	0.7	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1503	1	9.5	1.3	1.3	0	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1505	0.5	4.8	1.3	1.4	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1507	0.5	4.8	1.3	1.3	0	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1509	1	9.5	1.2	1.4	0.2	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1511	0.5	4.8	1.3	1.3	0	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1513	1	9.5	1.3	1.3	0	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1515	1	19.1	1.3	1.3	0	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1517	1	19.1	1.2	1.3	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1519	1	6.4	1.2	1.3	0.1	A	D	01/30/17	AD-4 / AD-5	19	Blank	5/N	
A-1521	0.5	4.8	1.2	1.2	0	A	D	01/30/17	AD-4 / AD-5	19	48	5/NW	
A-1523	1	9.5	1.2	1.2	0	A	D	01/30/17	AD-4 / AD-5	19	48	5/NW	
A-1525	0.5	4.8	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1527	1	9.5	0.9	1.1	0.2	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1529	1	19.1	1	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1531	0.5	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1533	1	6.4	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1535	0.5	4.8	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1537	1	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1539	0.5	4.8	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1541	1	9.5	0.9	1	0.1	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1543	0.5	4.8	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1545	1	9.5	0.9	1.3	0.4	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1547	1	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	48	5/NW	
A-1549	1	19.1	0.9	1	0.1	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	TVA #14
A-1551	1	19.1	1	1	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1553	0.5	4.8	0.9	1	0.1	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1555	1	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1557	1	9.5	0.9	1	0.1	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1559	1	19.1	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	Components are cold
A-1561	1	19.1	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1563	0.5	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1565	1	19.1	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1567	0.5	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1569	1	19.1	0.9	1	0.1	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1571	0.5	9.5	0.9	1	0.1	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1573	1	19.1	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1575	1	19.1	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1577	0.5	9.5	0.8	0.9	0.1	A	D	01/30/17	AD-4 / AD-5	14	49	5/NW	
A-1579	0.5	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	52	5/NW	
A-1581	1	19.1	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	52	5/NW	
A-1583	0.5	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	52	5/NW	
A-1585	1	19.1	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	52	5/NW	
A-1587	0.5	9.5	0.9	0.9	0	A	D	01/30/17	AD-4 / AD-5	14	52	5/NW	
A-1589	0.5	9.5	0.9	1	0.1	A	D	01/30/17	AD-4 / AD-5	14	52	5/NW	
A-1591	1	19.1	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1593	0.5	9.5	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1595	1	19.1	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1597	0.5	9.5	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1599	1	4.8	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1601	1	19.1	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1603	0.5	9.5	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1605	1	19.1	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	52	5/NW	
A-1607	0.5	9.5	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	TVA #18
A-1609	1	19.1	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1611	1	19.1	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1613	0.5	9.5	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1615	1	19.1	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1617	0.5	9.5	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1619	1	19.1	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1621	0.5	9.5	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1623	1	19.1	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1625	1	19.1	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1627	0.5	9.5	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1629	1	19.1	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1631	1	19.1	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1633	0.5	9.5	2	2.1	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1635	1	19.1	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1637	1	19.1	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	TVA #18
A-1639	1	19.1	2	2.3	0.3	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1641	1	19.1	1.9	2.1	0.2	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1643	1	19.1	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1645	0.5	9.5	2	2.1	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1647	1	19.1	2	2.1	0.1	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1649	0.5	9.5	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1651	1	19.1	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1653	1	19.1	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1655	0.5	9.5	2	2	0	A	D	01/30/17	AD-4 / AD-5	18	53	5/NW	
A-1657	2	6.4	1.8	2	0.2	A	D	01/30/17	AD-4 / AD-5	19	53	5/NW	TVA #19
A-1659	2	6.4	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	19	53	5/NW	
A-1661	2	6.4	1.9	2	0.1	A	D	01/30/17	AD-4 / AD-5	19	53	5/NW	FC-127 B
A-1663	2	6.4	1.6	1.8	0.2	A	D	01/30/17	AD-4 / AD-5	19	53	5/NW	
A-1665	1	19.1	1.6	1.7	0.1	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	Welded bonnet
A-1667	2	6.4	1.5	1.8	0.3	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1669	4	12.7	1.6	1.8	0.2	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1671	2	4.8	1.6	1.9	0.3	P	D	01/30/17	AD-4 / AD-5	19	48	Blank	Insulated bonnet
A-1673	2	38.2	1.6	2.3	0.7	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1675	1	19.1	1.5	1.7	0.2	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1677	1	12.7	1.6	1.6	0	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1679	2	6.4	1.6	1.6	0	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1681	1	3.2	1.5	1.6	0.1	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	76-FV-126
A-1683	2	6.4	1.5	1.6	0.1	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1685	1	9.5	1.5	1.6	0.1	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1687	1	9.5	1.5	1.5	0	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1689	0.5	9.5	1.4	1.5	0.1	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	Welded bonnet
A-1691	2	19.1	1.4	1.4	0	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	FV127A
A-1693	1	9.5	1.4	1.5	0.1	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1695	1	9.5	1.4	1.6	0.2	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1697	2	9.5	1.4	1.6	0.2	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1699	2	9.5	1.4	1.6	0.2	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1701	1	19.1	1.4	1.6	0.2	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1703	2	9.5	1.5	1.6	0.1	A	D	01/30/17	AD-4 / AD-5	19	48	Blank	
A-1705	2	9.5	0	0.1	0.1	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1707	1	9.5	0	0.1	0.1	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1709	1	9.5	0.1	0.1	0	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1711	2	19.1	0.1	0.2	0.1	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1713	1	9.5	0.2	0.2	0	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1715	2	38.2	0.2	0.2	0	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1717	1	9.5	0.2	0.3	0.1	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1719	1	9.5	0.2	0.2	0	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1721	1	9.5	0.3	0.3	0	A	D	01/30/17	AD-4 / AD-5	20	48	Blank	
A-1723	1	9.5	0.3	0.3	0	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	TVA #20
A-1725	1	19.1	0.3	0.3	0	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1727	1	9.5	0.3	0.4	0.1	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1729	1	9.5	0.3	0.4	0.1	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1731	1	19.1	0.3	0.3	0	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1733	1	19.1	0.2	0.3	0.1	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1735	1	19.1	0.3	0.3	0	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1737	1	19.1	0.2	0.2	0	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1739	1	9.5	0.2	0.3	0.1	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1741	1	12.7	0.2	0.2	0	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1743	2	19.1	0.2	0.8	0.6	A	D	01/30/17	AD-4 / AD-5	20	50	Blank	
A-1745	1	19.1	1.8	1.9	0.1	A	D	01/30/17	AD-4 / AD-5	24	50	Blank	TVA #24
A-1747	1	19.1	1.8	1.9	0.1	A	D	01/30/17	AD-4 / AD-5	24	50	Blank	
A-1749	1	19.1	1.8	1.9	0.1	A	D	01/30/17	AD-4 / AD-5	24	50	Blank	
A-1751	0.5	9.5	1.9	1.9	0	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	TVA #24
A-1753	4	50.9	1.9	2.3	0.4	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1755	1	12.7	1.8	1.8	0	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1757	1	12.7	1.7	1.8	0.1	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1759	1	12.7	1.7	1.7	0	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1761	1	9.5	1.7	1.8	0.1	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1763	2	19.1	1.7	1.8	0.1	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1765	1	19.1	1.7	1.7	0	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1767	1	19.1	1.7	1.8	0.1	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1769	1	19.1	1.6	1.7	0.1	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	Welded bonnet
A-1771	1	38.2	1.6	1.6	0	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1773	1	19.1	1.6	1.7	0.1	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1775	2	9.5	1.7	1.7	0	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1777	1	7.6	1.7	1.7	0	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1779	3	Unknown	1.6	1.8	0.2	A	D	01/30/17	AD-4 / AD-5	24	48	Blank	
A-1781	22	105	2.5	10.3	7.8	A	D	01/31/17	AD-1	18	Blank	Blank	A
A-1783	9	43	2	4.3	2.3	A	D	01/31/17	AD-1	18	Blank	Blank	A Not operating (inop)
A-1785	8	38.2	2	2.8	0.8	A	D	01/31/17	AD-1	18	Blank	Blank	A inop
A-1787	7	33.4	1.9	2.3	0.4	A	D	01/31/17	AD-1	18	Blank	Blank	A
A-1789	8	38.2	1.8	2.4	0.6	A	D	01/31/17	AD-1	18	Blank	Blank	A inop
A-1791	7	33.4	1.3	10.2	8.9	A	D	01/31/17	AD-1	18	Blank	Blank	A inop
A-1793	7	33.4	0.1	0.4	0.3	A	D	01/31/17	AD-3	24	Blank	Blank	J
A-1795	7	13.4	0.2	11	10.8	P	D	01/31/17	AD-3	24	Blank	Blank	J Inop, 50% accessible
A-1797	5	9.5	1.7	2.1	0.4	P	D	01/31/17	AD-2	18	Blank	Blank	Inop, 1/2 accessible
A-1799	8	76.4	1.6	1.7	0.1	A	D	01/31/17	AD-2	18	Blank	Blank	R
A-1801	5	47.7	0.6	0.6	0	A	D	01/31/17	AD-3	24	Blank	Blank	J

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1803	3	57.3	1.6	1.8	0.2	A	D	01/31/17	AD-2	18	Blank	Blank	R
A-1805	3	57.3	1.6	1.6	0	A	D	01/31/17	AD-2	18	Blank	Blank	R
A-1807	4	38.2	0.6	68	67.4	A	D	01/31/17	AD-3	24	Blank	Blank	J
A-1809	9	17.2	1.6	2	0.4	A	D	01/31/17	AD-2	18	Blank	Blank	R Steam @ seal insulated bonnet
A-1811	4	9.5	1.5	1.8	0.3	P	D	01/31/17	AD-2	18	Blank	Blank	R Steam/water 5% accessible
A-1813	3	28.6	1.6	1.8	0.2	A	D	01/31/17	AD-2	18	Blank	Blank	R inop
A-1815	5	15.9	1.5	1.5	0	A	D	01/31/17	AD-2	18	Blank	Blank	R inop
A-1817	8	38.2	1.4	1.4	0	A	D	01/31/17	AD-2	18	Blank	Blank	R inop
A-1819	1	19.1	2.5	2.6	0.1	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	TUA #20
A-1821	1	19.1	2.4	2.4	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1823	2	4.8	2.4	2.4	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1825	2	12.7	2.3	2.3	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1827	2	19.1	2.2	2.2	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1829	2	38.2	2.1	2.1	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1831	1	19.1	2	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1833	1	19.1	1.8	1.8	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1835	2	38.2	1.8	1.8	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1837	2	38.2	1.7	1.3	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1839	1	Unknown	1.2	1.4	0.2	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1841	1	19.1	1.2	1.3	0.1	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1843	1	19.1	1.1	1.2	0.1	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1845	2	19.1	1.2	1.4	0.2	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1847	3	28.6	1	1	0	A	D	02/14/17	AD-4 / AD-5	20	53	7/ENE	
A-1849	1	9.5	1.1	1.1	0	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	TUA #20
A-1851	1	9.5	0.8	0.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1853	1	9.5	0.7	0.8	0.1	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1855	1	9.5	0.8	0.8	0	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1857	1	9.5	0.7	0.8	0.1	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1859	1	9.5	0.7	0.7	0	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	Welded B
A-1861	2	4.8	0.7	0.8	0.1	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1863	1	9.5	0.6	0.7	0.1	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1865	1	25.5	0.7	0.8	0.1	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1867	1	19.1	0.7	0.7	0	A	D	02/14/17	AD-4 / AD-5	20	55	5/NE	
A-1869	2	19.1	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	55	5/NE	
A-1871	2	19.1	1.4	1.5	0.1	A	D	02/14/17	AD-4 / AD-5	19	55	5/NE	
A-1873	1	19.1	1.5	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	55	5/NE	
A-1875	2	19.1	1.4	1.5	0.1	A	D	02/14/17	AD-4 / AD-5	19	55	5/NE	
A-1877	1	9.5	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1879	1	19.1	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1881	4	Unknown	1.2	1.2	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1883	1	6.4	1.1	1.2	0.1	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1885	1	6.4	1.1	1.1	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1887	2	50.9	1.2	1.2	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1889	1	9.5	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1891	1	9.5	1	1	10	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1893	3	76.4	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1895	1	9.5	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1897	1	9.5	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1899	1	9.5	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1901	1	9.5	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1903	1	9.5	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1905	2	19.1	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	55	9/ENE	
A-1907	1	19.1	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1909	1	19.1	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1911	2	38.2	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1913	2	38.2	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1915	1	19.1	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1917	2	12.7	1	1	0	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1919	2	12.7	1	1.3	0.3	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1921	1	19.1	0.8	1	0.2	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1923	1	19.1	0.8	0.9	0.1	A	D	02/14/17	AD-4 / AD-5	19	57	6/NE	
A-1925	1	19.1	2.1	2	0	A	D	02/14/17	AD-4 / AD-5	20	57	6/NE	
A-1927	1	19.1	2	2	0	A	D	02/14/17	AD-4 / AD-5	20	57	6/NE	
A-1929	0.5	9.5	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	57	6/NE	
A-1931	1	19.1	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	57	6/NE	
A-1933	1	19.1	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	57	6/NE	
A-1935	1	19.1	2	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	TVA #20
A-1937	0.5	9.5	2	2	0	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1939	1	19.1	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1941	1	19.1	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1943	0.5	9.5	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1945	0.5	9.5	1.8	1.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1947	1	19.1	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1949	0.5	9.5	1.8	1.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1951	1	19.1	1.8	1.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1953	3	57.3	1.8	5.4	3.6	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	Top row - 4th in from right
A-1955	2	38.2	2	3.6	1.6	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1957	1	19.1	2.4	2.4	0	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1959	1	19.1	2.3	2.3	0	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1961	1	19.1	2.2	2.3	0.1	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1963	1	19.1	2	2	0	A	D	02/14/17	AD-4 / AD-5	20	59	6/NE	
A-1965	1	19.1	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	20	60	5/NE	TVA #20
A-1967	0.5	9.5	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	60	5/NE	
A-1969	1	19.1	1.9	2.2	0.3	A	D	02/14/17	AD-4 / AD-5	20	60	5/NE	
A-1971	1	19.1	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	20	60	5/NE	
A-1973	1	19.1	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	20	60	5/NE	
A-1975	0.5	9.5	1.8	1.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	60	5/NE	
A-1977	1	19.1	1.8	1.8	0	A	D	02/14/17	AD-4 / AD-5	20	60	5/NE	
A-1979	0.5	9.5	1.3	1.4	0.1	A	D	02/14/17	AD-4 / AD-5	19	60	5/NE	TVA #19
A-1981	1	19.1	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	60	5/NE	
A-1983	1	19.1	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	60	5/NE	
A-1985	1	19.1	1.5	1.5	0	A	D	02/14/17	AD-4 / AD-5	19	60	5/NE	
A-1987	0.5	9.5	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	60	5/NE	
A-1989	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	5/NE	
A-1991	1	19.1	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	TVA #19
A-1993	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-1995	0.5	9.5	1.3	1.4	0.1	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-1997	1	19.1	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-1999	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2001	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2003	1	19.1	1.2	1.4	0.2	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2005	1	19.1	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2007	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2009	1	19.1	1.3	1.4	0.1	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2011	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2013	1	19.1	1.2	1.3	0.1	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2015	0.5	9.5	1.2	1.4	0.2	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2017	1	19.1	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2019	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	60	Blank	
A-2021	1	19.1	1.2	1.4	0.2	A	D	02/14/17	AD-4 / AD-5	19	66	7/NE	TVA #19
A-2023	1	19.1	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	19	66	7/NE	
A-2025	0.5	9.5	1.2	1.3	0.1	A	D	02/14/17	AD-4 / AD-5	19	66	7/NE	
A-2027	1	19.1	1.3	1.4	0.1	A	D	02/14/17	AD-4 / AD-5	19	66	7/NE	
A-2029	11	210.1	1.2	1.2	0	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	TVA #20
A-2031	0.5	9.5	1.2	1.2	0	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2033	0.5	9.5	1.2	1.2	0	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2035	0.5	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2037	1	19.1	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2039	1	19.1	1.5	1.5	0	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2041	0.5	9.5	1.4	1.4	0	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2043	1	19.1	1	1.2	0.2	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2045	1	19.1	1	1.1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	7/NE	
A-2047	0.5	9.5	1	1	0	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	TVA #20
A-2049	0.5	9.5	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2051	1	19.1	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2053	0.5	9.5	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2055	0.5	9.5	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2057	1	19.1	1	1	0	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2059	0.5	9.5	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2061	1	19.1	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2063	1	19.1	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2065	1	19.1	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2067	0.5	9.5	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2069	1	19.1	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2071	0.5	9.5	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2073	0.5	9.5	0.8	0.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2075	0.5	9.5	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	20	66	Blank	
A-2077	0.5	9.5	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	TVA #20
A-2079	1	19.1	0.8	0.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2081	0.5	9.5	0.9	0.9	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2083	1	19.1	0.8	0.8	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2085	1	19.1	0.8	0.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2087	1	19.1	0.8	0.8	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2089	0.5	9.5	0.8	0.8	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2091	1	19.1	0.8	0.8	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2093	0.5	9.5	0.8	0.8	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2095	1	19.1	0.8	0.9	0.1	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2097	0.5	9.5	0.9	1	0.1	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2099	1	9.5	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	TVA #19
A-2101	0.5	9.5	2	2	0	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-2103	0.5	9.5	1.9	2.1	0.2	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2105	0.5	4.8	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	TVA #19
A-2107	1	9.5	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2109	0.5	4.8	1.8	1.9	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2111	1	9.5	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2113	0.5	4.8	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2115	0.5	4.8	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2117	1	9.5	1.8	2	0.2	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2119	1	9.5	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2121	1	9.5	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2123	0.5	4.8	1.8	2	0.2	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2125	0.5	4.8	1.8	1.9	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2127	1	9.5	1.9	2	0.1	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2129	1	9.5	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2131	0.5	4.8	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2133	1	9.5	1.9	1.9	0	A	D	02/14/17	AD-4 / AD-5	19	65	Blank	
A-2135	0.5	4.8	1.5	1.5	0	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	TVA #24
A-2137	1	9.5	1.5	1.5	0	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2139	1	9.5	1.5	1.6	0.1	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2141	1	9.5	1.5	1.6	0.1	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2143	0.5	4.8	1.5	1.5	0	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2145	1	9.5	1.5	1.7	0.2	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2147	0.5	4.8	1.5	1.5	0	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2149	0.5	4.8	1.5	1.6	0.1	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2151	5	47.7	1.5	8.1	6.6	A	D	02/14/17	AD-4 / AD-5	24	65	Blank	
A-2153	1	9.5	1.3	1.3	0	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	TVA #20
A-2155	1	9.5	1.3	1.4	0.1	A	D	02/14/17	AD-4 / AD-5	20	65	Blank	
A-2	10	19.1	0.5	1.9	1.4	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	1 level below top of column
A-4	3	57.3	0.3	1.7	1.4	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	1 level below top of column
A-6	2	19.1	1.8	1.9	0.1	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	top of column
A-8	2	19.1	1.9	2	0.1	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	
A-10	14	8.4	1.8	6.5	4.7	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	quick pulse
A-12	9	17.2	1	2.2	1.2	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	
A-14	7	11.1	-1.8	-0.8	1	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	
A-16	5	8	-2.2	-0.7	1.5	A	D	11/14/16	AD-4 / AD-5	19	66	NA/NNW	
A-18	4	7.6	1.3	2.4	1.1	A	D	11/15/16	AD-4 / AD-5	19	55	4/S	exchanger-E-4256, 05-390°F
A-20	2	38.2	1.3	1.3	0	A	D	11/15/16	AD-4 / AD-5	19	55	4/S	pulsing leak at pump seal 10-37 ppm
A-22	12	22.9	1.3	125	123.7	A	D	11/15/16	AD-4 / AD-5	19	55	4/S	concentration rose steadily to 125.0 then began dropping 05-390°F
A-24	5	9.5	0.5	0.6	0.1	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-26	2	38.2	0.4	0.4	0	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-28	17	32.5	0.4	410.5	410.1	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	concentration around 80, but spiked up to 410.5
A-30	3	5.7	0.7	0.8	0.1	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	HE 4005
A-32	2	3.8	0.7	0.7	0	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-34	2	38.2	0.7	0.8	0.1	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-36	1	19.1	0.7	0.8	0.1	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-38	1	19.1	0.8	0.8	0	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-40	2	38.2	0.8	0.8	0	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-42	2	38.2	0.8	0.9	0.1	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-44	1	1.9	0.8	0.8	0	A	D	11/15/16	AD-4 / AD-5	20	55	4/S	
A-46	4	6.4	0.7	1	0.3	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-48	3	4.8	0.7	1.6	0.9	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-50	2	2.5	0.9	1.1	0.2	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-52	3	3.8	0.8	2.3	1.5	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-54	3	3.8	1	1	0	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-56	1	19.1	0.8	0.8	0	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-58	2	38.2	0.8	10.3	9.5	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	Avg: 9ppm connector above elbow
A-60	1	19.1	1.3	1.6	0.3	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-62	1	19.1	1.3	3.5	2.2	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-64	5	15.9	1.4	1.4	0	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-66	3	9.5	0.9	1	0.1	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-68	8	25.5	0.9	11	10.1	A	D	11/15/16	AD-4 / AD-5	20	60	Blank	
A-70	2	6.4	-1.8	-1.7	0.1	A	D	11/15/16	AD-4 / AD-5	19	60	Blank	
A-72	2	38.2	-1.8	-1.4	0.4	A	D	11/15/16	AD-4 / AD-5	19	60	Blank	
A-74	1	19.1	-1.7	-1.6	0.1	A	D	11/15/16	AD-4 / AD-5	19	60	Blank	
A-76	1	19.1	-1.7	-1.7	0	A	D	11/15/16	AD-4 / AD-5	19	60	Blank	
A-78	1	19.1	-1.7	-1.7	0	A	D	11/15/16	AD-4 / AD-5	19	60	Blank	
A-80	8	152.8	-1.8	43	44.8	A	D	11/15/16	AD-4 / AD-5	19	60	Blank	
A-82	10	191	0.3	11.1	10.8	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	
A-84	3	57.3	1	1.4	0.4	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	
A-86	2	38.2	1	1	0	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	
A-88	3	57.3	0.8	0.8	0	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	
A-90	3	5.7	0.5	0.5	0	P	D	11/17/16	AD-4 / AD-5	20	53	Blank	Bonnet under insulation
A-92	2	38.2	0.2	0.2	0	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	Bonnet welded
A-94	2	50.9	0.1	0.2	0.1	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	
A-96	3	57.3	0.1	0.1	0	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	Cold bypass line

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-98	3	57.3	0.1	0.1	0	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	Cold bypass line
A-100	8	15.3	0.1	0.8	0.7	A	D	11/17/16	AD-4 / AD-5	20	53	Blank	
A-102	6	14.3	0	0.2	0.2	A	D	11/17/16	AD-4 / AD-5	19	53	Blank	E-4257 "slurry" stream
A-104	2	38.2	0	0.4	0.4	A	D	11/17/16	AD-4 / AD-5	19	53	Blank	E-4257
A-106	8	19.1	0.1	0.4	0.3	A	D	11/17/16	AD-4 / AD-5	19	53	Blank	E-4257
A-108	7	16.7	0.3	0.6	0.3	A	D	11/17/16	AD-4 / AD-5	19	53	Blank	E-4257
A-110	3	14.3	1.6	1.6	0	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	Bonnet under insulation 4' line - #10 Nozzle
A-112	1	19.1	1.2	1.4	0.2	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	Welded bonnet - #10 Nozzle
A-114	3	57.3	1.3	1.4	0.1	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	#10 Nozzle
A-116	3	57.3	1.5	1.5	0	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	#10 Nozzle
A-118	2	38.2	1.2	1.3	0.1	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	#10 Nozzle
A-120	2	38.2	1.2	2	0.8	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	#10 Nozzle
A-122	6	28.6	1.2	1.5	0.3	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	#9 Nozzle
A-124	6	65.5	1.2	4.7	3.5	A	D	11/17/16	AD-4 / AD-5	20	56	5/S	
A-126	9	34.4	0.9	5.6	4.7	A	D	11/17/16	AD-4 / AD-5	19	56	5/S	Avg 1.0ppm, dirty not tagged filter
A-128	9	114.6	1	3	2	A	D	11/17/16	AD-4 / AD-5	19	56	5/S	
A-130	2	38.2	1	1.1	0.1	A	D	11/17/16	AD-4 / AD-5	19	56	5/S	
A-132	8	152.8	1	4.2	3.2	A	D	11/17/16	AD-4 / AD-5	19	56	5/S	
A-134	3	57.3	1.7	2.4	0.7	A	D	11/17/16	AD-4 / AD-5	20	58	2/NE	Nozzle #9
A-136	4	50.9	1.7	2	0.3	A	D	11/17/16	AD-4 / AD-5	20	58	2/NE	Nozzle #8
A-138	2	9.5	1.8	1.9	0.1	P	D	11/17/16	AD-4 / AD-5	20	58	2/NE	Bonnet under insulation
A-140	1	12.7	1.9	2	0.1	A	D	11/17/16	AD-4 / AD-5	20	58	2/NE	
A-142	3	57.3	1.8	2	0.2	A	D	11/17/16	AD-4 / AD-5	20	58	2/NE	
A-144	4	76.4	1.9	2	0.1	A	D	11/17/16	AD-4 / AD-5	20	58	2/NE	
A-146	0.5	1.2	0.2	0.2	0	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	E-4259
A-148	5	11.9	0.2	0.2	0	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-150	3	57.3	0.1	0.1	0	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-152	2	4.8	0	0.1	0.1	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-154	1	2.4	0	0.1	0.1	P	D	11/22/16	AD-5 / AD-7	19	55	Blank	Bonnet under insulation
A-156	1	3.2	0	0.1	0.1	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-158	2	38.2	0	0.2	0.2	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-160	3	28.6	0.1	0.1	0	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-162	1	2.4	0.1	0.2	0.1	P	D	11/22/16	AD-5 / AD-7	19	55	Blank	Bonnet under insulation
A-164	5	11.9	0.1	0.2	0.1	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-166	2	19.1	0.1	0.2	0.1	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-168	2	4.8	0.1	0.2	0.1	P	D	11/22/16	AD-5 / AD-7	19	55	Blank	Bonnet under insulation
A-170	2	38.2	0.4	0.5	0.1	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	Checked filter - clear
A-172	2	38.2	0.4	0.8	0.4	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	
A-174	2	38.2	0.4	0.5	0.1	A	D	11/22/16	AD-5 / AD-7	19	55	Blank	Union
A-176	2	38.2	0.4	0.5	0.1	A	D	11/22/16	AD-5 / AD-7	19	60	3/S	
A-178	2	38.2	0.4	0.5	0.1	A	D	11/22/16	AD-5 / AD-7	19	60	3/S	
A-180	2	38.2	0.4	0.7	0.3	A	D	11/22/16	AD-5 / AD-7	19	60	3/S	
A-182	2	38.2	0.4	0.6	0.2	A	D	11/22/16	AD-5 / AD-7	19	60	3/S	
A-184	5	8	0.9	5.8	4.9	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	At packing - hung tag
A-186	5	63.7	1.6	1.6	0	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-190	2	38.2	1.3	1.3	0	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-192	3	5.7	1.2	1.3	0.1	P	D	11/22/16	AD-5 / AD-7	20	60	3/S	Bonnet under packing
A-194	2	38.2	1.2	1.4	0.2	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-196	1	2.4	1.2	1.3	0.1	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-198	2	3.8	1.2	1.4	0.2	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-200	13	24.8	1.2	2	0.8	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-202	3	38.2	1.4	1.4	0	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-204	2	3.8	1.2	1.2	0	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-206	2	25.5	0.9	1.2	0.3	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-208	1	12.7	0.8	0.9	0.1	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-210	1	12.7	0.8	0.9	0.1	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	2nd deck
A-212	2	25.5	0.9	1.1	0.2	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-214	2	25.5	0.8	0.8	0	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-216	1	1.9	0.8	0.9	0.1	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-218	10	5.3	1	1.2	0.2	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	HE 4008 end (lower)
A-220	2	3.8	1	1	0	P	D	11/22/16	AD-5 / AD-7	20	60	3/S	Bonnet under insulation
A-222	2	Unknown	0.6	0.6	0	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-224	1	12.7	0.5	0.6	0.1	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-226	4	12.7	0.6	2.1	1.5	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	OFF heat exchanger - 4010
A-228	2	3.8	0.7	0.6	0	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-230	6	11.5	0.6	16.8	16.2	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	
A-230	6	11.5	0.6	29.9	29.3	A	D	11/22/16	AD-5 / AD-7	19	60	3/S	Re-sniffing; previous component
A-232	1	25.5	1.2	1.2	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-234	2	25.5	1.1	1.9	0.8	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-236	2	38.2	1.3	1.2	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-238	0.5	6.4	1.2	1.2	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-240	2	25.5	1.1	2.2	1.1	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-242	2	25.5	1.2	1.5	0.3	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-244	1	19.1	1.2	1.1	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-246	1	12.7	1.2	1.3	0.1	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-250	2	25.5	1.1	1.2	0.1	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-252	1	1.9	1.2	2.1	0.9	P	D	11/22/16	AD-5 / AD-7	18	60	3/S	Bonnet under insulation
A-254	1	1.9	1.6	1.6	0	P	D	11/22/16	AD-5 / AD-7	18	60	3/S	Bonnet under insulation
A-256	0.5	6.4	1.7	1.7	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-258	1	12.7	1.5	2.2	0.7	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	Bonnet
A-260	3	38.2	1.5	1.4	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-262	1	19.1	1.5	2.7	1.2	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-264	1	1.9	1.7	2.1	0.4	P	D	11/22/16	AD-5 / AD-7	18	60	3/S	Bonnet under insulation
A-266	1	12.7	1.7	1.9	0.2	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-268	1	12.7	1.6	1.6	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-270	5	9.5	1.9	1.6	0	A	D	11/22/16	AD-5 / AD-7	18	60	3/S	
A-272	1	1.6	1.1	1.2	0.1	P	D	11/22/16	AD-5 / AD-7	18	60	3/S	Bonnet under insulation
A-274	8	15.3	1.9	77	75.1	A	D	11/22/16	AD-5 / AD-7	20	60	3/S	Tag, Average 18
A-276	1	19.1	0.7	0.5	0	A	D	11/22/16	AD-5 / AD-7	19	60	3/S	OFF ex 4012
A-278	6	11.5	0.7	9.5	8.8	A	D	11/22/16	AD-5 / AD-7	19	60	3/S	Only repeatable to 6.8 ppm
A-280	1	15.3	0.4	0.3	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Steam blowdown
A-282	1	17.8	0.1	0.1	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Stream on EX4012
A-284	1	15.3	0.1	0.1	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	
A-286	2	4.8	0	0.1	0.1	P	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Under insulation
A-288	2	6.4	0	0.3	0.3	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Very hot!
A-290	3	9.5	0.1	0.7	0.6	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	
A-292	2	25.5	-0.2	0.1	0.3	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Top of HE4008 - negative background
A-294	1	15.3	-0.2	-0.2	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	
A-296	1	15.3	-0.2	-0.2	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	
A-298	1	15.3	-0.3	-0.2	0.1	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	
A-300	7	3.7	-0.3	-0.1	0.2	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	End cap top
A-302	1	9.5	-0.2	-0.2	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Wash oil flushing
A-304	2	19.1	-0.2	-0.2	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Wash oil flushing
A-306	1	12.7	-0.4	-0.4	0	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Wash oil flushing
A-308	1	19.1	-0.4	-0.3	0.1	A	D	11/28/16	AD-5 / AD-7	20	54	2/NE	Wash oil flushing
A-310	1	15.3	-0.3	-0.3	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	Flushing oil wash line on valve stem
A-312	1	15.3	-0.5	-0.5	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-314	1	15.3	-0.5	-0.5	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	Locked out Blue paint
A-316	1	15.3	0.1	0.2	0.1	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	Wet mater 19.1 - Blue paint
A-318	2	30.6	0.1	0.2	0.1	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	Control valve
A-320	1	12.7	0.1	0.2	0.1	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	At stem
A-322	1	12.7	0.1	0.3	0.2	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	
A-324	1	15.3	0.1	0.3	0.2	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	OFF HE4010
A-326	1	15.3	0.2	0.2	0	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	Stem
A-328	2	30.6	0.2	0.7	0.5	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	
A-330	1	15.3	0.2	0.2	0	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	At stem
A-332	7	33.4	0.1	2.9	2.8	A	D	11/28/16	AD-7 / AD-5	19	60	5/NW	At top of HE4010
A-334	7	16.7	1.6	10.8	9.2	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	V200 Area "replace tag - blue handle - valve"
A-336	4	9.5	1.1	2.8	1.7	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	On valve - Body of valve 334
A-338	2	4.8	0.9	1	0.1	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	On stem
A-340	1	2.4	0.9	1	0.1	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	At butterfly valve
A-342	2	30.6	1.2	1.6	0.4	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	On stem
A-344	2	15.3	1.1	3	1.9	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	"Replace valve tag"
A-346	3	7.2	0.9	3.8	2.9	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	WITH 8.8 momentary spike
A-348	2	4.8	1.5	3.2	1.7	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	At stem
A-350	3	7.2	1.1	2.7	1.6	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	FV1873
A-352	4	9.5	1	5.7	4.7	A	D	11/28/16	AD-7 / AD-5	21	60	5/NW	
A-354	2	4.8	0.6	0.8	0.2	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-356	2	4.8	0.6	0.8	0.2	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-358	1	7.6	0.6	0.8	0.2	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-360	1	2.4	0.7	0.7	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-362	3	7.2	0.7	0.6	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-364	1	2.4	0.4	0.7	0.3	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-366	1	15.3	0.7	0.6	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-368	2	4.8	0.5	1.2	0.7	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-370	2	9.5	0.6	0.8	0.2	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-372	2	3.8	0.6	0.7	0.1	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-374	3	7.2	0.6	0.6	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-376	2	4.8	0.5	1.8	1.3	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-378	4	9.5	0.4	1.8	1.4	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-380	2	4.8	0.4	0.8	0.4	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-382	1	19.1	0.5	0.5	0	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-384	1	25.5	0.5	1.3	0.8	A	D	11/28/16	AD-7 / AD-5	20	60	5/NW	
A-386	2	4.8	0.5	0.4	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-388	1	7.6	0.4	0.4	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-390	2	4.8	0.4	0.5	0.1	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-392	1	19.1	0.5	0.5	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-394	1	9.5	0.3	0.4	0.1	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	V-200
A-396	1	9.5	0.3	0.3	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	V-200
A-398	2	9.5	0.7	0.4	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	V-200

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-400	2	9.5	0.6	0.5	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	V-200
A-402	2	9.5	0.4	0.2	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	V-200
A-404	4	9.5	0.3	0.5	0.2	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-406	1	3.2	0.3	0.4	0.1	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-408	1	12.7	0.4	0.4	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-410	1	9.5	0.4	0.4	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-412	1	3.2	0.3	0.4	0.1	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-414	3	7.2	0.3	0.4	0.1	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-416	1	15.3	1	0.7	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-418	4	12.7	1.1	0.5	0	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-420	3	9.5	0.5	1.1	0.6	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-422	4	19.1	0.4	0.6	0.2	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-424	1	19.1	0.5	1.3	0.8	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-426	3	9.5	0.8	1.5	0.7	A	D	11/28/16	AD-5 / AD-7	20	60	Blank	
A-428	6	11.5	3.5	12	8.5	A	D	11/29/16	AD-4 / AD-5	19	55	7/NE	Pump P-8887 inlet lane
A-430	6	11.5	1.2	4.7	3.5	A	D	11/29/16	AD-4 / AD-5	19	55	7/NE	Pump P-8887 inlet lane
A-432	2	38.2	1.8	2.6	0.8	A	D	11/29/16	AD-4 / AD-5	19	55	7/NE	Pump P-8887 inlet lane
A-434	3	57.3	1	3	2	A	D	11/29/16	AD-4 / AD-5	19	55	7/NE	Pump P-8887 inlet lane
A-436	9	21.5	2.6	16.3	13.7	A	D	11/29/16	AD-4 / AD-5	19	55	7/NE	Pump P-8887 inlet lane - End TVA #19
A-438	3	57.3	1.6	1.3	0	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	Start TVA #20, P-8887 Outlet Bypass
A-440	2	38.2	0.5	0.7	0.2	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-442	14	33.4	1.1	21.2	20.1	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-444	1	19.1	2.5	2.9	0.4	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-446	2	38.2	0.8	1.4	0.6	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-448	1	19.1	0.8	1.3	0.5	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-450	2	38.2	1	1	0	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-452	1	19.1	1.2	1.3	0.1	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-454	2	38.2	1.6	2.3	0.7	A	D	11/29/16	AD-4 / AD-5	20	55	7/NE	P-8887 outlet bypass
A-456	12	22.9	0.4	29.6	29.2	A	D	11/29/16	AD-4 / AD-5	20	58	5/NW	Max found at valve stem
A-458	7	16.7	1.5	2.3	0.8	A	D	11/29/16	AD-4 / AD-5	20	58	5/NW	
A-460	11	26.3	0.9	18.2	17.3	A	D	11/29/16	AD-4 / AD-5	20	58	5/NW	Pump 8888
A-462	5	11.9	1.5	2.1	0.6	A	D	11/29/16	AD-4 / AD-5	20	58	5/NW	Pump 8888
A-464	20	95.5	2.4	585	582.6	A	D	11/29/16	AD-4 / AD-5	19	58	5/NW	Avg 555ppm
A-466	5	23.9	1.4	3.6	2.2	A	D	11/29/16	AD-4 / AD-5	20	58	5/NW	
A-468	23	109.8	0.7	104.3	103.6	A	D	11/29/16	AD-4 / AD-5	20	58	5/NW	Avg 65ppm
A-470	12	57.3	2.9	479.3	476.4	A	D	11/29/16	AD-4 / AD-5	20	58	5/NW	
A-472	6	14.3	0.7	1.1	0.4	A	D	11/30/16	AD-4 / AD-5	19	50.0	5/S	P-8888 outlet
A-474	7	133.7	0.8	73	72.2	A	D	11/30/16	AD-4 / AD-5	19	50.0	5/S	P-8888 outlet bypass line
A-476	5	95.5	0.5	16.5	16	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	P-8888 outlet bypass line
A-478	6	6.4	1	1	0	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	Pump 8888 housing connector
A-480	2	38.2	0.6	0.7	0.1	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	P-8888 outlet bypass welded bonnet
A-482	2	38.2	0.5	0.8	0.3	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	
A-484	2	38.2	0.5	0.6	0.1	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	Bull plug, Avg 180ppm
A-486	10	191	0.4	335	334.6	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	P-8888 outlet
A-488	8	15.3	2.1	6.2	4.1	A	D	11/30/16	AD-4 / AD-5	19	50.0	5/S	P-8888 inlet, Drain line
A-490	8	152.8	2.4	39.4	37	A	D	11/30/16	AD-4 / AD-5	19	50.0	5/S	P-8888 inlet
A-492	5	9.5	2	4	2	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	P-8888 inlet, Drain line
A-494	4	76.4	2	29.3	27.3	A	D	11/30/16	AD-4 / AD-5	20	50.0	5/S	P-8888 inlet, Drain line, TVA #20
A-496	2	38.2	2.2	2.2	0	A	D	11/30/16	AD-4 / AD-5	20	55	3/SW	P-8888 flush oil line (welded bonnet)
A-498	5	95.5	2	33.2	31.2	A	D	11/30/16	AD-4 / AD-5	20	55	3/SW	
A-500	13	31	2.2	26.2	24	A	D	11/30/16	AD-4 / AD-5	20	55	3/SW	
A-502	4	101.9	1.6	2.2	0.6	A	D	11/30/16	AD-4 / AD-5	20	55	3/SW	
A-504	3	76.4	1.8	2.4	0.6	A	D	11/30/16	AD-4 / AD-5	20	55	3/SW	
A-506	3	114.6	2.3	3.3	1	A	D	11/30/16	AD-4 / AD-5	20	55	3/SW	
A-508	7	267.4	1.8	7.1	5.3	A	D	11/30/16	AD-4 / AD-5	20	55	3/SW	Pulsing leak?
A-510	11	140.1	0.1	1.1	1	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-512	2	38.2	0.7	2	1.3	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-514	1	19.1	1	1	0	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-516	8	25.5	0.8	1.2	0.4	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-518	2	6.4	1.6	2.2	0.6	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-520	4	12.7	0.5	1.2	0.7	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-522	5	15.9	0.4	2.2	1.8	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-524	2	38.2	1.7	2.2	0.5	A	D	11/30/16	AD-4 / AD-5	19	55	3/SW	
A-526	1	19.1	1.7	1.7	0	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	TVA #20 - Spillback to fractioner
A-528	2	38.2	1.6	1.6	0	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	TVA #20 - Spillback to fractioner
A-530	3	9.5	1	2	1	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	TVA #20 - Spillback to fractioner
A-532	5	15.9	1.2	1.5	0.3	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	TVA #20 - Spillback to fractioner
A-534	2	38.2	0.9	1	0.1	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	TVA #20 - Spillback to fractioner
A-536	1	19.1	0.9	0.8	0	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	TVA #20 - Spillback to fractioner
A-538	4	12.7	0.8	1.3	0.5	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	Spillback to frac; Bypass line (off)
A-540	3	9.5	0.4	0.4	0	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	Spillback to frac; Bypass line (off)
A-542	1	19.1	0.3	0.3	0	A	D	12/01/16	AD-4 / AD-5	20	46	2/SE	Spillback to frac; Bypass line (off)
A-544	1	19.1	1.6	1.6	0	A	D	12/01/16	AD-4 / AD-5	19	46	2/SE	Spillback to frac; Bypass line (off)
A-546	8	25.5	1.5	2.1	0.6	A	D	12/01/16	AD-4 / AD-5	19	46	2/SE	Spillback to frac; Bypass line (off)
A-548	4	12.7	1.5	1.5	0	A	D	12/01/16	AD-4 / AD-5	19	46	2/SE	Spillback to frac; Bypass line (off)

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-550	2	38.2	1.4	1.8	0.4	A	D	12/01/16	AD-4 / AD-5	19	46	2/SE	Spillback to frac; Bypass line (off)
A-552	1	19.1	1.3	1.4	0.1	A	D	12/01/16	AD-4 / AD-5	19	46	2/SE	Spillback to frac; Bypass line (off)
A-554	5	23.9	1.3	1.7	0.4	A	D	12/01/16	AD-4 / AD-5	19	50	3/SE	RGO spillback to frac. (bypass off)
A-556	2	9.5	1.2	1.7	0.5	A	D	12/01/16	AD-4 / AD-5	19	50	3/SE	RGO spillback to frac. (bypass off)
A-558	2	9.5	1.3	1.2	0	A	D	12/01/16	AD-4 / AD-5	19	50	3/SE	RGO spillback to frac. (bypass off)
A-560	4	19.1	1.5	1.4	0	A	D	12/01/16	AD-4 / AD-5	19	50	3/SE	RGO spillback to frac. (bypass off)
A-562	4	19.1	1	1.4	0.4	A	D	12/01/16	AD-4 / AD-5	19	50	3/SE	RGO spillback to frac. (bypass off)
A-564	4	19.1	2	2.3	0.3	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	RGO spillback to frac. (bypass off)
A-568	6	28.6	1.9	2.3	0.4	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	RGO spillback to frac. (bypass off)
A-570	3	9.5	1.8	1.9	0.1	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	RGO spillback to frac. (bypass off)
A-572	5	15.9	1.7	2.2	0.5	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	RGO spillback to frac. (bypass off)
A-574	1	19.1	1.9	2.5	0.6	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	Welded bonnet
A-576	1	19.1	1.7	2	0.3	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	
A-578	6	19.1	1.8	2.3	0.5	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	RGO spillback
A-580	3	9.5	1.8	2.1	0.3	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	
A-582	4	12.7	1.8	2.4	0.6	A	D	12/01/16	AD-4 / AD-5	20	50	3/SE	
A-584	1	19.1	1.6	1.6	0	A	D	12/01/16	AD-4 / AD-5	20	55	5/SE	TVA #20
A-586	4	19.1	1.5	1.6	0.1	A	D	12/01/16	AD-4 / AD-5	20	55	5/SE	
A-588	2	15.3	1.5	1.7	0.2	A	D	12/01/16	AD-4 / AD-5	20	55	5/SE	
A-590	7	33.4	1.7	5.3	3.6	A	D	12/01/16	AD-4 / AD-5	20	55	5/SE	Avg 4.2ppm
A-592	5	23.9	1.6	3	1.4	A	D	12/01/16	AD-4 / AD-5	20	55	5/SE	TC-2739 control valve
A-594	7	33.4	1.7	6.8	5.1	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	
A-596	2	9.5	2.3	2.3	0	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	Drain line; Bonnet welded
A-598	1	19.1	2.1	2.1	0	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	
A-600	4	19.1	1.9	3.1	1.2	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	O = ladder
A-602	3	14.3	1.8	2	0.2	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	O = ladder
A-604	5	23.9	1.7	6.5	4.8	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	FV-2396 control valve
A-606	3	9.5	1.7	1.7	0	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	Bonnet welded; TVA #19
A-608	3	9.5	1.6	2.1	0.5	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	
A-610	2	6.4	1.7	1.8	0.1	A	D	12/01/16	AD-4 / AD-5	19	55	5/SE	Bypass line
A-612	1	19.1	1.7	1.8	0.1	A	D	12/01/16	AD-4 / AD-5	19	61	8/S	
A-614	1	25.5	1.7	1.7	0	A	D	12/01/16	AD-4 / AD-5	19	61	8/S	
A-616	3	14.3	1.7	1.8	0.1	A	D	12/01/16	AD-4 / AD-5	19	61	8/S	
A-618	2	12.7	1.2	1.4	0.2	A	D	12/01/16	AD-4 / AD-5	20	61	8/S	
A-620	4	19.1	1.3	1.3	0	A	D	12/01/16	AD-4 / AD-5	20	61	8/S	
A-622	7	22.3	1.3	3.1	1.8	A	D	12/01/16	AD-4 / AD-5	20	61	8/S	
A-624	6	11.5	0.2	1.5	1.3	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3705
A-626	10	19.1	0.5	2	1.5	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3706
A-628	1	19.1	0.3	0.3	0	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3707
A-630	3	57.3	0.3	1.5	1.2	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3708
A-632	3	14.3	0.4	0.4	0	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3709
A-634	5	9.5	0.9	1.7	0.8	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3710
A-636	2	76.4	0.4	1.1	0.7	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3711
A-638	1	38.2	0.4	0.4	0	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3712
A-640	2	38.2	0.4	0.5	0.1	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	P-3713
A-642	3	57.3	0.8	1.2	0.4	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	
A-644	3	7.2	0.4	1.3	0.9	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	
A-646	1	38.2	0.2	0.6	0.4	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	
A-648	14	26.7	0.7	1.8	1.1	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	
A-650	1	38.2	-0.3	0	0.3	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	
A-652	2	76.4	-0.7	-0.4	0.3	A	D	12/05/16	AD-4 / AD-5	19	52	Blank	
A-654	2	38.2	0.6	1.2	0.6	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	TVA #20
A-656	6	114.6	0.7	1.8	1.1	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-658	1	19.1	0.5	0.8	0.3	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-660	4	76.4	0.6	0.8	0.2	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-662	4	76.4	0.6	1	0.4	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-664	1	19.1	0.6	0.8	0.2	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-666	3	5.7	0.6	0.8	0.2	P	D	12/05/16	AD-4 / AD-5	20	55	Blank	30% of valve bonnet was inaccessible
A-668	3	38.2	0.8	1.6	0.8	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-670	5	9.5	2.2	2.8	0.6	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 inlet
A-670	3	9.5	0.8	1.1	0.3	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-672	8	19.1	1.5	14.9	13.4	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	Valve stem upper platform
A-672	2	38.2	1	1.3	0.3	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-674	2	38.2	1.3	1.3	0	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-674	2	6.4	1.6	1.6	0	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	
A-676	2	6.4	1.5	1.7	0.2	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	16-FU-125
A-676	2	38.2	0.4	1.3	0.9	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-678	7	11.1	0.8	1.4	0.6	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-678	3	9.5	1.6	1.7	0.1	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	
A-680	2	38.2	1.5	1.5	0	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	Welded bonnet
A-680	1	19.1	0.2	0.5	0.3	A	D	12/05/16	AD-4 / AD-5	20	55	Blank	
A-682	10	47.7	1.5	14.4	12.9	A	D	12/05/16	AD-4 / AD-5	19	57	2/N	TVA #19
A-682	4	7.6	1.8	2.2	0.4	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 inlet
A-684	1	19.1	1.8	1.8	0	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 outlet
A-684	2	6.4	1.4	1.5	0.1	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	TVA #20

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-686	1	19.1	1.6	1.7	0.1	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 out - Welded bonnet
A-686	4	12.7	1.3	1.4	0.1	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	
A-688	2	38.2	1.6	1.8	0.2	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 out
A-688	4	12.7	1.4	2	0.6	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	
A-690	1	19.1	1.4	1.4	0	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	Resid line drain
A-690	6	14.3	1.7	2.7	1	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 out
A-692	1	19.1	1.4	1.5	0.1	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	Resid line drain
A-692	2	38.2	1.8	2.4	0.6	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 - Housing drain
A-694	2	38.2	1.9	2.4	0.5	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 - Housing drain
A-694	1	19.1	1.3	1.4	0.1	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	Welded bonnet
A-696	5	9.5	1.8	1.9	0.1	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 inlet
A-696	1	19.1	1.3	1.5	0.2	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	Welded bonnet
A-698	4	7.6	2.2	2.3	0.1	A	D	12/05/16	AD-4 / AD-5	19	56	8/NE	TVA #19 P-9242 inlet
A-698	1	19.1	1.4	1.4	0	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	Welded bonnet
A-700	2	38.2	1.3	1.4	0.1	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	Welded bonnet
A-702	3	14.3	1.4	1.5	0.1	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	
A-704	2	9.5	1.3	1.3	0	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	
A-706	4	19.1	1.2	2.1	0.9	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	16-FU-125
A-708	1	19.1	1.5	1.6	0.1	A	D	12/05/16	AD-4 / AD-5	20	57	2/N	Welded bonnet
A-710	3	14.3	1.3	1.5	0.2	A	D	12/05/16	AD-4 / AD-5	20	60	Calm/SW	
A-712	3	14.3	1.4	1.5	0.1	A	D	12/05/16	AD-4 / AD-5	20	60	Calm/SW	
A-714	2	9.5	1.5	1.4	0	A	D	12/05/16	AD-4 / AD-5	20	60	Calm/SW	
A-716	2	38.2	1.3	1.6	0.3	A	D	12/06/16	AD-4 / AD-5	19	50	Blank	P-3805 TVA #19
A-718	1	19.1	1.6	2	0.4	A	D	12/06/16	AD-4 / AD-5	19	50	Blank	P-3805 TVA #19
A-720	5	95.5	1.6	22.9	21.3	A	D	12/06/16	AD-4 / AD-5	19	50	Blank	P-3805 TVA #19
A-722	1	19.1	0.5	0.5	0	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	TVA #20
A-724	1	19.1	0.3	0.5	0.2	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	P-3805
A-726	2	9.5	0.4	0.4	0	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	P-3805
A-728	3	14.3	0.3	0.4	0.1	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	P-3805
A-730	4	19.1	0.3	0.5	0.2	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	P-3805
A-732	1	19.1	0.3	0.3	0	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	P-3805
A-734	1	19.1	0.4	0.6	0.2	P	D	12/06/16	AD-4 / AD-5	20	50	Blank	Insulated bonnet
A-736	2	38.2	0.2	0.7	0.5	P	D	12/06/16	AD-4 / AD-5	20	50	Blank	Insulated bonnet
A-738	2	38.2	0.2	0.2	0	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	
A-740	2	38.2	0.1	0.4	0.3	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	
A-742	1	19.1	0.1	0.2	0.1	A	D	12/06/16	AD-4 / AD-5	20	50	Blank	Welded bonnet
A-744	1	19.1	0.1	0.1	0	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	TVA #20
A-746	1	19.1	0.2	0.1	0	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-748	1	19.1	0.1	0.1	0	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-750	2	38.2	0.1	0.4	0.3	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-752	1	19.1	0.1	0.1	0	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-754	1	19.1	0.1	0.1	0	P	D	12/06/16	AD-4 / AD-5	20	52	Blank	Insulated bonnet
A-756	1	19.1	0.1	0.2	0.1	P	D	12/06/16	AD-4 / AD-5	20	52	Blank	Insulated bonnet
A-758	1	19.1	0.1	0.2	0.1	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-760	1	19.1	0.1	0.2	0.1	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-762	2	9.5	0	0.3	0.3	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-764	3	14.3	0.1	0.4	0.3	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-766	2	15.3	0.1	0.3	0.2	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-768	2	9.5	0.1	0.4	0.3	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-770	4	19.1	0.1	0.5	0.4	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-772	4	30.6	0.1	0.5	0.4	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	1-HV-4210
A-774	1	9.5	0.2	0.3	0.1	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	TVA #20
A-776	4	25.5	0.8	1.2	0.4	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	TVA #19
A-778	1	9.5	0.9	1.1	0.2	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-780	2	15.3	0.9	0.9	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-782	3	14.3	0.8	0.9	0.1	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-784	1	4.8	0.8	0.9	0.1	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-786	2	38.2	1	1.3	0.3	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-788	2	9.5	0.8	0.8	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-790	3	14.3	0.8	1.2	0.4	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	Overspeed automatic shutdown valve
A-792	1	38.2	0.7	0.7	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-794	0.5	19.1	0.7	0.7	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-796	1	19.1	0.7	0.9	0.2	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-798	2	38.2	0.7	0.9	0.2	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-800	2	76.4	0.7	0.9	0.2	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-802	2	9.5	0.8	0.7	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	TVA #19
A-804	4	19.1	0.7	1.1	0.4	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	Lunch - drift test
A-806	3	14.3	1.7	2.3	0.6	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	TVA #19
A-808	3	14.3	1.7	2.1	0.4	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-810	1	9.5	1.8	1.8	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	1-FU-17
A-812	2	9.5	1.8	1.8	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-814	2	9.5	1.5	1.6	0.1	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	
A-816	1	19.1	1.5	1.7	0.2	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	Welded bonnet
A-818	1	19.1	1.7	1.7	0	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	Welded bonnet
A-820	8	152.8	1.7	23	21.3	A	D	12/06/16	AD-4 / AD-5	19	52	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-822	2	9.5	1.9	2.8	0.9	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-824	4	19.1	1.8	2.4	0.6	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-826	2	38.2	1.9	1.9	0	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	
A-828	1	19.1	1.5	1.5	0	A	D	12/06/16	AD-4 / AD-5	20	52	Blank	Welded bonnet
A-830	1	19.1	1.4	1.5	0.1	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	#20
A-832	1	19.1	1.5	1.5	0	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	Welded bonnet
A-834	6	28.6	1.6	6.8	5.2	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	Stem
A-836	6	28.6	0.6	1.6	1	A	D	12/06/16	AD-4 / AD-5	15	58	8/SE	#15
A-838	1	19.1	0.8	0.8	0	A	D	12/06/16	AD-4 / AD-5	15	58	8/SE	
A-840	5	9.5	1.7	2.3	0.6	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	#19
A-842	1	19.1	1.7	2.1	0.4	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-844	1	19.1	1.7	1.8	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-846	1	19.1	1.6	1.7	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	Welded bonnet
A-848	1	19.1	1.7	1.8	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-850	1	50.9	1.8	1.8	0	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-852	4	4.8	1.7	1.8	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-854	1	50.9	1.5	1.5	0	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-856	1	50.9	1.5	1.5	0	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	#19
A-858	1	50.9	1.5	1.6	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-860	0.5	25.5	1.3	1.4	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-862	1	50.9	1.3	1.3	0	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-864	1	50.9	1.3	1.4	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-866	1	50.9	1.3	1.3	0	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-868	1	50.9	1.3	1.3	0	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-870	1	50.9	1.2	1.3	0.1	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	
A-872	7	133.7	1.2	35.4	34.2	A	D	12/06/16	AD-4 / AD-5	19	58	8/SE	P-3504 (stem) - Welded bonnet
A-874	1	19.1	1.6	1.7	0.1	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	TVA #20
A-876	1	19.1	1.6	1.9	0.3	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	
A-878	4	76.4	1.7	6.7	5	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	
A-880	5	95.5	1.9	7.0	5.1	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	Could be ambient? Bonnet
A-882	1	19.1	1.9	1.9	0	A	D	12/06/16	AD-4 / AD-5	20	58	8/SE	Welded bonnet
A-884	6	6.4	0.1	0.5	0.4	A	D	12/07/16	AD-4 / AD-5	19	39	10/NW	Tower access hatch
A-886	11	26.3	0.2	11	10.8	A	D	12/07/16	AD-4 / AD-5	19	39	10/NW	
A-888	11	26.3	0.7	114.5	113.8	A	D	12/07/16	AD-4 / AD-5	19	39	10/NW	Avg 90ppm
A-890	4	4.2	0.7	0.7	0	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	
A-892	2	6.4	0.6	0.8	0.2	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	
A-894	8	25.5	0.7	43.3	42.6	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	Avg 33ppm
A-896	8	61.1	0.7	2.8	2.1	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	LDAR Tag #62091 next to AGO side cut
A-898	2	15.3	0.6	1.4	0.8	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	
A-900	1	19.1	0.5	0.5	0	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	
A-902	1	19.1	0.5	0.8	0.3	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	Welded bonnet
A-904	1	9.5	0.4	0.4	0	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	
A-906	1	19.1	0.4	0.5	0.1	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	Welded bonnet
A-908	1	19.1	0.6	0.4	0	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	Welded bonnet
A-910	1	19.1	0.4	0.5	0.1	A	D	12/07/16	AD-4 / AD-5	20	39	10/NW	
A-912	1	19.1	0.5	0.5	0	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	TVA #20
A-914	1	19.1	0.2	0.4	0.2	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-916	1	19.1	0.4	0.9	0.5	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-918	3	22.9	0.6	0.7	0.1	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-920	3	22.9	0.5	0.8	0.3	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-922	2	15.3	0.6	0.9	0.3	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-924	1	2.4	0.2	0.6	0.4	P	D	12/07/16	AD-4 / AD-5	20	45	10/NW	Bonnet inaccessible; AGO deck
A-926	5	5.3	0.2	0.7	0.5	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-928	3	57.3	0.4	31.8	31.4	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	Tag 16-PT-1095
A-928	1	19.1	0.6	0.6	0	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-930	1	19.1	1.1	1.4	0.3	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	Welded bonnet
A-930	1	19.1	0.7	0.8	0.1	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-932	1	19.1	0.8	1.1	0.3	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-932	2	6.4	1.8	2.1	0.3	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	TVA #20
A-934	2	38.2	0.8	1.4	0.6	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-934	2	6.4	1.8	2.1	0.3	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-936	2	38.2	0.9	1	0.1	A	D	12/07/16	AD-4 / AD-5	20	45	10/NW	
A-936	2	38.2	1.7	1.9	0.2	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-938	4	12.7	1.7	2	0.3	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-940	4	4.2	1.9	2.4	0.5	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-942	2	38.2	1.7	1.9	0.2	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	TS-09504
A-944	1	19.1	1.8	1.8	0	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-946	2	38.2	1.9	2.3	0.4	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-948	1	19.1	1.9	1.9	0	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	TS-09504
A-950	2	3.8	1.8	2.1	0.3	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-952	1	19.1	1.9	2.2	0.3	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	Line enters column level with 2nd deck
A-954	2	25.5	1.8	2.1	0.3	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	Line enters column level with 3rd deck
A-956	4	19.1	1.8	10.3	8.5	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-958	1	4.8	1.9	2	0.1	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	
A-960	6	38.2	1.9	55.5	53.6	A	D	12/07/16	AD-4 / AD-5	20	52	5/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-962	2	12.7	1	1.7	0.7	A	D	12/07/16	AD-4 / AD-5	19	50	7/SE	
A-964	2	4.8	1.3	1.1	0	P	D	12/07/16	AD-4 / AD-5	19	50	7/SE	Inaccessible bonnet
A-966	5	31.8	1	50.9	49.9	A	D	12/07/16	AD-4 / AD-5	19	50	7/SE	INO160172
A-968	1	4.8	1.8	70.7	68.9	A	D	12/07/16	AD-4 / AD-5	19	50	7/SE	
A-970	1	19.1	1.3	1.4	0.1	A	D	12/07/16	AD-4 / AD-5	20	50	7/SE	TVA #20 E5002; Welded bonnet
A-972	1	19.1	1.2	1.5	0.3	A	D	12/07/16	AD-4 / AD-5	20	50	7/SE	E-5002
A-974	2	9.5	1.6	2.2	0.6	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	AGO Cooler
A-976	8	38.2	1.8	2.7	0.9	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	AGO Cooler
A-978	1	15.3	1.7	1.7	0	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	AGO Cooler
A-980	2	38.2	1.4	1.6	0.2	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	AGO Cooler
A-982	1	19.1	1.5	1.5	0	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	AGO Cooler
A-984	4	19.1	1.6	1.9	0.3	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	AGO Cooler
A-986	1	19.1	1.2	1.3	0.1	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-988	2	9.5	1.7	1.8	0.1	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-990	1	15.3	1.6	2.2	0.6	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-992	2	30.6	1.6	1.5	0	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-994	2	30.6	1.2	1.9	0.7	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-996	2	38.2	1.7	1.6	0	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-998	1	19.1	1.3	1.6	0.3	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-1000	2	30.6	1.2	1.3	0.1	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-1002	1	15.3	1.3	1.3	0	A	D	12/12/16	AD-4 / AD-5	19	48	5/NE	Welded bonnet
A-1004	3	14.3	0.4	0.7	0.3	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	TVA #20
A-1006	5	6.8	0.4	0.7	0.3	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	
A-1008	9	43	0.3	330.5	330.2	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1010	2	9.5	1.5	1.5	0	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1012	3	19.1	1	1.7	0.7	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1014	7	33.4	0.6	885.7	885.1	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler; Avg 500/TVA #20 - 885.7; TVA #19 - 680
A-1016	1	19.1	1.5	1.7	0.2	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1018	1	19.1	0.7	0.9	0.2	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1020	4	76.4	0.8	6.7	5.9	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1022	1	19.1	0.5	0.5	0	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1024	1	19.1	0.8	0	0	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1026	2	38.2	0.5	0.5	0	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Kerosene cooler
A-1028	2	6.4	0.1	1	0.9	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Crude/LPA heat exchanger E-4139
A-1030	1	3.2	0.5	0.8	0.3	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	Crude/LPA heat exchanger E-4140
A-1032	4	19.1	0	44.3	44.3	A	D	12/12/16	AD-4 / AD-5	20	50	3/NE	E-4637
A-1034	1	19.1	0.6	0.8	0.2	A	D	12/12/16	AD-4 / AD-5	20	52	7/NE	E-4637 TVA #20
A-1036	1	4.8	0.7	0.7	0	A	D	12/12/16	AD-4 / AD-5	20	52	7/NE	
A-1038	7	133.7	0.1	1797	1796.9	A	D	12/12/16	AD-4 / AD-5	20	52	7/NE	
A-1040	2	9.5	1.3	1.8	0.5	A	D	12/12/16	AD-4 / AD-5	19	52	7/NE	
A-1042	2	50.9	1.2	2.5	1.3	A	D	12/12/16	AD-4 / AD-5	19	52	7/NE	
A-1044	3	28.6	1.5	2	0.5	A	D	12/12/16	AD-4 / AD-5	19	52	7/NE	
A-1046	3	57.3	1.2	3.2	2	A	D	12/12/16	AD-4 / AD-5	19	52	7/NE	
A-1048	2	19.1	1.6	2.3	0.7	A	D	12/12/16	AD-4 / AD-5	19	52	7/NE	
A-1050	5	95.5	1.6	5026	5024.4	A	D	12/12/16	AD-4 / AD-5	19	52	7/NE	
A-1052	4	76.4	1.9	20.4	18.5	A	D	12/12/16	AD-4 / AD-5	20	52	7/NE	
A-1054	5	23.9	2.1	52.4	50.3	A	D	12/12/16	AD-4 / AD-5	20	52	7/NE	
A-1056	7	33.4	2.3	31	28.7	A	D	12/12/16	AD-4 / AD-5	20	52	7/NE	Avg 20ppm
A-1058	1	19.1	1.6	1.6	0	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	TVA #13
A-1060	1	19.1	0.6	1	0.4	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1062	2	38.2	0.9	1.6	0.7	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	LDAR Tag #38653
A-1064	1	19.1	0.9	1.8	0.9	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	LDAR Tag #38652
A-1068	1	19.1	0.7	1.1	0.4	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1070	2	38.2	0.6	1.6	1	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1072	1	19.1	0.8	1.1	0.3	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1074	3	57.3	0.9	55.5	54.6	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1076	2	38.2	1.5	1.8	0.3	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1078	1	19.1	1	1.6	0.6	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1080	1	4.8	1	1.4	0.4	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1082	1	19.1	1	1.4	0.4	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1084	1	19.1	1.3	1.9	0.6	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1086	2	38.2	0.5	0.7	0.2	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1088	2	38.2	1.1	1.4	0.3	A	D	12/12/16	AD-4 / AD-5	13	55	Blank	
A-1090	2	50.9	1.8	2.6	0.8	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1092	1	19.1	1.8	1.9	0.1	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1094	1	19.1	1.8	2.1	0.3	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1096	1	19.1	1.8	1.9	0.1	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	Welded bonnet
A-1098	1	19.1	1.8	2	0.2	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1100	1	19.1	1.8	1.8	0	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	Welded bonnet
A-1102	1	19.1	1.8	2.1	0.3	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1104	2	6.4	1.9	3.3	1.4	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	HE 4133
A-1106	3	57.3	1.8	2.2	0.4	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1108	2	38.2	1.8	2.2	0.4	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1110	1	19.1	1.9	2.3	0.4	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	E-4149
A-1112	1	19.1	1.9	2.2	0.3	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	Bottom of E-4149

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1114	6	14.3	1.8	3.3	1.5	A	D	12/12/16	AD-4 / AD-5	20	55	Blank	
A-1116	2	50.9	2.1	2.4	0.3	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	TVA #19 P-3504
A-1118	1	25.5	2.5	2.8	0.3	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	Welded bonnet #19
A-1120	1	15.3	3.1	3.2	0.1	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19
A-1122	2	30.6	2.9	3.1	0.2	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	Welded bonnet #19
A-1124	2	30.6	3.6	3.4	0	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19
A-1126	2	30.6	2.7	3.9	1.2	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19
A-1128	1	15.3	3.7	3.8	0.1	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19
A-1130	1	15.3	3.1	3.3	0.2	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19
A-1132	2	30.6	2.8	3.5	0.7	A	D	12/14/16	AD-4 / AD-5	13	50	4/NW	TVA #13 P-9376
A-1134	4	122.2	2.7	8.7	6	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19
A-1136	2	38.2	2.5	4	1.5	A	D	12/14/16	AD-4 / AD-5	13	50	4/NW	TVA #13 Welded bonnet
A-1138	1	19.1	3.4	3.4	0	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19
A-1140	2	50.9	2.7	2.9	0.2	A	D	12/14/16	AD-4 / AD-5	13	50	4/NW	#13
A-1142	2	25.5	2.9	2.9	0	A	D	12/14/16	AD-4 / AD-5	19	50	4/NW	#19 Welded bonnet
A-1144	1	25.5	2.6	3	0.4	A	D	12/14/16	AD-4 / AD-5	13	50	4/NW	#13
A-1146	2	38.2	2	2.3	0.3	A	D	12/14/16	AD-4 / AD-5 / AD-6	19	52	4/NW	#19 P-3504
A-1148	2	50.9	2	2	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	13	52	4/NW	#13 P-9376
A-1150	1	19.1	2.4	2.4	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	19	52	4/NW	#19 P-3504
A-1152	4	76.4	1.9	5.6	3.7	A	D	12/14/16	AD-4 / AD-5 / AD-6	13	52	4/NW	#13 P-9376
A-1154	2	38.2	2.1	1	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	19	52	4/NW	#19 P-3504
A-1156	2	38.2	1.7	1.7	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	19	52	4/NW	#19 P-3504
A-1158	1	19.1	1.6	1.5	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	19	52	4/NW	#19 P-3504
A-1160	1	25.5	1.4	1.4	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	19	52	4/NW	#19 P-3504 Welded bonnet
A-1162	1	19.1	1.2	1.3	0.1	A	D	12/14/16	AD-4 / AD-5 / AD-6	19	52	4/NW	#19 P-3504 Welded bonnet
A-1164	1	19.1	1.3	1.3	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	20	52	4/NW	#20 P-3504
A-1166	1	12.7	0.5	0.6	0.1	A	D	12/14/16	AD-4 / AD-5 / AD-6	20	52	4/NW	#20 P-3504
A-1168	1	12.7	0.5	0.5	0	A	D	12/14/16	AD-4 / AD-5 / AD-6	20	52	4/NW	#20 P-3504
A-1170	5	95.5	0.5	1.3	0.8	A	D	12/14/16	AD-4 / AD-5 / AD-6	20	52	4/NW	#20 P-3504 Welded bonnet
A-1172	1	12.7	0.7	0.9	0.2	A	D	12/14/16	AD-4 / AD-5 / AD-6	20	52	4/NW	#20 P-3504
A-1174	1	19.1	1.5	2	0.5	A	D	12/14/16	AD-4 / AD-5 / AD-6	20	53	8/S	#20 P-3504
A-1176	5	63.7	1.9	7.3	5.4	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	#20 P-3504
A-1178	1	12.7	1.2	1.3	0.1	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	#20 P-9376
A-1180	3	57.3	1.1	2.2	1.1	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	#20 P-9376
A-1182	1	19.1	1.5	1.5	0	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	#20 P-9376
A-1184	1	19.1	1.2	1.2	0	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	Welded Bonnet
A-1186	1	19.1	1.1	1.2	0.1	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	Welded Bonnet
A-1188	6	114.6	1	5.1	4.1	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	Welded Bonnet
A-1190	Blank	NA	1.7	6.3	4.6	A	D	12/14/16	AD-4 / AD-5	20	53	8/S	Welded Bonnet
A-1192	1	19.1	1	1.1	0.1	A	D	12/14/16	AD-4 / AD-5	19	53	8/S	TVA #19
A-1194	1	19.1	1	1.1	0.1	P	D	12/14/16	AD-4 / AD-5	19	53	8/S	Inaccessible bonnet
A-1196	1	25.5	1	1.1	0.1	A	D	12/14/16	AD-4 / AD-5	19	53	8/S	
A-1198	2	50.9	1	1	0	A	D	12/14/16	AD-4 / AD-5	19	53	8/S	Welded bonnet
A-1200	1	19.1	1	1.3	0.3	A	D	12/14/16	AD-4 / AD-5	19	53	8/S	
A-1202	2	30.6	1	1.3	0.3	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	TVA #19 P-9376
A-1204	2	30.6	1.1	1.3	0.2	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	TVA #19 P-9376
A-1206	1	15.3	1.2	1.2	0	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	TVA #19 P-9376
A-1208	1	15.3	1.2	1.2	0	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	TVA #19 P-9376
A-1210	2	30.6	1.1	1.2	0.1	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	TVA #19 P-9376
A-1212	2	30.6	1.2	1.2	0	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	TVA #19 P-9376
A-1214	3	45.8	1.1	3.5	2.4	P	D	12/14/16	AD-4 / AD-5	19	54	10/S	Insulated bonnet
A-1216	1	15.3	1.5	1.5	0	P	D	12/14/16	AD-4 / AD-5	19	54	10/S	Insulated bonnet
A-1218	1	15.3	1.4	1.4	0	P	D	12/14/16	AD-4 / AD-5	19	54	10/S	Insulated bonnet
A-1220	1	19.1	1.4	1.5	0.1	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	Insulated bonnet
A-1222	1	19.1	1.4	1.4	0	P	D	12/14/16	AD-4 / AD-5	19	54	10/S	Insulated bonnet
A-1224	1	19.1	1.2	1.3	0.1	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	Welded bonnet
A-1226	6	91.7	1.8	4.9	3.1	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	TVA #19
A-1228	1	19.1	2.5	2.8	0.3	A	D	12/14/16	AD-4 / AD-5	19	54	10/S	
A-1230	3	28.6	2.5	2.7	0.2	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	TVA #19
A-1232	2	30.6	2.2	2.4	0.2	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1234	1	19.1	2.3	2.4	0.1	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1236	1	19.1	2.4	2.6	0.2	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1238	1	19.1	2.4	2.6	0.2	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1240	2	30.6	2.9	3.6	0.7	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1242	3	57.3	2.8	3.5	0.7	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1244	2	30.6	3.3	3.8	0.5	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1246	1	15.3	3.5	4.3	0.8	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1248	1	19.1	3.7	4.1	0.4	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1250	2	38.2	3.6	4.4	0.8	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1252	1	19.1	3.1	3.4	0.3	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	Welded bonnet
A-1254	1	19.1	2.8	3.6	0.8	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	Welded bonnet
A-1256	1	19.1	1.6	1.7	0.1	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	Welded bonnet
A-1258	1	19.1	2.7	1.9	0	A	D	12/14/16	AD-4 / AD-5	19	54	Blank	
A-1260	1	19.1	1.6	1.8	0.2	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1262	1	19.1	1.5	1.8	0.3	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1264	1	19.1	1.8	3.4	1.6	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1266	1	19.1	2.8	2.8	0	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1268	1	19.1	2.8	2.8	0	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1270	1	19.1	2.4	2.7	0.3	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1272	1	19.1	2.2	3.3	1.1	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1274	1	19.1	2	2.1	0.1	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1276	1	19.1	2	2	0	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1278	1	19.1	2.9	2.1	0	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1280	5	95.5	1.8	56.1	54.3	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1282	2	38.2	3.2	3.2	0	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1284	2	38.2	2.9	3.1	0.2	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1286	1	19.1	3.6	3.7	0.1	A	D	12/14/16	AD-4 / AD-5	20	54	Blank	P-3558
A-1288	5	76.4	2.7	6.9	4.2	A	D	12/14/16	AD-4 / AD-5	19	55	Blank	P-3558
A-1290	5	76.4	3.5	23.8	20.3	A	D	12/14/16	AD-4 / AD-5	19	55	Blank	P-3558
A-1292	3	45.8	3.4	3.7	0.3	A	D	12/14/16	AD-4 / AD-5	19	55	Blank	P-3558
A-1294	1	15.3	3.5	3.6	0.1	A	D	12/14/16	AD-4 / AD-5	19	55	Blank	P-3558
A-1296	2	38.2	3.2	3.6	0.4	A	D	12/14/16	AD-4 / AD-5	19	55	Blank	P-3558
A-1298	2	38.2	3.2	3.6	0.4	A	D	12/14/16	AD-4 / AD-5	19	55	Blank	P-3558
A-1300	2	38.2	4.2	5.1	0.9	A	D	12/14/16	AD-4 / AD-5	19	55	Blank	P-3558
A-1302	2	38.2	1.5	1.6	0.1	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1304	2	9.5	1.5	1.7	0.2	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	Welded bonnet
A-1306	1	19.1	1.5	1.7	0.2	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	Welded bonnet
A-1308	1	19.1	1.5	1.5	0	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1310	1	25.5	1.5	1.8	0.3	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1312	5	15.9	1.5	2	0.5	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1314	2	6.4	1.5	1.8	0.3	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1316	3	9.5	1.6	2	0.4	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1318	1	19.1	1.5	1.8	0.3	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	Welded bonnet
A-1320	2	6.4	1.5	1.6	0.1	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1322	3	9.5	1.5	1.6	0.1	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1324	2	38.2	1.5	1.5	0	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1326	1	4.8	1.5	1.6	0.1	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1328	1	9.5	1.5	1.5	0	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1330	8	25.5	1.4	11	9.6	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1332	5	15.9	0.6	1.4	0.8	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	TVA #20
A-1334	1	19.1	0.6	0.7	0.1	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	Welded bonnet
A-1336	4	19.1	0.6	2.4	1.8	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	TV-43A
A-1338	2	9.5	0.6	1.1	0.5	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	
A-1340	1	19.1	0.6	0.7	0.1	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	Welded bonnet
A-1342	4	12.7	0.5	0.6	0.1	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	
A-1344	3	14.3	0.5	0.7	0.2	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	
A-1346	3	14.3	0.5	0.7	0.2	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	
A-1348	2	9.5	0.5	0.7	0.2	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	
A-1350	2	9.5	0.6	0.6	0	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	
A-1352	1	19.1	0.4	0.5	0.1	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	Welded bonnet
A-1354	9	43	0.5	4.5	4	A	D	01/05/17	AD-4 / AD-5	20	50	NA/NW	
A-1356	5	23.9	1.2	2.7	1.5	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	
A-1358	4	19.1	1.4	1.9	0.5	A	D	01/05/17	AD-4 / AD-5	19	50	NA/NW	TV-43B
A-1360	1	19.1	1.5	1.5	0	A	D	01/05/17	AD-4 / AD-5	19	52	Blank	Welded bonnet
A-1362	3	14.3	1.5	1.8	0.3	A	D	01/05/17	AD-4 / AD-5	19	52	Blank	
A-1364	2	9.5	1.4	1.7	0.3	A	D	01/05/17	AD-4 / AD-5	19	52	Blank	
A-1366	1	25.5	1.4	1.4	0	A	D	01/05/17	AD-4 / AD-5	19	52	Blank	
A-1368	1	19.1	1.3	1.3	0	A	D	01/05/17	AD-4 / AD-5	19	52	Blank	Fin tag plus
A-1370	1	25.5	1.1	1.2	0.1	A	D	01/05/17	AD-4 / AD-5	19	52	Blank	Fin tag plus
A-1372	9	28.6	1.7	139.4	137.7	A	D	01/05/17	AD-4 / AD-5	19	52	Blank	TVA #19 Post lunch
A-1374	6	57.3	1.5	14.0	12.5	A	D	01/05/17	AD-4 / AD-5	20	52	Blank	TVA #20
A-1376	1	19.1	0.4	0.5	0.1	A	D	01/05/17	AD-4 / AD-5	21	52	Blank	
A-1378	1	19.1	0.5	0.8	0.3	A	D	01/05/17	AD-4 / AD-5	21	52	Blank	
A-1380	1	19.1	0.5	0.7	0.2	A	D	01/05/17	AD-4 / AD-5	21	52	Blank	
A-1382	1	19.1	0.5	0.8	0.3	A	D	01/05/17	AD-4 / AD-5	21	52	Blank	
A-1384	1	19.1	0.5	0.7	0.2	A	D	01/05/17	AD-4 / AD-5	21	52	Blank	
A-1386	1	19.1	0.5	0.6	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	Fin fan hex plugs
A-1388	0.5	9.5	0.6	0.7	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1390	1	19.1	0.5	0.6	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1392	4	76.4	0.6	0.6	0	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1394	1	19.1	0.6	0.7	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1396	1	19.1	0.8	0.8	0	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1398	1	19.1	0.7	0.8	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1400	1	19.1	0.8	0.9	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1402	1	19.1	0.9	0.9	0	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1404	1	19.1	0.8	1	0.2	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1406	1	19.1	1	1.1	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1408	1	19.1	1	1.2	0.2	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1410	1	19.1	1	1.1	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1412	1	19.1	1.1	1.1	0	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1414	1	19.1	1	1.5	0.5	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1416	1	19.1	1.2	1.6	0.4	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	TVA #21
A-1418	0.5	9.5	1.2	1.4	0.2	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1420	0.5	9.5	1.1	1.1	0	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1422	0.5	9.5	0.9	1	0.1	A	D	01/05/17	AD-4 / AD-5	21	50	3/E	
A-1424	1	19.1	1.5	1.6	0.1	A	D	01/05/17	AD-4 / AD-5	20	50	3/E	TVA #20
A-1426	1	19.1	1.4	1.5	0.1	A	D	01/05/17	AD-4 / AD-5	20	50	3/E	Bull plug
A-1428	2	6.4	1.4	1.4	0	A	D	01/05/17	AD-4 / AD-5	20	50	3/E	
A-1430	2	38.2	1.3	1.5	0.2	A	D	01/05/17	AD-4 / AD-5	20	50	3/E	
A-1432	1	19.1	1.3	1.4	0.1	A	D	01/05/17	AD-4 / AD-5	20	50	3/E	Welded bonnet
A-1434	12	38.2	1.3	145.1	143.8	A	D	01/05/17	AD-4 / AD-5	20	50	3/E	
A-1436	1	19.1	1.4	1.8	0.4	A	D	01/05/17	AD-4 / AD-5	19	50	3/E	Welded bonnet
A-1438	1	19.1	1.6	1.8	0.2	A	D	01/05/17	AD-4 / AD-5	19	50	3/E	
A-1440	5	63.7	1.6	105.1	103.5	A	D	01/05/17	AD-4 / AD-5	19	50	3/E	
A-1442	1	19.1	0.9	1	0.1	A	D	01/05/17	AD-4 / AD-5	13	50	3/E	TVA #13
A-1444	7	22.3	1	378	377	A	D	01/05/17	AD-4 / AD-5	13	50	3/E	
A-1446	3	9.5	1.1	1.1	0	A	D	01/05/17	AD-4 / AD-5	16	50	3/E	TVA #16
A-1448	1	19.1	0.8	0.9	0.1	A	D	01/05/17	AD-4 / AD-5	16	50	3/E	
A-1450	1	19.1	0.8	0.8	0	A	D	01/05/17	AD-4 / AD-5	16	50	3/E	
A-1452	1	3.2	0.8	0.8	0	P	D	01/05/17	AD-4 / AD-5	16	50	3/E	1/4 of flange inaccessible
A-1454	4	76.4	0.8	133	132.2	A	D	01/05/17	AD-4 / AD-5	16	50	3/E	
A-1456	8	38.2	0.4	1.7	1.3	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	Pump not running
A-1458	3	14.3	0.7	0.9	0.2	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1460	2	38.2	0.5	0.5	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	Welded bonnet
A-1462	7	133.7	0.5	16.9	16.4	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1464	3	19.1	0.4	0.4	0	A	D	01/11/17	AD-1 / AD-2	15	Blank	Blank	***TVA 15***
A-1466	3	28.6	0.4	0.4	0	A	D	01/11/17	AD-1 / AD-2	15	Blank	Blank	
A-1468	4	38.2	0.3	0.4	0.1	A	D	01/11/17	AD-1 / AD-2	15	Blank	Blank	
A-1470	7	33.4	0.3	45.7	45.4	A	D	01/11/17	AD-1 / AD-2	15	Blank	Blank	Pump running
A-1472	2	38.2	0.3	0.5	0.2	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	*** TVA 13***
A-1474	1	19.1	0.4	0.4	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1476	3	28.6	0.4	0.4	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1478	5	23.9	0.3	42.4	42.1	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1480	3	19.1	1.3	1.3	0	A	D	01/11/17	AD-1 / AD-2	21	Blank	Blank	***TVA 21***
A-1482	5	9.5	1.3	1.3	0	A	D	01/11/17	AD-1 / AD-2	21	Blank	Blank	
A-1484	4	7.6	1.3	1.3	0	A	D	01/11/17	AD-1 / AD-2	21	Blank	Blank	
A-1486	5	9.5	1.3	1.4	0.1	A	D	01/11/17	AD-1 / AD-2	21	Blank	Blank	
A-1488	7	13.4	1.3	1.7	0.4	A	D	01/11/17	AD-1 / AD-2	21	Blank	Blank	
A-1490	3	57.3	1.3	1.4	0.1	A	D	01/11/17	AD-1 / AD-2	21	Blank	Blank	
A-1492	6	114.6	1.3	9.9	8.6	A	D	01/11/17	AD-1 / AD-2	21	Blank	Blank	
A-1494	3	57.3	0.5	0.5	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	***TVA 13***
A-1496	3	57.3	0.5	0.5	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1498	1	19.1	0.5	0.5	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1500	3	57.3	0.4	0.4	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1502	1	38.2	0.2	0.2	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1504	3	57.3	0.1	0.1	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1506	5	15.9	0.1	0.1	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	From V3
A-1508	5	15.9	0.1	0.1	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1510	3	19.1	0.1	0.1	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1512	6	19.1	0	0	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1514	4	25.5	0	0	0	A	D	01/11/17	AD-1 / AD-2	13	Blank	Blank	
A-1516	2	38.2	0	0	0	A	D	01/11/17	AD-1 / AD-2	13	53	Blank	
A-1518	5	15.9	0	0	0	A	D	01/11/17	AD-1 / AD-2	13	53	Blank	
A-1520	5	11.9	1.5	2	0.5	A	D	01/11/17	AD-1 / AD-2	15	53	Blank	***TVA 15***
A-1522	4	9.5	1.6	1.6	0	A	D	01/11/17	AD-1 / AD-2	15	53	Blank	
A-1524	15	28.6	1.1	1.9	0.8	A	D	01/25/17	AD-1	16	45	Blank	A
A-1526	6	11.5	1.3	1.6	0.3	A	D	01/25/17	AD-1	16	45	Blank	A
A-1528	7	13.4	1.4	4	2.6	A	D	01/25/17	AD-3	21	45	Blank	J
A-1530	8	15.3	1.2	1.8	0.6	A	D	01/25/17	AD-1	16	45	Blank	A
A-1532	3	57.3	1.4	1.7	0.3	A	D	01/25/17	AD-3	21	45	Blank	J
A-1534	4	76.4	0.9	1.4	0.5	A	D	01/25/17	AD-1	16	45	Blank	A
A-1536	5	6.8	1.3	1.6	0.3	A	D	01/25/17	AD-3	21	45	Blank	J
A-1538	5	6.8	0.9	1	0.1	A	D	01/25/17	AD-1	16	45	Blank	A
A-1540	2	38.2	0.9	0.9	0	A	D	01/25/17	AD-1	16	45	Blank	A
A-1542	2	38.2	1.1	1.2	0.1	A	D	01/25/17	AD-3	21	45	Blank	J
A-1544	4	38.2	0.7	1.3	0.6	A	D	01/25/17	AD-1	16	45	Blank	A
A-1546	4	38.2	0.9	1.3	0.4	A	D	01/25/17	AD-1	16	45	Blank	A
A-1548	3	28.6	0.8	1	0.2	A	D	01/25/17	AD-1	16	45	Blank	A
A-1550	2	38.2	1	1	0	A	D	01/25/17	AD-3	21	45	Blank	J
A-1552	2	38.2	1	1.2	0.2	A	D	01/25/17	AD-3	21	45	Blank	J
A-1554	3	9.5	0.9	1	0.1	P	D	01/25/17	AD-1	16	Blank	Blank	A bonnet covered
A-1556	3	9.5	0.9	1.2	0.3	P	D	01/25/17	AD-3	21	Blank	Blank	J bonnet covered
A-1558	1	19.1	0.8	0.8	0	A	D	01/25/17	AD-1	16	Blank	Blank	A
A-1560	3	19.1	1	1.2	0.2	A	D	01/25/17	AD-3	21	Blank	Blank	J
A-1562	1	19.1	0.8	0.8	0	A	D	01/25/17	AD-1	16	Blank	Blank	A

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1564	3	9.5	0.7	0.9	0.2	P	D	01/25/17	AD-1	16	Blank	Blank	A bonnet covered
A-1566	2	38.2	1	1	0	A	D	01/25/17	AD-3	21	Blank	Blank	J
A-1568	4	12.7	1	1	0	P	D	01/25/17	AD-3	21	Blank	Blank	J bonnet covered
A-1570	2	38.2	0.9	0.9	0	A	D	01/25/17	AD-1	16	Blank	Blank	A
A-1572	3	19.1	1.7	1.8	0.1	A	D	01/25/17	AD-1	18	Blank	Blank	A **TVA 18**
A-1574	1	19.1	1	1	0	A	D	01/25/17	AD-3	21	Blank	Blank	J welded bonnet
A-1576	4	25.5	0.9	0.9	0	A	D	01/25/17	AD-3	21	Blank	Blank	J
A-1578	2	38.2	1.6	1.7	0.1	A	D	01/25/17	AD-1	18	Blank	Blank	A
A-1580	2	38.2	1.7	1.8	0.1	A	D	01/25/17	AD-1	18	Blank	Blank	A
A-1582	9	14.3	1.5	1.6	0.1	A	D	01/25/17	AD-1	18	Blank	Blank	A*
A-1584	4	76.4	1.6	6.3	4.7	A	D	01/25/17	AD-3	22	Blank	Blank	J
A-1586	2	38.2	1.5	1.7	0.2	A	D	01/25/17	AD-1	18	Blank	Blank	A
A-1588	5	9.5	1.5	1.6	0.1	A	D	01/25/17	AD-1	18	Blank	Blank	A
A-1590	3	19.1	1.5	1.7	0.2	A	D	01/25/17	AD-1	18	Blank	Blank	A
A-1592	5	4	1.7	1.8	0.1	A	D	01/25/17	AD-3	22	Blank	Blank	J
A-1594	3	14.3	1.5	1.6	0.1	A	D	01/25/17	AD-1	18	Blank	Blank	A
A-1596	5	31.8	2	2.1	0.1	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1598	4	12.7	1.2	1.4	0.2	A	D	01/25/17	AD-3	22	Blank	Blank	J
A-1600	3	19.1	1.9	2	0.1	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1602	3	9.5	1.3	1.3	0	A	D	01/25/17	AD-3	22	Blank	Blank	J
A-1604	5	6.8	2	2.3	0.3	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1606	3	9.5	1.3	1.3	0	A	D	01/25/17	AD-3	22	Blank	Blank	J
A-1608	2	12.7	2.1	2.4	0.3	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1610	5	4.8	1.2	3	1.8	A	D	01/25/17	AD-3	22	Blank	Blank	J
A-1612	3	28.6	2.1	2.6	0.5	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1614	3	28.6	1.1	3	1.9	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1616	3	114.6	2	2.3	0.3	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1618	2	76.4	1.9	1.9	0	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1620	2	38.2	1.7	1.7	0	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1622	7	13.4	1.1	1.4	0.3	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1624	2	38.2	1.6	1.6	0	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1626	7	13.4	1.6	1.8	0.2	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1628	2	50.9	1.1	1.2	0.1	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1630	3	57.3	1.1	1.1	0	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1632	5	9.5	1.6	1.6	0	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1634	3	57.3	0.9	1	0.1	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1636	7	13.4	0.9	3.4	2.5	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1638	2	38.2	1.6	1.6	0	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1640	2	19.1	1.5	1.6	0.1	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1642	2	19.1	1.5	1.6	0.1	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1644	3	76.4	1.5	1.8	0.3	A	D	01/25/17	AD-2	21	Blank	Blank	R
A-1646	2	19.1	1.1	1.2	0.1	A	D	01/25/17	AD-3	18	Blank	Blank	J welded bonnet
A-1648	2	38.2	1.6	1.6	0	A	D	01/25/17	AD-2	21	Blank	Blank	R welded bonnet
A-1650	3	76.4	0.9	1	0.1	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1652	13	24.8	1.6	50	48.4	A	D	01/25/17	AD-2	21	Blank	Blank	R 1440
A-1654	10	4	0.8	0.8	0	A	D	01/25/17	AD-3	18	Blank	Blank	J
A-1656	16	50.9	0.7	9.4	8.7	A	D	01/26/17	AD-1	22	Blank	Blank	A Not operating (inop)
A-1658	10	31.8	0.9	4.7	3.8	A	D	01/26/17	AD-1	22	Blank	Blank	A
A-1660	8	19.1	0.9	6.5	5.6	P	D	01/26/17	AD-1	22	Blank	Blank	A Only half accessible
A-1662	9	21.5	0.3	1.3	1	A	D	01/26/17	AD-1	22	Blank	Blank	A inop
A-1664	19	36.3	0.7	1.4	0.7	A	D	01/26/17	AD-1	22	Blank	Blank	A inop
A-1666	14	26.7	1.2	3	1.8	A	D	01/26/17	AD-3	18	Blank	Blank	J
A-1668	7	13.4	0.5	1.1	0.6	A	D	01/26/17	AD-1	22	Blank	Blank	A inop
A-1670	9	17.2	1.3	2.9	1.6	A	D	01/26/17	AD-3	18	Blank	Blank	J
A-1672	14	26.7	1.1	1.6	0.5	A	D	01/26/17	AD-1	18	Blank	Blank	A** switch to TVA 18**
A-1674	13	24.8	1.5	2.8	1.3	P	D	01/26/17	AD-2	13	Blank	Blank	R 3/4 accessible
A-1676	10	47.7	1.5	2.2	0.7	A	D	01/26/17	AD-3	23	Blank	Blank	J inop
A-1678	13	62.1	1.6	2.8	1.2	A	D	01/26/17	AD-2	13	Blank	Blank	R inop
A-1680	6	19.1	1.6	3	1.4	A	D	01/26/17	AD-2	13	Blank	Blank	R
A-1682	6	19.1	1.3	2.6	1.3	A	D	01/26/17	AD-3	23	Blank	Blank	J N/O
A-1684	11	35	1.4	4.5	3.1	A	D	01/26/17	AD-2	13	Blank	Blank	R 1351
A-1688	10	31.8	1.3	3.5	2.2	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1690	6	19.1	1.7	2.6	0.9	A	D	01/26/17	AD-2	13	Blank	Blank	R
A-1692	6	19.1	1.2	2	0.8	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1694	5	23.9	1.3	2	0.7	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1696	10	4	1.5	2	0.5	A	D	01/26/17	AD-2	13	Blank	Blank	R
A-1698	3	14.3	1.2	1.3	0.1	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1700	4	19.1	1.2	1.3	0.1	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1702	4	19.1	1.2	1.9	0.7	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1704	3	14.3	1.2	1.6	0.4	A	D	01/26/17	AD-2	13	Blank	Blank	R
A-1706	2	9.5	1.1	1.3	0.2	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1708	4	19.1	1.1	1.5	0.4	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1710	4	19.1	1.2	1.2	0	A	D	01/26/17	AD-2	13	Blank	Blank	R
A-1712	2	9.5	1.1	1.3	0.2	A	D	01/26/17	AD-3	23	Blank	Blank	J
A-1714	4	19.1	1.2	1.5	0.3	A	D	01/26/17	AD-2	13	Blank	Blank	R

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1716	10	31.8	1.5	16.2	14.7	A	D	01/30/17	AD-1 / AD-3	21	44	1-3/E	Steam on seals (TVA 21)
A-1718	7	22.3	1.8	2.4	0.6	A	D	01/30/17	AD-1 / AD-3	22	44	1-3/E	Steam/Pump not/OP (TVA 22)
A-1720	15	47.7	1.7	137	135.3	A	D	01/30/17	AD-1 / AD-3	22	44	1-3/E	No steam (T22)
A-1722	15	47.7	1.4	355	353.6	A	D	01/30/17	AD-1 / AD-3	21	44	1-3/E	No steam/Pump non-op (T21)
A-1724	15	71.6	2.4	30.1	27.7	A	D	01/30/17	AD-1 / AD-3	22	44	1-3/E	No steam/Pump non-op (T22)
A-1726	7	33.4	2.4	3.1	0.7	A	D	01/30/17	AD-1 / AD-3	22	44	1-3/E	Some steam/Pump non-op (T22)
A-1728	20	95.5	1.9	406	404.1	A	D	01/30/17	AD-1 / AD-3	22	44	1-3/E	No steam (T22)
A-1730	14	66.8	1.3	541	539.7	A	D	01/30/17	AD-1 / AD-3	21	44	1-3/E	No steam/not-running (T21)
A-1732	6	19.1	1.1	1.3	0.2	A	D	01/30/17	AD-1 / AD-3	14	44	1-3/E	No steam/Scaffold block half of pump (T14)
A-1734	12	38.2	1.3	2	0.7	A	D	01/30/17	AD-1 / AD-3	21	44	1-3/E	No steam/not-running (T21)
A-1736	10	31.8	1.5	2	0.5	A	D	01/30/17	AD-1 / AD-3	18	44	1-3/E	Pump running (T18)
A-1738	8	38.2	1.4	2.2	0.8	A	D	01/30/17	AD-1 / AD-3	18	44	1-3/E	Pump running (T18)
A-1740	7	33.4	1.3	1.8	0.5	A	D	01/30/17	AD-1 / AD-3	18	44	1-3/E	Grating around seals (T18 cover over seals)
A-1742	11	35	1.1	23.8	22.7	A	D	01/30/17	AD-1 / AD-3	14	44	1-3/E	High-background ~ 2-3ppm (T14)
A-1744	2	9.5	1.5	2.5	1	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	HE 4648
A-1746	3	14.3	1.5	1.8	0.3	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1748	4	12.7	1.5	1.8	0.3	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1750	1	3.2	1.4	1.5	0.1	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1752	4	76.4	1.4	2	0.6	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1754	2	38.2	1.8	2	0.2	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1756	1	19.1	1.9	1.9	0	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	Welded bonnet
A-1758	1	19.1	2.5	3.2	0.7	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	Welded bonnet
A-1760	2	38.2	2.5	3	0.5	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1762	0.5	9.5	2.5	2.8	0.3	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	Welded bonnet
A-1764	6	2.7	2.5	3.1	0.6	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1766	2	0.8	1.6	2.3	0.7	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	HE 4649
A-1768	3	9.5	2	2.3	0.3	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1770	1	19.1	2.2	2.2	0	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1772	1	19.1	1	1	0	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1774	2	38.2	1.7	1.7	0	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	HX 4649
A-1776	1	19.1	1.7	1.9	0.2	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1780	1	19.1	2.2	2.2	0	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1782	1	19.1	1.5	1.6	0.1	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	Welded bonnet
A-1784	1	19.1	1.5	1.8	0.3	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1786	2	9.5	0.6	1.4	0.8	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	HX 4646
A-1788	2	9.5	0.7	2.2	1.5	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1790	3	7.2	0.7	2.5	1.8	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1792	1	19.1	0.6	1.6	1	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1794	1	19.1	0.7	1	0.3	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1796	4	76.4	0.5	22.4	21.9	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1798	1	19.1	1.8	2	0.2	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1800	1	19.1	1.7	2	0.3	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1802	0.5	9.5	1.4	2	0.6	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	Welded bonnet
A-1804	1	19.1	1.2	1.2	0	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1806	11	210.1	1	1.4	0.4	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1808	1	2.4	1	1.4	0.4	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1810	2	4.8	1	1	0	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1812	2	38.2	0.7	1	0.3	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1814	1	19.1	1.1	1.1	0	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1816	1	19.1	1	1	0	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1818	1	19.1	1.1	1.1	0	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1820	1	19.1	0.8	1	0.2	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1822	1	19.1	0.8	0.8	0	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1824	1	19.1	0.8	0.8	0	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1826	3	9.5	1.8	2.2	0.4	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1828	1	19.1	2	2.1	0.1	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	Welded bonnet
A-1830	1	19.1	2.1	2.6	0.5	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1832	1	9.5	2.7	2.7	0	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1834	1	3.2	2.6	2.8	0.2	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1836	4	12.7	2.2	3.9	1.7	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	
A-1838	7	33.4	2.2	14.2	12	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	FC-462
A-1840	1	4.8	2.6	2.8	0.2	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1842	2	38.2	2.6	3.6	1	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1844	3	9.5	2.4	3.1	0.7	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1846	1	4.8	2.3	3.3	1	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1848	2	9.5	2.5	2.7	0.2	A	D	01/31/17	AD-4 / AD-8	19	44	5/E	
A-1850	4	12.7	2.2	3.7	1.5	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	HE-4648 crude/diesel
A-1852	2	6.4	2.1	2.3	0.2	P	D	01/31/17	AD-4 / AD-8	20	44	5/E	Partially inaccessible crude/diesel
A-1854	3	9.5	2.1	2.3	0.2	A	D	01/31/17	AD-4 / AD-8	20	44	5/E	HE-4649 crude/diesel
A-1856	4	12.7	2	4	2	P	D	01/31/17	AD-4 / AD-8	20	44	5/E	HE-4649 partially inaccessible
A-1858	1	19.1	2.6	3.3	0.7	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	
A-1860	1	19.1	2.7	2.9	0.2	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	
A-1862	2	38.2	2.3	3.6	1.3	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4648
A-1864	1	19.1	2.8	3	0.2	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4646
A-1866	4	9.5	2.8	2.8	0	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4646 resid/crude

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
A-1868	1	19.1	2.6	3.2	0.6	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4646 welded bonnet
A-1870	1	19.1	2.6	3.1	0.5	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4646
A-1872	3	7.2	2.1	3	0.9	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4647 resid/crude
A-1874	1	19.1	1.9	2.4	0.5	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4647
A-1876	3	9.5	1.9	2.9	1	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4639 diesel/crude
A-1878	1	3.2	2.1	2.2	0.1	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4639 diesel/crude
A-1880	1	19.1	2.2	2.3	0.1	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4639 diesel/crude
A-1882	1	9.5	2.1	2.2	0.1	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4639 diesel/crude
A-1884	0.5	4.8	1.9	1.9	0	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4639 diesel/crude
A-1886	7	33.4	2.1	2.1	0	A	D	01/31/17	AD-4 / AD-8	19	58	7/NE	HE 4639 diesel/crude
A-1888	0.5	9.5	1.9	2.1	0.2	A	D	01/31/17	AD-4 / AD-8	19	57	8/NE	HE 4639 welded bonnet
A-1890	1	19.1	1.9	1.9	0	A	D	01/31/17	AD-4 / AD-8	19	57	8/NE	HE 4639 welded bonnet
A-1892	1	19.1	1.9	1.9	0	A	D	01/31/17	AD-4 / AD-8	19	57	8/NE	HE 4639 welded bonnet
A-1894	1	19.1	2	1.9	0	A	D	01/31/17	AD-4 / AD-8	19	57	8/NE	HE 4639 welded bonnet
A-1896	0.5	9.5	1.7	2	0.3	A	D	01/31/17	AD-4 / AD-8	19	57	8/NE	HE 4639 welded bonnet
A-1898	3	9.5	1.5	1.9	0.4	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	TVA #24 HE 4639 inlet
A-1900	1	3.2	1.5	1.6	0.1	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	HE 4639 inlet
A-1902	7	133.7	1.5	16.6	15.1	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	HE 4639
A-1904	3	28.6	2.8	2.8	0	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	HE 4638
A-1906	1	9.5	2.8	2.9	0.1	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	HE 4638
A-1908	4	19.1	2.5	4	1.5	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	HE 4639
A-1910	1	4.8	2.7	2.7	0	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	HE 4640
A-1912	1	19.1	2.6	2.6	0	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	Welded bonnet
A-1914	1	19.1	2.4	2.5	0.1	A	D	01/31/17	AD-4 / AD-8	24	57	8/NE	Welded bonnet
A-1916	1	19.1	2.2	2.4	0.2	A	D	01/31/17	AD-4 / AD-8	24	59	9/NE	HE 4638 welded bonnet
A-1918	1	19.1	2.4	2.6	0.2	A	D	01/31/17	AD-4 / AD-8	24	59	9/NE	HE 4638 welded bonnet
A-1920	2	61.1	2.2	2.4	0.2	A	D	01/31/17	AD-4 / AD-8	24	59	9/NE	HE 4638 welded bonnet
A-1922	1	19.1	2.3	2.4	0.1	A	D	01/31/17	AD-4 / AD-8	24	59	9/NE	HE 4638 welded bonnet
A-1924	2	6.4	2.4	2.4	0	A	D	01/31/17	AD-4 / AD-8	24	59	9/NE	HE 4638 welded bonnet
A-1926	1	19.1	2.2	2.3	0.1	A	D	01/31/17	AD-4 / AD-8	24	59	9/NE	HE 4644
A-1928	1	19.1	1.3	1.7	0.4	A	D	01/31/17	AD-4 / AD-8	22	59	9/NE	TVA #22 HE 4644 welded bonnet
A-1930	1	19.1	1.1	1.1	0	A	D	01/31/17	AD-4 / AD-8	22	59	9/NE	HE 4644
A-1932	1	19.1	1	1.9	0.9	A	D	01/31/17	AD-4 / AD-8	22	59	9/NE	HE 4645
A-1934	1	19.1	1.4	1.4	0	A	D	01/31/17	AD-4 / AD-8	22	59	9/NE	HE 4644 welded bonnet
A-1936	2	9.5	1.3	3	1.7	A	D	01/31/17	AD-4 / AD-8	22	59	9/NE	HE 4647
A-1938	4	12.7	1.9	8.3	6.4	A	D	01/31/17	AD-4 / AD-8	22	59	9/NE	HE 4648
A-1940	18	85.9	1.7	13.3	11.6	A	D	02/14/17	AD-3 / AD-2	24	62	1-3/E	Not running (T24); Leak @ outboard seal
A-1942	7	33.4	1.5	2.3	0.8	A	D	02/14/17	AD-3 / AD-2	24	62	1-3/E	Not running; Steam @ seals (T24)
A-1944	9	43	1.6	2.9	1.3	A	D	02/14/17	AD-3 / AD-2	24	62	1-3/E	Not running (High backgrounds, T24), from TK622)
A-1946	16	38.2	0.9	1.4	0.5	A	D	02/14/17	AD-3 / AD-2	24	62	1-3/E	Not running (T24)
A-1948	6	9.5	0.8	1.1	0.3	A	D	02/14/17	AD-3 / AD-2	24	62	1-3/E	Running w/ (steam on seal)(T24)
A-1950	5	8	0.8	0.8	0	A	D	02/14/17	AD-3 / AD-2	24	62	1-3/E	Not running (steam @ seal)(TK24)
A-1952	NA	NA	(5-9) 15	N/A	NA	U	D	02/14/17	AD-3 / AD-2	24	62	1-3/E	Not running (T24) High Background/Can't screen
A-1954	10	31.8	2.2	23.2	21	A	D	02/14/17	AD-3 / AD-2	22	62	1-3/E	Not running (T-22)
A-1956	10	31.8	2.4	33.1	30.7	A	D	02/14/17	AD-3 / AD-2	22	62	1-3/E	Was running & shut down
A-1958	3	7.2	2.2	2.6	0.4	P	D	02/14/17	AD-3 / AD-2	22	62	1-3/E	Screen cover blocking seal Fl6./Not running (T-22)
A-1960	3	7.2	2.2	2.5	0.3	P	D	02/14/17	AD-3 / AD-2	22	62	1-3/E	Screen cover blocking seal Fl6./Not running (T-22)
A-1962	12	38.2	2.4	27.5	25.1	A	D	02/14/17	AD-3 / AD-2	22	62	1-3/E	Not running (T-22)
A-1964	10	23.9	0.5	0.5	0	A	D	02/14/17	AD-3 / AD-2	18	62	1-3/E	Not running (T-18)
A-1966	2	38.2	0.4	1.1	0.7	A	D	02/14/17	AD-3 / AD-2	18	62	1-3/E	(T-18)
A-1968	2	38.2	0.3	0.3	0	A	D	02/14/17	AD-3 / AD-2	18	62	1-3/E	(T-18)
B-1	5	15.9	1.7	1.8	0.1	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Cold feed to E-845
B-3	3	9.5	1.7	1.7	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Cold feed to E-845
B-5	1	25.5	1.7	1.7	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Cold feed to E-845, welded bonnet (wb)
B-7	1	19.1	1.7	1.7	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Cold feed to E-845
B-9	1	3.2	1.6	1.7	0.1	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Diesel #U250
B-11	3	9.5	1.7	1.7	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Diesel #U250
B-13	2	38.2	1.6	1.7	0.1	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Diesel #U250, wb
B-15	1	19.1	1.9	1.6	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Diesel #U250
B-17	4	12.7	1.5	1.6	0.1	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Diesel #U250
B-19	2	6.4	1.5	1.6	0.1	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Diesel #U250
B-21	1	19.1	1.5	1.5	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Diesel #U250, wb
B-23	2	38.2	1.5	1.6	0.1	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Cold feed tk- 281, wb
B-25	5	15.9	1.5	1.5	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Cold feed tk- 281, wb
B-27	1	19.1	1.5	1.5	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Cold feed tk- 281, wb
B-29	1	19.1	1.4	1.5	0.1	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-31	4	12.7	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-33	1	9.5	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-35	1	19.1	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Welded Bonnet
B-37	4	12.7	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-39	5	15.9	1.4	1.7	0.3	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Pump Seal Covered
B-41	1	19.1	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-43	3	9.5	1.4	1.6	0.2	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-45	2	38.2	1.5	1.5	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-47	1	19.1	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Welded Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-49	1	19.1	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Welded Bonnet
B-51	1	19.1	1.4	1.4	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Welded Bonnet
B-53	4	12.7	1.4	1.4	0	P	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Bonnet under insulation
B-55	1	19.1	1.3	1.3	0	P	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Bonnet under insulation
B-57	1	9.5	1.4	1.4	0	P	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	Bonnet under insulation
B-59	2	6.4	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	22	Blank	Blank	
B-61	1	19.1	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-63	1	9.5	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-65	6	19.1	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	Pump Seal Covered
B-67	2	6.4	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-69	2	38.2	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-71	1	19.1	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	Welded Bonnet
B-73	2	38.2	1.3	1.3	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	Welded Bonnet
B-75	1	19.1	1.2	1.3	0.1	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	Welded Bonnet
B-77	6	19.1	1.2	1.5	0.3	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-79	4	12.7	1.3	1.4	0.1	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-81	4	12.7	1.2	1.3	0.1	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-83	4	25.5	1.2	1.2	0	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-85	1	19.1	1.2	1.2	0	P	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	Insulated Bonnet
B-87	2	12.7	1.2	1.2	0	P	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	Insulated
B-89	1	19.1	1.2	1.2	0	P	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	Insulated Bonnet
B-91	3	19.1	1.1	1.2	0.1	A	D	06/27/17	AD-2 / AD-1	18	Blank	Blank	
B-93	1	38.2	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-95	1	19.1	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-97	1	38.2	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-99	4	12.7	1.4	1.5	0.1	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-101	1	19.1	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-103	1	19.1	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-105	5	15.9	1.4	1.5	0.1	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-107	1	19.1	1.3	1.4	0.1	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-109	1	19.1	1.3	1.3	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	E-845 Shell out to G-8175
B-111	1	25.5	1.4	1.5	0.1	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-113	1	25.5	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-115	1	25.5	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-117	1	25.5	1.4	1.6	0.2	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-119	1	25.5	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines
B-121	1	25.5	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-123	1	25.5	1.2	1.4	0.2	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-125	1	25.5	1.3	1.3	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-127	1	25.5	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	Cold feed sample lines.. Welded Bonnet
B-129	4	19.1	1.2	1.2	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	North of 8F-831 E-846 by pass valve
B-131	4	15.3	1.2	1.8	0.6	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	North of 8F-831 E-846 by pass valve
B-133	2	9.5	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	8FV-003B
B-135	3	14.3	1.2	1.2	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	8FV-003B
B-137	1	25.5	1.2	1.2	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	8FV-003B
B-139	2	6.4	1.2	1.4	0.2	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	8FV-003B
B-141	2	38.2	1.1	1.1	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	8FV-003B
B-143	2	6.4	1.1	1.1	0	P	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	50% accessible
B-145	4	25.5	1.1	1.1	0	P	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	50% accessible
B-147	1	9.5	1.2	1.2	0	P	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	50% accessible
B-149	1	6.4	1.4	1.4	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	8FV 003A
B-151	3	19.1	1.1	1.1	0	A	D	06/28/17	AD-2 / AD-1	18	Blank	Blank	8FV 003A
B-153	4	12.7	1.3	1.3	0	A	D	06/28/17	AD-2 / AD-1	24	Blank	Blank	E-846 bypass valve
B-155	5	15.9	1.3	1.3	0	A	D	06/28/17	AD-2 / AD-1	24	Blank	Blank	E-846 bypass valve
B-157	4	9.5	1.2	1.2	0	A	D	06/28/17	AD-2 / AD-1	24	Blank	Blank	8F-831
B-159	3	7.2	1.2	1.2	0	A	D	06/28/17	AD-2 / AD-1	24	Blank	Blank	8F-831
B-161	5	15.9	0.9	0.9	0	A	D	06/28/17	AD-2 / AD-1	24	Blank	Blank	8F-831
B-163	4	12.7	0.8	0.8	0	A	D	06/28/17	AD-2 / AD-1	24	Blank	Blank	8F-831
B-165	4	12.7	1.7	1.8	0.1	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	TVA #22 Restarted TVA due to stuck reading. Tested with sharpie. OK
B-167	5	15.9	1.8	1.8	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-169	2	6.4	1.6	1.7	0.1	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-171	1	19.1	1.6	1.7	0.1	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-173	3	9.5	1.6	1.6	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-175	2	19.1	1.6	1.6	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-177	1	9.5	1.6	1.6	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-179	2	19.1	1.6	1.7	0.1	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-181	2	19.1	1.6	1.6	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-183	7	4.5	1.5	1.7	0.2	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	E-845
B-185	1	19.1	1.6	1.6	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	Welded Bonnet
B-187	3	14.3	1.6	1.6	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-189	3	14.3	1.6	1.6	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-191	3	9.5	1.5	1.7	0.2	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-193	2	6.4	1.5	1.7	0.2	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-195	1	19.1	1.5	1.5	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-197	1	19.1	1.5	1.5	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-199	1	19.1	1.5	1.5	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-201	3	9.5	1.5	1.5	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-203	1	19.1	1.5	1.5	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-205	1	19.1	1.5	1.7	0.2	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-207	1	9.5	1.5	1.5	0	A	D	06/28/17	AD-2 / AD-1	22	Blank	Blank	
B-209	2	6.4	1.8	1.8	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-211	2	6.4	1.8	1.8	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-213	1	3.2	1.4	1.4	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-215	1	3.2	1.4	1.4	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-217	1	19.1	1.4	1.4	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-219	3	9.5	1.5	1.5	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-846 Tube inlet
B-221	1	19.1	1.5	1.5	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-223	4	12.7	1.4	1.4	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-225	1	19.1	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-227	3	9.5	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845 Tube Inlet
B-229	1	19.1	1.2	1.2	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845 Tube Inlet
B-231	1	19.1	1.2	1.1	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845 Tube Inlet
B-233	3	9.5	1.2	1.2	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845 Tube Inlet
B-235	1	38.2	1.1	1.1	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-237	1	38.2	1.1	1.1	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-239	1	19.1	1.1	1.1	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-241	2	6.4	1.0	1.0	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-243	1	25.5	1.0	1.0	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-245	1	25.5	1.0	1.0	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-247	2	6.4	0.9	1.0	0.1	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-249	1	38.2	1.0	1.0	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-251	1	19.1	1.0	1.0	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-253	3	9.5	1.1	1.1	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	E-845
B-255	1	19.1	0.9	0.9	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-257	1	19.1	0.9	0.9	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-259	2	6.4	0.9	0.9	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-261	1	19.1	0.9	0.9	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-263	1	19.1	0.9	0.9	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-265	1	3.2	0.8	0.9	0.1	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-267	2	6.4	0.9	0.9	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-269	1	19.1	1.2	1.2	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-271	1	19.1	1.2	1.2	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-273	4	12.7	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-275	2	6.4	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-277	2	12.7	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-279	1	19.1	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-281	1	19.1	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-283	4	9.5	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	E-845
B-285	8	Unknown	1.2	25.2	24	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809,pump housing flange
B-287	1	3.2	1.2	1.2	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809
B-289	2	4.8	1.2	1.3	0.1	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809
B-291	1	19.1	1.8	1.8	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809
B-293	2	4.8	1.7	2.5	0.8	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809
B-295	1	19.1	1.6	1.6	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809
B-297	1	19.1	1.6	1.6	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809
B-299	1	19.1	1.5	1.5	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	G-809
B-301	5	11.9	1.5	14.4	12.9	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	Valve Stem
B-303	1	9.5	1.7	1.7	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	
B-305	5	8.0	1.5	1.5	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	
B-307	4	6.4	1.2	1.2	0	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	
B-309	Unknown	Unknown	2.1	Blank	Blank	U	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	TVA #18 extended probe, pump was tagged LDAR, G-816B
B-311	7	Unknown	2.4	3.3	0.9	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	Pump G-808B
B-313	12	Unknown	2.3	33.0	30.7	A	D	06/29/17	AD-8 / AD-2	18	Blank	Blank	Pump G-808 leak on the bottom of seal
B-315	Unknown	Unknown	1.7	38.2	36.5	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Pump G-818 TVA#22 extended probe
B-317	4	9.5	1.2	1.7	0.5	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-319	2	4.8	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-321	1	19.1	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-323	Unknown	Unknown	1.3	1.3	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-325	2	4.8	1.2	1.3	0.1	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-327	4	9.5	1.1	1.1	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-329	1	19.1	1.1	1.1	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-331	3	14.3	1.0	1.2	0.2	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-333	1	19.1	1.0	1.0	0	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	Welded Bonnet
B-335	2	9.5	1.0	1.2	0.2	A	D	06/29/17	AD-8 / AD-2	22	Blank	Blank	
B-337	3	28.6	0.5	0.6	0.1	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-339	1	19.1	0.5	0.5	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	Welded Bonnet
B-341	1	19.1	0.5	0.5	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-343	5	9.5	0.5	0.6	0.1	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-345	1	19.1	0.6	0.7	0.1	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	Welded Bonnet
B-347	1	19.1	0.6	0.6	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	Welded Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-349	1	19.1	0.4	0.4	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-351	1	19.1	0.5	0.5	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	Welded Bonnet
B-353	2	19.1	0.4	0.4	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-355	2	19.1	0.4	0.4	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-357	2	38.2	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-359	1	19.1	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-361	1	19.1	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-363	1	19.1	0.4	0.4	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-365	2	19.1	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-367	2	38.2	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-369	1	19.1	0.2	0.3	0.1	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-371	1	19.1	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-373	1	19.1	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-375	4	3.2	0.2	0.2	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	Elbow Downstream of flange is tagged but not monitored.
B-377	3	19.1	0.2	0.2	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-379	4	6.4	0.1	0.2	0.1	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-381	5	8.0	0.1	0.1	0	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	
B-383	1	19.1	0.6	0.6	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	TVA # 21
B-385	1	19.1	0.6	0.6	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-387	7	11.1	0.6	2.0	1.4	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-389	1	19.1	0.6	0.6	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-391	1	19.1	0.6	0.6	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-393	10	23.9	2.0	46.1	459	A	D	07/05/17	AD-1 / AD-2	18	Blank	Blank	TVA 18 Extended Probe
B-395	6	11.5	0.3	0.3	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	TVA 21
B-397	1	19.1	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	Welded Bonnet
B-399	1	19.1	1.3	1.3	0	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-401	1	1.9	1.3	1.3	0	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-403	3	14.3	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-405	2	12.7	1.3	1.4	0.1	P	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	Bonnet Insulated
B-407	2	6.4	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-409	2	6.4	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-411	1	19.1	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	Welded Bonnet
B-413	0.5	9.5	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-415	1	4.8	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-417	1	19.1	1.3	1.3	0	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-419	1	19.1	1.3	1.7	0.4	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-421	2	6.4	1.3	1.3	0	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-423	2	9.5	1.3	1.3	0	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	Ladder
B-425	2	9.5	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	Ladder
B-427	1	19.1	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-429	0.5	9.5	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-431	1	19.1	1.3	1.5	0.2	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-433	0.5	9.5	1.3	1.4	0.1	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-435	2	9.5	1.4	1.4	0	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-437	1	4.8	1.4	1.4	0	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-439	2	9.5	1.3	1.7	0.4	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-441	2	9.5	1.3	1.5	0.2	A	D	07/05/17	AD-1 / AD-2	23	Blank	Blank	
B-443	0.5	9.5	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	TVA#21
B-445	1	19.1	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-447	1	4.8	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-449	2	9.5	1.8	2.0	0.2	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-451	0.5	9.5	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-453	1	19.1	1.8	1.8	0	P	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	Insulated
B-455	1	4.8	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-457	2	4.8	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-459	3	7.2	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-461	1	19.1	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-463	0.5	9.5	1.8	1.8	0	P	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	Insulated
B-465	3	7.2	1.7	1.9	0.2	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-467	1	19.1	1.7	1.7	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-469	0.5	9.5	1.7	1.7	0	P	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	Insulated
B-471	3	7.2	1.7	1.7	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-473	2	9.5	1.8	1.8	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-475	1	19.1	1.7	1.7	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-477	1	19.1	1.7	1.7	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-479	2	9.5	1.7	1.8	0.1	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-481	1	4.8	1.7	1.7	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-483	1	19.1	1.7	1.7	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-485	Unknown	Unknown	1.7	1.7	0	A	D	07/05/17	AD-1 / AD-2	21	Blank	Blank	
B-487	4	12.7	1.5	1.7	0.2	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam Injection
B-489	3	9.5	1.6	2.3	0.7	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam
B-491	2	6.4	1.7	1.9	0.2	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam
B-493	3	9.5	1.5	1.7	0.2	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam
B-495	2	12.7	1.3	1.7	0.4	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam
B-497	3	19.1	1.3	1.8	0.5	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-499	2	12.7	1.4	1.5	0.1	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam
B-501	4	25.5	1.5	4.1	2.6	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam Background work
B-503	5	8.0	1.6	2.4	0.8	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam (Background from work?)
B-505	5	8.0	2.2	129.0	126.8	A	D	07/10/17	AD-1 / AD-2	22	Blank	Blank	TVA #22 Steam- switched to TVA #21 for this reading, pulsing leak from 1115-1118 hrs
B-507	2	12.7	2.1	2.8	0.7	A	D	07/10/17	AD-1 / AD-2	22	Blank	Blank	Steam
B-509	4	25.5	1.0	1.6	0.6	A	D	07/10/17	AD-1 / AD-2	18	Blank	Blank	TVA #18 Water cooling (wc)
B-511	8	38.2	0.7	6.8	6.1	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	TVA #21 WC
B-513	4	38.2	1.7	2.7	1	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	TVA # 21 WC
B-515	3	14.3	1.0	1.1	0.1	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	TVA#21 WC
B-517	2	9.5	0.8	0.8	0	A	D	07/10/17	AD-1 / AD-2	21	Blank	Blank	Steam, Flange only, TVA #21
B-519	5	15.9	0.8	5.0	4.2	A	D	07/10/17	AD-1 / AD-2	18	Blank	Blank	Steam TVA #18
B-521	5	15.9	0.8	3.2	2.4	A	D	07/10/17	AD-1 / AD-2	18	Blank	Blank	Steam TVA #18
B-523	4	19.1	1.1	2.5	1.4	A	D	07/10/17	AD-1 / AD-2	18	Blank	Blank	Steam TVA #18
B-525	3	19.1	1.0	2.2	1.2	A	D	07/10/17	AD-1 / AD-2	18	Blank	Blank	Steam TVA #18
B-527	3	Unknown	1.1	2.1	1	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-529	3	Unknown	0.9	1.0	0.1	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-531	2	Unknown	0.3	0.4	0.1	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-533	1	Unknown	0.3	0.4	0.1	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-535	5	Unknown	0.2	24.3	24.1	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-537	6	Unknown	1.2	158.0	156.8	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-539	5	15.9	0.5	50.3	49.8	A	D	07/11/17	AD-1 / AD-2	21	73	NA	Top of Shaft Seal
B-541	7	22.3	1.4	24.0	22.6	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-543	2	Unknown	1.5	1.6	0.1	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-545	1	Unknown	1.5	1.5	0	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-547	4	Unknown	0.4	4250.0	4249.6	A	D	07/11/17	AD-1 / AD-2	21	73	NA	Top of Shaft Seal
B-549	3	Unknown	1.5	14.4	12.9	A	D	07/11/17	AD-1 / AD-2	21	73	NA	
B-551	5	Unknown	1.4	330.0	328.6	A	D	07/11/17	AD-1 / AD-2	18	73	NA	Top of Shaft Seal TVA# 18
B-553	6	Unknown	0.2	120.0	119.8	A	D	07/11/17	AD-1 / AD-2	18	73	NA	Steam, Shaft Seal, Motor side
B-555	5	Unknown	0.0	4.4	4.4	A	D	07/12/17	AD-1 / AD-2 / AD-7	21	65	10//NW	steam; motor side partial insp shaft
B-557	4	Unknown	0.0	6.0	6	A	D	07/12/17	AD-1 / AD-2 / AD-7	21	65	10//NW	Pump off (inop)
B-559	8	Unknown	0.5	185.0	184.5	A	D	07/12/17	AD-1 / AD-2 / AD-7	21	65	10//NW	Inop; leak at outboard shaft seal
B-561	3	Unknown	-0.6	-0.6	0	A	D	07/12/17	AD-1 / AD-2 / AD-7	21	72	NA	inop
B-563	2	Unknown	-0.6	0.0	0.6	P	D	07/12/17	AD-1 / AD-2 / AD-7	21	72	NA	Partially inaccessible- 75%
B-565	8	Unknown	-0.6	37.4	38	A	D	07/12/17	AD-1 / AD-2 / AD-7	21	72	NA	Shaft seal- 2 sides leak- bearing side shaft seal
B-567	7	Unknown	0.5	4.0	3.5	A	D	07/12/17	AD-1 / AD-2 / AD-7	21	72	NA	Dual Shaft Seals
B-569	3	Unknown	0.2	0.2	0	A	D	07/12/17	AD-1 / AD-2 / AD-7	21	72	NA	
B-571	3	7.2	1.1	1.2	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-573	2	4.8	1.0	1.0	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-575	1	12.7	1.0	1.0	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-577	2	4.8	1.0	1.0	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-579	1	3.2	0.8	0.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-581	1	12.7	0.8	1.2	0.4	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-583	1	12.7	0.8	0.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-585	1	12.7	0.8	0.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-587	1	12.7	0.8	0.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-589	1	19.1	0.8	0.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	tagged but in heavy liquid service
B-591	1	19.1	0.8	0.9	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-593	1	12.7	0.8	0.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-595	1	19.1	0.8	0.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-597	1	12.7	0.7	0.8	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-599	1	9.5	0.8	0.8	0	a	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	tagged but in heavy liquid service
B-601	1	19.1	0.6	0.7	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-603	1	19.1	0.6	0.9	0.3	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-605	1	19.1	0.7	0.9	0.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-607	2	4.8	0.7	0.7	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-609	1	2.4	0.5	0.7	0.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-611	2	4.8	0.5	0.5	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-613	1	19.1	0.5	0.5	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-615	1	19.1	0.5	0.5	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-617	1	12.7	0.5	0.5	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-619	1	12.7	0.5	0.5	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-621	1	12.7	0.4	0.5	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-623	1	2.4	0.3	0.4	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-625	1	2.4	0.3	0.4	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-627	1	2.4	0.4	0.4	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-629	2	4.8	0.5	0.5	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	70	5-10/NW	
B-631	2	4.8	0.3	0.3	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-633	1	2.4	0.3	0.7	0.4	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-635	1	19.1	0.4	0.4	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-637	1	19.1	0.4	0.4	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-639	2	38.2	0.4	1.0	0.6	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-641	1	19.1	0.4	0.7	0.3	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-643	2	9.5	0.4	0.4	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-645	1	19.1	0.4	0.4	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-647	1	19.1	0.4	0.4	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-649	2	4.8	0.2	0.2	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-651	1	2.4	0.2	0.5	0.3	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-653	1	12.7	0.2	0.3	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-655	1	12.7	0.3	0.3	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-657	1	12.7	0.3	0.3	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-659	1	12.7	0.3	0.3	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	Blank	
B-661	1	4.8	1.5	1.6	0.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-663	1	Unknown	2.2	2.2	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	TVA #18, E-104 cap flange
B-665	1	19.1	2.2	2.2	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	welded bonnet
B-667	2	38.2	2.2	2.2	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-669	1	4.8	2.2	2.2	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-671	1	19.1	2.1	2.3	0.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-673	1	19.1	2.1	2.3	0.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-675	1	6.4	2.1	2.1	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-677	2	12.7	2.1	2.1	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-679	2	12.7	2.1	2.1	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-681	0.5	9.5	2.1	2.1	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	welded bonnet
B-683	2	4.8	2.1	3.1	1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-685	0.5	9.5	2.1	2.1	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-687	1	6.4	2.1	2.1	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-689	0.5	3.2	1.9	1.9	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-691	3	19.1	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-693	2	12.7	1.8	2.2	0.4	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-695	1	6.4	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-697	2	4.8	1.8	2.0	0.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-699	0.5	9.5	1.8	2.0	0.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-701	1	6.4	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-703	1	6.4	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-705	0.5	19.1	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-707	1	6.4	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-709	0.5	9.5	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-711	2	38.2	1.8	10.0	8.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	north side of exchanger
B-713	2	50.9	2.0	2.3	0.3	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-715	1	25.5	1.7	2.2	0.5	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-717	1	25.5	1.7	2.5	0.8	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-719	1	19.1	1.7	2.5	0.8	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	
B-721	3	3.2	1.8	3.1	1.3	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-723	1	25.5	1.8	1.8	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-725	2	50.9	1.6	2.3	0.7	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-727	1	25.5	1.6	2.4	0.8	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-729	2	38.2	1.9	2.7	0.8	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-731	1	25.5	1.9	2.6	0.7	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-733	2	25.5	1.9	2.5	0.6	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-735	1	6.4	1.6	2.4	0.8	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-737	0.5	9.5	1.6	2.2	0.6	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-739	2	38.2	1.6	1.6	0	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-741	1	6.4	1.6	2.7	1.1	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-743	2	12.7	1.6	2.8	1.2	A	D	07/13/17	AD-1 / AD-2 / AD-7	18	Blank	5-10/NW	2nd level
B-745	3	19.1	0.3	1.2	0.9	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	TVA #22
B-747	1	19.1	0.3	0.8	0.5	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-749	3	19.1	0.2	1.5	1.3	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-751	3	3.6	0.3	1.0	0.7	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-753	2	2.4	0.3	0.3	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-755	2	9.5	0.3	0.3	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-757	1	12.7	0.5	0.5	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-759	1	1.2	0.5	0.5	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-761	2	9.5	0.6	0.6	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-763	3	4.1	0.3	0.3	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	22	Blank	5-10/NW	
B-765	1	1.2	1.0	1.5	0.5	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	TVA # 21 ext
B-767	3	7.2	1.0	2.2	1.2	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	TVA # 21 ext
B-769	2	2.4	1.4	2.3	0.9	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	TVA #21 extend probe
B-771	1	1.9	1.3	2.6	1.3	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-773	2	2.4	1.4	2.3	0.9	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	NW Coker
B-775	Unknown	Unknown	1.4	2.5	1.1	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	NW Coker
B-777	2	2.4	1.4	1.9	0.5	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	NW Coker
B-779	Unknown	Unknown	1.4	2.1	0.7	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	next coker
B-781	2	2.4	1.5	4.2	2.7	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-783	2	2.4	1.2	1.8	0.6	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-785	5	6.0	0.8	500.0	499.2	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	Valve Stem LDAR #29892
B-787	2	2.4	0.8	0.8	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-789	1	1.2	0.6	2.2	1.6	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	3rd coker
B-791	Unknown	Unknown	0.5	16.6	16.1	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	Bottom, LDAR tag at stem, unable to read tag #
B-793	2	2.4	0.5	5.1	4.6	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-795	2	12.7	0.2	0.2	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-797	1	6.4	0.1	0.1	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-799	1	6.4	0.1	0.1	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-801	1	19.1	0.1	0.1	0	A	D	07/17/17	AD-1 / AD-2 / AD-7	21	Blank	5-10/NW	
B-803	2	9.5	1.0	132.0	131	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-805	2	6.4	0.9	1.0	0.1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-807	2	38.2	1.0	18.0	17	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	GREEN TAG
B-809	1	19.1	1.6	1.6	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-811	1	9.5	1.5	2.3	0.8	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-813	1	0.6	1.4	1.6	0.2	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-815	1	9.5	1.2	1.2	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-817	1	9.5	1.1	0.9	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-819	0.5	19.1	0.9	1.0	0.1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-821	1	6.4	0.8	6.8	6	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	GREEN TAG?
B-823	1	3.2	1.7	2.0	0.3	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-825	4	76.4	1.5	20.0	18.5	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	GREEN TAG
B-827	2	19.1	1.7	9.6	7.9	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-829	1	19.1	1.9	1.9	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-831	Unknown	Unknown	1.5	1.4	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-833	1	12.7	1.1	2.1	1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-835	1	9.5	1.5	1.3	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - closed
B-837	2	19.1	1.2	1.2	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-839	1	19.1	1.0	1.1	0.1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - closed
B-841	1	19.1	1.0	1.0	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - closed
B-843	1	19.1	1.6	1.6	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - closed
B-845	1	9.5	0.9	1.0	0.1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-847	2	19.1	1.1	1.1	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-849	1	9.5	0.9	0.9	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - closed
B-851	1	9.5	0.9	0.9	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	
B-853	0.5	9.5	0.9	0.9	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - closed
B-855	1	19.1	0.9	0.9	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V open
B-857	1	2.4	1.0	1.2	0.2	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - open
B-859	2	19.1	0.9	1.0	0.1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V - closed
B-861	Unknown	Unknown	0.9	0.9	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/NW	V-open
B-863	3	5.7	0.9	0.7	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	
B-865	4	6.4	0.1	0.1	0	A	D	07/18/17	AD-7 / AD-2	21	Blank	5-10/SW	TVA #21 extension probe
B-867	1	19.1	1.0	1.0	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	
B-869	1	1.9	1.0	1.0	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	V-open
B-871	1	9.5	0.9	1.0	0.1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	V-closed
B-873	2	4.8	0.9	1.2	0.3	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	V-open
B-875	1	2.4	0.9	1.2	0.3	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	V-open
B-877	1	4.8	1.0	0.8	0	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	V-closed
B-879	1	2.4	1.0	1.1	0.1	A	D	07/18/17	AD-7 / AD-2	22	Blank	5-10/SW	V-open
B-881	5	15.9	1.0	1.2	0.2	A	D	07/18/17	AD-7 / AD-2	21	Blank	5-10/SW	TVA #21 Ray screening
B-883	1	2.4	0.7	0.7	0	A	D	07/18/17	AD-7 / AD-2	21	Blank	5-10/SW	
B-885	3	5.7	0.8	0.8	0	A	D	07/18/17	AD-7 / AD-2	21	Blank	5-10/SW	
B-887	3	5.7	0.9	1.0	0.1	A	D	07/18/17	AD-7 / AD-2	21	Blank	5-10/SW	
B-889	1	9.5	0.9	0.7	0	A	D	07/18/17	AD-7 / AD-2	21	Blank	5-10/SW	
B-891	2	19.1	0.7	0.8	0.1	A	D	07/18/17	AD-7 / AD-2	21	Blank	5-10/SW	
B-893	2	4.8	0.8	0.8	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-895	1	1.9	0.9	0.9	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-897	3	5.7	0.9	1.4	0.5	A	D	07/18/17	AD-2	21	80	10/SW	836
B-899	1	2.4	0.7	2.8	2.1	A	D	07/18/17	AD-2	21	80	10/SW	836
B-901	2	4.8	0.7	3.4	2.7	A	D	07/18/17	AD-2	21	80	10/SW	836
B-903	2	9.5	1.5	1.5	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-905	2	6.4	1.5	1.4	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-907	2	19.1	1.4	3.2	1.8	A	D	07/18/17	AD-2	21	80	10/SW	836
B-909	2	38.2	1.3	1.3	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-911	1	19.1	1.3	1.2	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-913	1	19.1	1.2	1.2	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-915	2	12.7	1.1	1.2	0.1	A	D	07/18/17	AD-2	21	80	10/SW	836
B-917	1	6.4	1.2	1.0	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-919	1	6.4	1.0	1.2	0.2	A	D	07/18/17	AD-2	21	80	10/SW	836
B-921	1	9.5	1.0	1.0	0	A	D	07/18/17	AD-2	21	80	10/SW	836
B-923	1	3.2	0.6	1.0	0.4	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	inlet
B-925	2	19.1	0.6	0.7	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-927	2	19.1	0.5	0.5	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-929	1	19.1	0.5	0.6	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	Welded bonnet
B-931	1	38.2	0.6	0.6	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-933	1	38.2	0.6	0.6	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-935	1	38.2	0.6	0.6	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-937	1	4.8	0.5	0.6	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	outlet
B-939	1	19.1	0.5	0.5	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-941	1	38.2	0.6	0.6	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-943	0.5	19.1	0.5	0.5	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-945	1	25.5	0.4	0.5	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	Welded bonnet
B-947	1	25.5	0.4	0.5	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-949	2	4.8	0.4	0.7	0.3	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-951	2	9.5	0.4	0.5	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/SW	
B-953	2	9.5	0.4	0.5	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-955	2	4.8	0.3	1.5	1.2	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-957	3	7.2	0.4	0.6	0.2	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-959	1	25.5	0.3	0.4	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	Welded bonnet
B-961	1	25.5	0.3	0.3	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-963	7	16.7	0.3	26.3	26	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-965	4	9.5	1.1	1.4	0.3	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-967	5	11.9	1.0	3.4	2.4	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-969	4	9.5	0.5	4.1	3.6	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-971	4	9.5	0.6	2.6	2	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-973	1	25.5	0.5	0.5	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	Welded bonnet
B-975	1	25.5	0.3	0.3	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-977	2	4.8	0.1	0.3	0.2	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-979	1	2.4	0.1	4.2	4.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-981	2	9.5	0.9	1.0	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-983	3	14.3	0.3	2.4	2.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	TVA#21 ext. probe
B-985	3	14.3	0.3	2.4	2.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-987	3	14.3	0.3	2.4	2.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-989	3	14.3	0.3	2.4	2.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-991	3	14.3	0.3	2.4	2.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-993	3	14.3	0.3	2.4	2.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-995	3	14.3	0.3	2.4	2.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	21	Blank	5-10/NW	
B-997	2	19.1	1.2	1.2	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	TVA # 16
B-999	1	9.5	1.1	1.2	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	
B-1001	1	19.1	1.1	1.1	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	Welded bonnet
B-1003	1	25.5	1.1	1.2	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	Welded bonnet
B-1005	0.5	12.7	1.1	1.1	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	
B-1007	1	25.5	1.1	1.1	0	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	
B-1009	6	14.3	0.9	1.4	0.5	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	
B-1011	1	19.1	0.9	1.0	0.1	A	D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/NW	
B-1013	2	1.1	0.9	Blank	Blank		D	07/19/17	AD-2 / AD-1 / AD-9	16	Blank	5-10/SW	4-gas carbon monoxide alarm 71 ppm, staff left the unit
B-1017	2	38.2	0.0	0.0	0	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/5 WSD T-D-711
B-1019	2	38.2	0.0	0.1	0.1	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/5 WSD T-D-711
B-1021	2	38.2	0.0	0.4	0.4	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/5 WSD T-D-711
B-1023	2	38.2	0.0	0.2	0.2	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/5 WSD T-D-711
B-1025	3	19.1	0.0	1.1	1.1	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 WSD T-D-711
B-1027	2	12.7	0.0	0.1	0.1	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 WSD T-D-711
B-1029	2	12.7	0.0	0.3	0.3	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 WSD T-D-711
B-1031	2	38.2	0.0	0.6	0.6	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/3 NWSD D-711
B-1033	2	38.2	0.2	0.2	0	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 NWSD D-711
B-1035	2	12.7	0.4	0.3	0	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 NWSD D-711
B-1037	2	12.7	0.2	0.2	0	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 NWSD D-711
B-1039	2	12.7	0.1	0.3	0.2	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 NSD D-711
B-1041	2	38.2	0.3	0.1	0	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 NSD D-711
B-1043	2	38.2	0.6	0.7	0.1	A	R	03/06/18	B-1 / B-2	202017072515	46	Low/N	1/4 NSD D-711
B-1045	2	6.4	-0.1	0.3	0.4	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	1/1 NESD D-711
B-1047	4	25.5	0.0	-0.2	0	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	1/5 NESD D-711
B-1049	2	12.7	0.1	0.6	0.5	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	1/5 NESD D-711
B-1051	4	25.5	-0.1	-0.4	0	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	1/5 NESD D-711
B-1053	2	38.2	-0.2	-0.3	0	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/3 10 Ft E D-711
B-1055	1	19.1	-0.3	-0.5	0	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/3 10 Ft E D-711
B-1057	2	38.2	-0.2	-0.3	0	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/3 10 Ft E D-711
B-1059	3	7.2	-0.5	0.2	0.7	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/510 Ft E D-711
B-1061	3	7.2	-0.2	0.1	0.3	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/5 10 Ft E D-711
B-1063	2	4.8	-0.4	0.1	0.5	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/5 10 Ft E D-711
B-1065	2	4.8	-0.2	-0.2	0	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/3 10 Ft E D-711
B-1067	4	9.5	-0.3	0.6	0.9	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/3 10 Ft E D-711
B-1069	2	4.8	-0.1	-0.4	0	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/3 10 Ft E D-711
B-1071	2	4.8	-0.4	-0.3	0.1	A	R	03/06/18	B-1 / B-2	202017072515	54	Low/N	G/3 10 Ft E D-711
B-1073-1	3	7.2	0.1	0.9	0.8	A	R	03/06/18	B-1 / B-2	202017072515	60	Low/N	G/3 10 Ft E D-711
B-1073-2	3	7.2	-4.0	-3.9	0.1	A	R	03/07/18	B-1 / B-2	202017072515	54	Low/N	G/5 10 Ft E D-711
B-1075	3	14.3	-3.9	-4.0	0	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/4 10 Ft E P-G-736
B-1077	3	14.3	-3.9	-3.9	0	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/3 8 Ft E P-G-736
B-1079	1	19.1	-3.8	-0.3	3.5	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/1 7 Ft E P-G-736
B-1081	1	19.1	-3.4	-3.6	0	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/1 7 Ft E P-G-736
B-1083	3	9.5	-3.9	-3.6	0.3	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/1 3 Ft E P-G-736
B-1085	3	14.3	-3.5	-3.6	0	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/7 3 Ft E P-G-736
B-1087	2	9.5	-3.4	5.0	8.4	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/2 SSD P-736
B-1089	2	9.5	-1.9	-2.0	0	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/2 SSD P-736
B-1091	9	Unknown	-2.1	-2.1	0	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	Pump 736
B-1093	2	50.9	-1.9	-2.0	0	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/6 ESD P-G-721B
B-1095	3	76.4	-2.0	-1.8	0.2	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/6 ESD P-G-721B
B-1097	2	50.9	-1.9	3.1	5	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/5 ESD P-G-721B

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1099	2	50.9	-1.4	32.8	34.2	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/4 ESD P-G-721B
B-1101	2	25.5	-1.6	2.0	3.6	A	R	03/07/18	B-1 / B-2	202017072515	60	Low/N	G/6 ESD P-G-721B
B-1103	2	50.9	-1.3	-1.5	0	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/7 ESD P-G-721B
B-1105	2	50.9	-1.5	-1.5	0	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/7 ESD P-G-721B
B-1107	2	50.9	-1.0	-1.9	0	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/7 ESD P-G-721B
B-1109	2	50.9	-1.5	-1.8	0	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/6 ESD P-G-721B
B-1111	1	25.5	-1.8	-1.7	0.1	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/4 ESD P-G-721B
B-1113	2	50.9	-1.6	-1.4	0.2	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/4 ESD P-G-721B
B-1115	1	25.5	-1.8	-2.0	0	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/4 ESD P-G-721B
B-1117	3	38.2	-2.1	18.2	20.3	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/3 ESD P-G-721B
B-1119	4	50.9	-1.0	-2.0	0	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/2 ESD P-G-721B
B-1121	2	25.5	-2.1	-2.0	0.1	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/2 ESD P-G-721B
B-1123	2	25.5	-2.0	-1.7	0.3	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/1 ESD P-G-721B
B-1125	2	38.2	-2.0	41.0	43	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/1 ESD P-G-721B
B-1127	Unknown	Unknown	-1.5	-1.9	0	A	R	03/07/18	B-1 / B-2 / B-3	202017072515	67	Low/N	G/1 ESD P-G-721B
B-1129	3	28.6	-2.0	-0.8	1.2	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 S Side B-103
B-1131	1	9.5	-2.2	-1.7	0.5	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 S Side B-103
B-1133	2	50.9	-2.6	-2.1	0.5	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 S Side B-103
B-1135	2	12.7	-2.7	-1.5	1.2	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/6 S Side B-103
B-1137	4	38.2	-2.1	48.4	50.5	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 E Side B-103
B-1139	3	19.1	-1.8	-0.8	1	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/6 E Side B-103
B-1141	3	28.6	-2.3	12.8	15.1	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 E Side B-103
B-1143	3	28.6	0.2	0.8	0.6	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 N Side B-103
B-1145	2	12.7	0.1	0.6	0.5	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 N Side B-103
B-1147	2	50.9	-1.1	0.4	1.5	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/3 N Side B-103
B-1149	2	12.7	-1.2	-0.4	0.8	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/6 N Side B-103
B-1151	6	14.3	-1.8	12.6	14.4	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/2 20 feet NE D-104
B-1153	4	12.7	1.3	2.3	1	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/2 20 feet NE D-104
B-1155	7	16.7	-0.6	31.0	31.6	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/4 20 feet NE D-104
B-1157	6	14.3	-4.5	-4.1	0.4	A	R	03/08/18	B-4 / B-5	202017072515	67	0-5/N	G/6 20 feet NE D-104
B-1159	3	38.2	-4.5	-4.2	0.3	A	R	03/08/18	B-4 / B-5	202017072515	64	0-5/N	G/6 E Side F-309A
B-1161	2	25.5	-5.0	-4.7	0.3	A	R	03/08/18	B-4 / B-5	202017072515	64	0-5/N	G/6 E Side F-309A
B-1163	2	50.9	-4.8	-4.5	0.3	A	R	03/08/18	B-4 / B-5	202017072515	64	0-5/N	G/5 E Side F-309A
B-1165	3	114.6	-4.7	-4.6	0.1	A	R	03/08/18	B-4 / B-5	202017072515	64	0-5/N	G/5 E Side F-309A
B-1167	2	50.9	0.8	1.2	0.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/4 E Side F-309A
B-1171	3	19.1	1.1	1.4	0.3	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/2 SE Side E-314
B-1173	1	6.4	0.9	1.3	0.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/2 SE Side E-314
B-1175	2	50.9	0.9	0.9	0	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1177	4	38.2	0.9	1.8	0.9	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/3 E Side E-314
B-1179	2	19.1	1.4	1.8	0.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/3 E Side E-314
B-1181	2	50.9	1.1	1.5	0.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1183	5	47.7	1.0	6.2	5.2	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/4 E Side E-314
B-1185	2	25.5	1.6	2.1	0.5	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1187	2	25.5	1.6	1.7	0.1	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/5 E Side E-314
B-1189	3	38.2	1.3	5.9	4.6	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1191	3	38.2	1.9	2.4	0.5	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/3 E Side E-314
B-1193	2	25.5	1.6	1.7	0.1	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/3 E Side E-314
B-1195	Unknown	Unknown	1.2	1.6	0.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/1 E Side E-314
B-1197	1	38.2	1.1	1.6	0.5	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/1 E Side E-314
B-1199	2	50.9	1.1	1.3	0.2	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1201	3	76.4	1.0	2.0	1	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1203	2	50.9	1.3	2.1	0.8	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1205	3	114.6	1.4	6.8	5.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/3 E Side E-314
B-1207	3	76.4	1.6	5.3	3.7	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1209	3	114.6	1.8	2.2	0.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/3 E Side E-314
B-1211	2	50.9	1.7	5.4	3.7	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1213	2	76.4	1.8	1.8	0	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/5 E Side E-314
B-1215	2	50.9	1.5	2.7	1.2	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/5 E Side E-314
B-1217	2	76.4	1.7	2.0	0.3	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/5 E Side E-314
B-1219	1	25.5	1.7	1.7	0	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1221	2	50.9	1.6	1.9	0.3	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1223	1	38.2	1.5	2.0	0.5	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/3 E Side E-314
B-1225	3	76.4	1.6	5.4	3.8	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1227	3	76.4	1.9	2.2	0.3	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1229	1	38.2	-4.5	-4.4	0.1	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/2 East side E-314
B-1231	2	50.9	-4.6	-4.3	0.3	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1233	1	25.5	-4.6	-4.4	0.2	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1235	2	76.4	-4.6	-4.5	0.1	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/4 East side E-314
B-1237	1	19.1	-4.6	-4.4	0.2	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/1 East side E-314
B-1239	2	50.9	-4.6	-4.1	0.5	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1241	2	50.9	-4.6	-4.2	0.4	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1243	3	38.2	-4.5	-4.2	0.3	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/1 East side E-314
B-1245	1	12.7	-1.2	-1.2	0	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/1 East side E-314
B-1247	2	50.9	-1.5	-1.3	0.2	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1249	1	38.2	-1.6	-0.3	1.3	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/0 East side E-314

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1251	3	28.6	-1.5	0.2	1.7	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/5 East side E-314
B-1253	3	38.2	-0.8	-0.8	0	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	No bonnet
B-1255	2	19.1	-1.1	-1.0	0.1	A	R	03/09/18	B-4 / B-5	202017072540	46	3/SSW	G/6 East side E-314
B-1257	3	28.6	-1.1	-1.1	0	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	G/4 East side E-314
B-1259	1	9.5	-1.5	-0.9	0.6	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	G/3 East side E-314
B-1261	2	38.2	-1.9	-1.2	0.7	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	No bonnet
B-1263	1	19.1	-1.6	-1.2	0.4	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	No bonnet
B-1265	2	76.4	-1.5	-1.4	0.1	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	G/5 East side E-314
B-1267	3	76.4	-2.0	-1.9	0.1	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	G/6 Above G-306
B-1269	2	50.9	-2.2	-2.1	0.1	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	G/7 NW side G-306
B-1271	1	25.5	-2.2	-2.1	0.1	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	G/7 NW side G-306
B-1273	6	5.7	-2.3	-1.3	1	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	G/8 5 feet NW G-306
B-1275	3	14.3	-1.6	-0.6	1	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	1/1 15 feet SW D-303
B-1277	4	19.1	-1.2	4.4	5.6	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	1/1 15 feet SW D-303
B-1279	4	19.1	-0.3	-0.3	0	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	1/3 15 feet SW D-303
B-1281	2	9.5	-0.8	-0.6	0.2	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	1/3 15 feet SW D-303
B-1283	Unknown	Unknown	-1.0	-0.8	0.2	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	1/5 15 feet SW D-303
B-1285	3	14.3	-1.2	-0.5	0.7	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	1/3 15 feet SW D-303
B-1287	2	9.5	-1.1	-0.9	0.2	A	R	03/09/18	B-4 / B-5	202017072540	58	3/SSW	1/4 15 feet SW D-303
B-1289	1	9.5	0.4	0.5	0.1	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/1 15 feet SW E-116
B-1291	2	50.9	0.7	0.5	0	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	No bonnet
B-1293	2	9.5	0.3	0.6	0.3	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/4 15 feet SW E-116
B-1295	1	25.5	0.5	1.0	0.5	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/4 15 feet SW E-116
B-1297	2	19.1	0.4	1.1	0.7	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/2 15 feet SW E-116
B-1299	1	19.1	1.0	1.6	0.6	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/4 15 feet SW E-116
B-1301	1	25.5	0.7	1.5	0.8	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/4 15 feet SW E-116
B-1303	2	25.5	1.7	0.7	0	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	No bonnet
B-1305	2	19.1	0.6	1.6	1	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/6 15 feet SW E-116
B-1307	2	19.1	0.9	0.8	0	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/6 15 feet SW E-116
B-1309	2	19.1	0.5	1.0	0.5	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/6 15 feet SW E-116
B-1311	1	19.1	0.5	0.5	0	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	G/5 15 feet SW E-116
B-1313	2	4.8	0.6	1.4	0.8	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	2/1 S side D-303
B-1315	4	9.5	1.2	1.7	0.5	A	R	03/12/18	B-1 / B-3	202017072540	50	2/E	2/1 S side D-303
B-1317	2	4.8	1.4	3.1	1.7	A	R	03/12/18	B-1 / B-3	202017072540	65	7/E	2/1 S side D-303
B-1319	6	14.3	1.7	3.3	1.6	A	R	03/12/18	B-1 / B-3	202017072540	65	7/E	2/1 S side D-303
B-1321	3	7.2	2.3	2.8	0.5	A	R	03/12/18	B-1 / B-3	202017072540	65	7/E	2/1 S side D-303
B-1323	3	7.2	2.7	45.7	43	A	R	03/12/18	B-1 / B-3	202017072540	65	7/E	2/1 S side D-303
B-1325	4	9.5	1.1	1.3	0.2	A	R	03/12/18	B-1 / B-3	202017072540	65	7/E	2/1 S side D-303
B-1327	1	19.1	0.9	1.4	0.5	A	R	03/12/18	B-1 / B-3	202017072540	65	7/E	No bonnet
B-1329	4	76.4	1.3	85.0	83.7	A	R	03/12/18	B-1 / B-3	202017072540	65	7/E	2/1 S side D-303
B-1331	1	25.5	1.3	1.3	0	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/1 S side E-614A
B-1333	1	25.5	1.2	1.3	0.1	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/1 S side E-614A
B-1335	4	19.1	1.3	1.6	0.3	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/6 G-612
B-1339	6	28.6	1.4	2.3	0.9	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/5 G-612
B-1343	1	4.8	1.4	1.5	0.1	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/5 G-612
B-1345	1	4.8	1.5	1.6	0.1	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/3 N side G-612
B-1347	2	6.4	1.5	1.7	0.2	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/3 N side G-612
B-1349	2	6.4	1.4	1.9	0.5	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/4 N side G-612
B-1351	3	9.5	1.4	1.6	0.2	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/5 N side G-612
B-1355	2	6.4	1.4	1.6	0.2	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/5 N side G-612
B-1357	3	7.2	1.3	1.7	0.4	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/6 N side G-615A
B-1359	2	4.8	1.5	1.7	0.2	A	R	03/19/18	B-6 / B-1	202016121827	50	0-5/NA	G/6 N side G-615A
B-1361	1	2.4	1.5	1.5	0	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/6 N side G-615A
B-1363	1	2.4	1.5	1.7	0.2	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/5 N side G-615A
B-1365	2	19.1	1.5	1.7	0.2	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/5 N side G-617A
B-1369	1	9.5	1.5	1.6	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/5 N side G-617A
B-1371	2	19.1	1.6	1.7	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/5 N side G-617A
B-1373	3	28.6	1.6	1.7	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/5 N side G-617A
B-1377	1	19.1	1.6	1.7	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/6 N side G-617A
B-1379	1	9.5	1.6	1.8	0.2	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/6 N side G-617A
B-1381	2	19.1	1.7	1.8	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/6 N side G-617A
B-1383	2	19.1	1.7	1.8	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/6 N side G-617A
B-1387	1	9.5	1.9	2.0	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/5 N side G-617A
B-1389	1	9.5	1.8	1.9	0.1	A	R	03/19/18	B-6 / B-1	202016121827	55	0-5/NA	G/6 N side G-617A
B-1391	2	9.5	-0.9	-0.5	0.4	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/3 15 feet N B-601
B-1395	2	9.5	-0.8	-0.5	0.3	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/3 15 feet N B-601
B-1397	1	4.8	-0.7	-0.7	0	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/3 15 feet N B-601
B-1399	2	50.9	-0.9	-0.7	0.2	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/2 15 feet N B-601
B-1403	1	25.5	-0.7	-0.7	0	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/2 15 feet N B-601
B-1405	3	14.3	-0.8	-0.5	0.3	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/3 12 feet N B-601
B-1409	1	4.8	-0.8	-0.7	0.1	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/3 10 feet N B-601
B-1411	1	4.8	-0.8	-0.7	0.1	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/3 12 feet N B-601
B-1413	4	19.1	-0.8	-0.7	0.1	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/6 10 feet N B-601
B-1417	1	4.8	-0.8	-0.8	0	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/6 10 feet N B-601
B-1419	1	4.8	-0.8	-0.8	0	A	R	03/19/18	B-7 / B-8	202016121827	58	5-10/NA	G/6 10 feet N B-601

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1421	2	50.9	-0.9	-0.9	0	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/2 10 feet N G-601
B-1425	0.5	12.7	-0.9	-0.6	0.3	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/2 10 feet N G-601
B-1427	4	19.1	-0.9	-0.8	0.1	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/3 10 feet N G-601
B-1431	1	4.8	-1.0	-0.9	0.1	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/3 10 feet N G-601
B-1433	2	9.5	-0.9	-0.9	0	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/3 10 feet N G-601
B-1435	4	25.5	-0.9	-0.8	0.1	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/4 10 feet N G-601
B-1439	1	6.4	-1.1	-1.0	0.1	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/4 10 feet N G-601
B-1441	2	12.7	-1.0	-0.9	0.1	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/4 10 feet N G-601
B-1443	3	32.7	-1.1	-0.8	0.3	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/5 10 feet N G-601
B-1447	1	38.2	-0.9	-0.8	0.1	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/5 10 feet N G-601
B-1449	1	38.2	-1.0	-0.9	0.1	A	R	03/19/18	B-7 / B-8	202016121827	60	10/S	G/5 10 feet N G-601
B-1451	3	76.4	0.8	0.7	0	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/3 10 feet N G-601
B-1455	2	50.9	0.8	0.7	0	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/3 10 feet N G-601
B-1457	1	9.5	0.8	0.8	0	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/3 10 feet N G-601
B-1459	1	76.4	0.6	0.7	0.1	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/3 10 feet N G-601
B-1461	0.5	38.2	0.6	0.9	0.3	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/3 10 feet N G-601
B-1463	1	9.5	0.9	0.9	0	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/3 10 feet N G-601
B-1465	1	9.5	0.6	0.8	0.2	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/3 10 feet N G-601
B-1467	1	38.2	0.7	0.7	0	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/4 10 feet N G-601
B-1469	1	38.2	0.7	0.7	0	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/4 10 feet N G-601
B-1471	1	38.2	0.8	0.9	0.1	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/4 10 feet N G-601
B-1473	1	38.2	0.7	0.9	0.2	A	R	03/19/18	B-7 / B-8	202016121827	61	10/S	G/4 10 feet N G-601
B-1475	4	12.7	1.0	1.1	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	No bonnet
B-1477	1	19.1	1.1	1.1	0	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	No bonnet
B-1479	1	38.2	1.1	1.1	0	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	No bonnet
B-1481	1	38.2	1.1	1.2	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	No bonnet
B-1483	4	12.7	1.1	1.2	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/5 S side E-616
B-1485	2	25.5	1.1	1.2	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/3 SE side E-616
B-1487	2	12.7	1.1	1.3	0.2	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/3 SE side E-616
B-1489	3	9.5	1.2	1.3	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/3 E side E-616
B-1491	3	9.5	1.2	1.4	0.2	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/3 E side E-616
B-1493	7	22.3	1.4	1.7	0.3	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/3 S side E-616
B-1495	2	9.5	1.4	1.8	0.4	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/2 S side E-616
B-1497	3	57.3	1.5	1.6	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/2 S side E-616
B-1499	2	38.2	1.6	1.8	0.2	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/1 S side E-616
B-1501	5	15.9	1.7	1.8	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/4 S side E-616
B-1503	4	19.1	1.6	1.7	0.1	A	R	03/21/18	B-6 / B-2	202017072515	54	0-5/NA	1/4 S side E-616
B-1505	1	19.1	-2.2	-2.0	0.2	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1507	2	38.2	-2.1	-1.9	0.2	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1509	2	19.1	-2.0	-1.8	0.2	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	1/3 W side F-612
B-1511	2	19.1	-2.2	-2.0	0.2	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	1/3 W side F-612
B-1513	3	28.6	-2.2	3.6	5.8	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	1/2 W side F-612
B-1515	1	12.7	-1.3	-1.4	0	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1517	1	19.1	-1.8	-1.5	0.3	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1519	1	19.1	-1.3	-1.2	0.1	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1521	2	25.5	-1.4	-1.4	0	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1523	2	50.9	-1.4	-1.1	0.3	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1525	2	50.9	-1.3	-1.3	0	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1527	2	50.9	-1.4	-1.2	0.2	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	1/6 W side F-612
B-1529	2	50.9	-1.2	-1.2	0	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	1/6 W side F-612
B-1531	2	38.2	-1.3	-1.2	0.1	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	No bonnet
B-1533	3	9.5	-1.7	-1.2	0.5	A	R	03/21/18	B-6 / B-2	202017072515	55	0-5/NA	T/3 E side D-604
B-1535	2	38.2	-1.6	-1.2	0.4	A	R	03/21/18	B-6 / B-2	202017072515	57	0-5/NA	T/1 E side D-604
B-1537	4	19.1	-1.5	-1.1	0.4	A	R	03/21/18	B-6 / B-2	202017072515	57	0-5/NA	T/1 E side D-604
B-1539	2	9.5	-1.5	-1.5	0	A	R	03/21/18	B-6 / B-2	202017072515	57	0-5/NA	T/1 E side D-604
B-1541	3	9.5	-1.7	-1.6	0.1	A	R	03/21/18	B-6 / B-2	202017072515	57	0-5/NA	T/3 E side D-604
B-1543	4	25.5	-1.8	-1.8	0	A	R	03/21/18	B-6 / B-2	202017072515	57	0-5/NA	T/7 E side D-604
B-1545	2	50.9	0.6	0.8	0.2	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	1/1 S side D-604
B-1547	2	38.2	0.6	1.0	0.4	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	1/1 S side D-604
B-1549	1	19.1	0.6	1.0	0.4	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	1/6 S side D-604
B-1551	2	38.2	0.7	0.7	0	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	1/6 S side D-604
B-1553	4	101.9	0.7	0.9	0.2	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1555	0.5	12.7	0.7	0.7	0	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1557	2	50.9	0.7	0.9	0.2	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1559	2	38.2	1.1	1.1	0	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1561	3	76.4	0.7	1.7	1	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1563	2	76.4	0.8	0.9	0.1	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1565	3	14.3	1.0	1.3	0.3	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1567	3	76.4	0.8	0.9	0.1	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1569	1	25.5	0.8	0.9	0.1	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1571	4	19.1	0.9	0.9	0	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1573	7	178.3	0.9	1.2	0.3	A	R	03/26/18	B-7 / B-9	202016121827	44	10/NE	
B-1575	1	25.5	1.1	1.0	0	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	No bonnet
B-1577	1	25.5	1.0	1.2	0.2	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1579	2	38.2	1.0	1.0	0	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1581	2	38.2	0.9	1.3	0.4	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1583	2	50.9	1.0	1.1	0.1	P	R	03/26/18	B-7 / B-9	202016121827	58	10/N	Bonnet Insulated
B-1585	2	50.9	1.0	1.0	0	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1587	2	50.9	1.0	1.0	0	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1589	5	4.0	1.0	1.2	0.2	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1591	5	4.0	0.8	0.9	0.1	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1593	3	14.3	0.9	1.0	0.1	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1595	4	7.6	2.0	2.0	0	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1597	2	3.8	0.7	0.8	0.1	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1599	3	5.7	0.7	0.9	0.2	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1601	2	50.9	0.7	0.8	0.1	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1603	1	25.5	0.8	0.8	0	A	R	03/26/18	B-7 / B-9	202016121827	58	10/N	
B-1605	1	25.5	0.6	0.7	0.1	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1607	1	38.2	0.6	0.7	0.1	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1609	0.5	19.1	0.6	0.6	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1611	1	38.2	0.6	0.6	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1613	1	38.2	0.4	0.5	0.1	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1615	1	38.2	0.5	0.5	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1617	2	76.4	0.5	0.5	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1619	2	76.4	0.6	0.6	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1621	1	38.2	0.5	0.5	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1623	0.5	19.1	0.5	0.6	0.1	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1625	0.5	19.1	0.5	0.6	0.1	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1627	2	76.4	0.5	0.6	0.1	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1629	1	38.2	0.4	0.6	0.2	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1631	0.5	19.1	0.8	0.8	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1633	1	38.2	0.5	0.5	0	A	R	03/26/18	B-7 / B-9	202016121827	60	10/N	
B-1635	1	3.2	1.0	1.0	0	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1637	1	25.5	0.6	0.7	0.1	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1639	0.5	12.7	0.5	0.6	0.1	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1641	3	9.5	0.6	0.6	0	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1643	2	3.8	0.4	0.5	0.1	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1645	1	38.2	0.4	0.4	0	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	No bonnet
B-1647	2	76.4	0.4	0.5	0.1	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1649	2	3.8	0.5	0.5	0	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1651	1	38.2	0.5	0.5	0	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1653	1	38.2	0.5	0.5	0	A	R	03/26/18	B-7 / B-9	202016121827	61	10/N	
B-1655	0.5	6.4	-0.8	-0.8	0	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	Swapped for TVA #2515
B-1657	1	12.7	-0.7	-0.7	0	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1659	2	6.4	-0.7	-0.7	0	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1661	1	25.5	-0.7	-0.7	0	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1663	1	25.5	-0.7	-0.7	0	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1665	2	6.4	-0.7	-0.7	0	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1667	1	25.5	-0.7	-0.7	0	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1669	1	38.2	-0.7	-0.5	0.2	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1671	1	38.2	-0.7	-0.6	0.1	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1673	4	12.7	-0.7	-0.5	0.2	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1675	2	50.9	-0.6	-0.4	0.2	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1677	1	25.5	-0.7	-0.6	0.1	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1681	2	6.4	-0.7	-0.4	0.3	A	R	03/26/18	B-7 / B-9	202017072515	61	10/N	
B-1683	1	19.1	0.6	0.8	0.2	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1685	1	19.1	0.6	0.7	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1687	2	50.9	0.6	0.7	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1689	1	25.5	0.5	0.6	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	No bonnet
B-1691	1	38.2	0.5	0.6	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1693	0.5	19.1	0.6	0.6	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1695	1	1.9	0.6	0.7	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1697	1	19.1	0.5	0.6	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1699	0.5	19.1	0.5	0.5	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1701	2	6.4	0.5	0.6	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1703	2	50.9	0.5	0.5	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1705	1	38.2	0.5	0.5	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1707	2	6.4	0.5	1.0	0.5	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1709	2	1.6	0.7	0.8	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1711	2	76.4	1.7	1.7	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1713	1	38.2	0.5	0.5	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1715	1	38.2	0.5	0.5	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1717	2	76.4	0.5	1.5	1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1719	1	38.2	0.5	0.5	0	P	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	Packing and bonnet under insulation
B-1721	2	25.5	0.5	1.1	0.6	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1723	2	19.1	0.5	1.2	0.7	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1725	1	9.5	0.4	0.6	0.2	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1727	1	25.5	0.4	0.9	0.5	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1729	1	38.2	0.5	0.5	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1731	1	9.5	0.4	0.6	0.2	P	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	Bonnet Insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1733	1	9.5	0.4	0.4	0	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1735	0.5	12.7	0.4	0.6	0.2	P	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	Packing and bonnet under insulation
B-1737	1	12.7	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1739	1	9.5	0.3	0.7	0.4	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1741	1	9.5	0.5	0.6	0.1	A	R	03/27/18	B-5 / B-7	202016121827	50	2/SW	
B-1743	2	50.9	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1745	1	21.2	0.4	0.4	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1747	1	19.1	0.3	0.4	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1749	1	19.1	0.4	0.4	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1751	0.5	12.7	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	No bonnet
B-1753	0.5	19.1	0.5	0.5	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1755	1	9.5	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1757	1	9.5	0.4	0.5	0.1	P	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	Bonnet Insulated
B-1759	1	38.2	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1761	1	38.2	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1763	1	76.4	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1765	1	9.5	0.4	0.5	0.1	P	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	Bonnet Insulated
B-1767	1	38.2	0.4	0.6	0.2	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1769	1	38.2	0.4	0.5	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1771	1	9.5	0.4	0.6	0.2	P	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	Bonnet Insulated
B-1773	1	19.1	0.4	0.7	0.3	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1775	1	19.1	0.6	0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1777	2	38.2	1.4	1.4	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1779	1	38.2	1.2	1.2	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1781	1	38.2	1.2	1.3	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1783	1	38.2	1.1	1.2	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1785	1	38.2	1.1	1.2	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	No bonnet
B-1787	1	38.2	1.1	1.1	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1789	1	38.2	1.1	1.3	0.2	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1791	1	9.5	1.1	1.5	0.4	P	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	Bonnet Insulated
B-1793	1	38.2	1.0	1.1	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1795	1	38.2	1.0	1.0	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1797	1	9.5	0.9	1.0	0.1	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	No bonnet
B-1799	1	38.2	0.9	0.9	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1801	1	38.2	0.9	0.9	0	A	R	03/27/18	B-5 / B-7	202017072540	50	2/SW	
B-1803	2	76.4	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1805	1	38.2	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1807	1	38.2	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1809	1	38.2	-0.9	-0.8	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1811	1	38.2	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1813	1	38.2	-0.8	-0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1815	1	38.2	-0.8	-0.6	0.2	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1817	2	76.4	-0.7	-0.6	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1819	1	38.2	-0.9	-0.6	0.3	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1821	1	76.4	-0.8	-0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1823	1	9.5	-0.8	-0.7	0.1	P	R	03/27/18	B-5 / B-7	202017072515	66	6/N	Bonnet Insulated
B-1825	2	76.4	-0.8	-0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1827	1	25.5	-0.7	-0.7	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1829	1	38.2	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1831	1	9.5	-0.8	-0.8	0	P	R	03/27/18	B-5 / B-7	202017072515	66	6/N	Bonnet Insulated
B-1833	1	25.5	-0.9	-0.7	0.2	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	No bonnet
B-1835	2	50.9	-0.9	-0.4	0.5	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1837	1	38.2	-0.8	-0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1839	0.5	19.1	-0.8	-0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1841	1	38.2	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1843	1	38.2	-0.8	-0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1845	1	19.1	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1847	1	9.5	-0.8	-0.7	0.1	P	R	03/27/18	B-5 / B-7	202017072515	66	6/N	Bonnet Insulated
B-1849	1	25.5	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1851	1	38.2	-0.8	-0.7	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1853	1	9.5	-0.9	-0.7	0.2	P	R	03/27/18	B-5 / B-7	202017072515	66	6/N	Bonnet Insulated
B-1855	0.5	19.1	-0.8	-0.8	0	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1857	0.5	19.1	-0.9	-0.8	0.1	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1859	0.5	19.1	-1.0	-0.8	0.2	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1861	1	38.2	-1.0	-0.8	0.2	A	R	03/27/18	B-5 / B-7	202017072515	66	6/N	
B-1863	1	38.2	-1.4	-1.4	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1865	1	38.2	-1.4	-1.4	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1867	1	38.2	-1.5	-1.4	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1869	1	38.2	-1.5	-1.4	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1871	1	38.2	-1.5	-1.4	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1873	1	38.2	-1.5	-1.4	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1875	1	38.2	-1.5	-1.3	0.2	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1877	1	38.2	-1.4	-1.4	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1879	1	38.2	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1881	1	38.2	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1883	1	38.2	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1885	1	38.2	-1.4	-1.4	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1887	1	38.2	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1889	1	38.2	-1.4	-1.4	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1891	1	38.2	-1.5	-1.3	0.2	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1893	1	38.2	-1.5	-1.5	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1895	1	38.2	-1.5	-1.5	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1897	1	38.2	-1.5	-1.5	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1899	0.5	19.1	-1.5	-1.4	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1901	0.5	19.1	-1.4	-1.4	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1903	0.5	19.1	-1.5	-1.5	0	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1905	1	38.2	-1.5	-1.4	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1907	1	38.2	-1.5	-1.4	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1909	1	38.2	-1.6	-1.4	0.2	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1911	1	38.2	-1.6	-1.5	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1913	1	9.5	-1.5	-1.3	0.2	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1915	1	9.5	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1917	1	9.5	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1919	1	9.5	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1921	1	9.5	-1.4	-1.3	0.1	A	R	03/27/18	B-5 / B-7	202016121827	66	6/N	
B-1923	1	38.2	0.8	0.9	0.1	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	No bonnet
B-1925	1	38.2	0.5	0.7	0.2	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1927	2	76.4	0.5	0.7	0.2	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1929	1	9.5	0.4	0.6	0.2	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1931	1	9.5	0.3	0.3	0	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1933	2	19.1	0.5	0.9	0.4	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1935	2	6.4	0.9	0.9	0	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1937	3	9.5	0.6	0.6	0	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1939	1	38.2	0.3	0.4	0.1	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	No bonnet
B-1941	1	38.2	0.4	0.5	0.1	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1943	2	6.4	0.4	0.4	0	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1945	2	6.4	0.4	0.5	0.1	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1947	2	6.4	0.3	0.5	0.2	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1949	2	6.4	0.2	0.4	0.2	A	R	03/28/18	B-5 / B-7 / B-6	202017072540	52	4/SE	
B-1951	2	6.4	0.3	0.3	0	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1953	2	6.4	0.3	0.5	0.2	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1955	2	6.4	0.4	0.4	0	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1957	1	38.2	0.4	0.5	0.1	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	No bonnet
B-1959	1	38.2	0.4	0.4	0	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1961	3	9.5	0.3	0.4	0.1	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1963	3	9.5	0.4	0.7	0.3	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1965	1	4.8	0.6	0.7	0.1	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1967	1	4.8	0.6	0.7	0.1	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1969	1	25.5	0.2	0.1	0	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	No bonnet
B-1971	0.5	12.7	0.2	0.2	0	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1973	1	3.2	0.2	0.3	0.1	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1975	2	6.4	0.1	0.4	0.3	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1977	1	6.4	0.2	0.3	0.1	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1979	2	12.7	0.3	0.4	0.1	A	R	03/28/18	B-5 / B-6	202017072540	52	0-5/NA	
B-1981	1	6.4	-0.3	-0.2	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1983	2	6.4	-0.1	-0.1	0	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1985	1	3.2	-0.3	-0.1	0.2	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1987	1	25.5	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1989	2	50.9	-0.4	-0.1	0.3	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1991	2	9.5	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1993	2	9.5	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1995	1	3.2	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1997	1	6.4	-0.3	-0.2	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	
B-1999	1	38.2	-0.4	-0.3	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	Fin Fan Plug
B-2001	1	38.2	-0.4	0.0	0.4	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	Fin Fan Plug
B-2003	1	38.2	-0.1	-0.1	0	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	Fin Fan Plug
B-2005	1	38.2	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	Fin Fan Plug
B-2007	1	38.2	-0.1	-0.1	0	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	Fin Fan Plug
B-2009	1	38.2	-0.4	-0.1	0.3	A	R	03/28/18	B-5 / B-7	202017072515	61	15/W	Fin Fan Plug
B-2011	1	38.2	-0.5	-0.3	0.2	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2013	1	38.2	-0.4	-0.2	0.2	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2015	1	38.2	-0.4	-0.1	0.3	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2017	1	38.2	-0.3	-0.3	0	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2019	1	38.2	-0.2	-0.2	0	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2021	1	38.2	-0.2	-0.2	0	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2023	1	38.2	-0.4	-0.1	0.3	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2025	1	38.2	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2027	1	38.2	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2029	1	38.2	-0.2	-0.2	0	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2031	1	38.2	-0.2	-0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-2033	1	38.2	-0.3	-0.2	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2035	1	38.2	-0.4	-0.2	0.2	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2037	1	38.2	-0.3	-0.2	0.1	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2039	1	38.2	-0.2	-0.2	0	A	R	03/28/18	B-5 / B-7	202017072515	61	10/W	Fin Fan Plug
B-2041	1	38.2	0.1	0.3	0.2	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2043	1	38.2	0.2	0.2	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2045	1	38.2	0.2	0.2	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2047	1	38.2	0.2	0.2	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2049	1	38.2	0.2	0.3	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2051	1	38.2	0.1	0.3	0.2	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2053	1	38.2	0.2	0.2	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2055	1	38.2	0.2	0.3	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2057	1	38.2	0.2	0.4	0.2	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2059	1	38.2	0.2	0.3	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Fin Fan Plug
B-2061	2	19.1	0.2	0.3	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2063	2	12.7	0.1	0.2	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2065	2	6.4	0.1	0.3	0.2	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2067	2	6.4	0.2	0.3	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2069	2	6.4	0.2	0.2	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2071	1	19.1	0.2	0.2	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	No bonnet
B-2073	1	38.2	0.0	0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2075	1	3.2	0.0	0.6	0.6	P	R	03/28/18	B-5 / B-7	202017072540	71	5/E	Bonnet Insulated
B-2077	3	9.5	0.0	0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2079	2	6.4	0.1	0.1	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2081	1	3.2	0.0	0.1	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2083	2	6.4	0.1	0.1	0	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2085	2	6.4	-0.1	0.0	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2087	2	6.4	-0.1	0.0	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2089	2	6.4	-0.1	0.0	0.1	A	R	03/28/18	B-5 / B-7	202017072540	71	5/E	
B-2101	1	Unknown	1.0	5.0	4	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2103	1	Unknown	1.1	1.3	0.2	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2105	2	Unknown	0.5	0.6	0.1	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2107	2	Unknown	0.6	0.6	0	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2109	2	Unknown	0.5	0.6	0.1	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2111	2	Unknown	0.5	0.7	0.2	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2113	1	Unknown	0.6	0.6	0	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2115	2	Unknown	0.5	0.6	0.1	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2117	2	Unknown	0.6	1.7	1.1	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2119	4	Unknown	0.6	0.9	0.3	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2121	2	Unknown	1.2	3.0	1.8	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2123	2	Unknown	1.1	1.7	0.6	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2125	1	Unknown	1.1	1.4	0.3	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2127	2	Unknown	1.1	1.7	0.6	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2129	1	Unknown	1.0	1.5	0.5	A	R	03/29/18	B-5 / B-7	202017072540	56	4/SSE	
B-2131	3	Unknown	1.1	1.8	0.7	A	R	03/29/18	B-5 / B-2	202017072540	78	4/SSE	
B-2133	4	Unknown	1.2	4.4	3.2	A	R	03/29/18	B-5 / B-2	202017072540	78	4/SSE	
B-2135	4	Unknown	1.0	4.2	3.2	A	R	03/29/18	B-5 / B-2	202017072540	78	4/SSE	
B-2137	2	Unknown	0.3	1.0	0.7	A	R	03/29/18	B-5 / B-2	202017072540	78	4/SSE	
B-2139	2	Unknown	0.5	5.6	5.1	A	R	03/29/18	B-5 / B-2	202017072540	78	4/SSE	
B-2	6	2.4	1.4	1.6	0.2	A	D	06/27/17	AD-5 / AD-4	20	70	W	T1= First deck from Top
B-4	2	6.4	1.4	1.5	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	W	P-11-008
B-6	1	9.5	1.4	1.4	0	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-8	2	19.1	1.3	1.5	0.2	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-10	1	9.5	1.2	1.4	0.2	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-12	2	19.1	1.4	1.4	0	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-14	1	9.5	1.4	1.5	0.1	P	D	06/27/17	AD-5 / AD-4	20	70	W	Bonnet inaccessible
B-16	1	19.1	1.4	1.4	0	A	D	06/27/17	AD-5 / AD-4	20	70	W	Welded Bonnet
B-18	1	9.5	1.4	1.7	0.3	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-20	1	19.1	1.3	1.3	0	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-22	4	6.4	1.3	2.1	0.8	A	D	06/27/17	AD-5 / AD-4	20	70	W	P-11-001
B-24	5	2.0	1.3	1.5	0.2	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-26	2	25.5	1.3	1.4	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-28	1	12.7	1.3	1.4	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	W	
B-30	4	6.4	1.3	1.5	0.2	A	D	06/27/17	AD-5 / AD-4	20	70	W	P-11-001
B-32	1	9.5	1.4	1.5	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	SW	P-11-006
B-34	3	4.8	2.1	2.1	0	A	D	06/27/17	AD-5 / AD-4	20	70	SW	TVA #20 P-10-006
B-36	1	9.5	2.0	2.1	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-38	1	9.5	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-40	1	9.5	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-42	1	9.5	1.9	2.0	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-44	1	9.5	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-46	5	2.0	2.0	2.1	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-48	1	19.1	1.9	2.0	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	SW	Welded Bonnet
B-50	1	19.1	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-52	1	9.5	2.0	2.0	0	P	D	06/27/17	AD-5 / AD-4	20	70	SW	Bonnet Inaccessible 8LT--59

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-54	1	9.5	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-56	1	9.5	1.9	2.0	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	SW	
B-58	1	9.5	2.0	2.0	0	P	D	06/27/17	AD-5 / AD-4	20	70	SW	Bonnet Partially Inaccessible
B-60	1	9.5	2.0	2.1	0.1	A	D	06/27/17	AD-5 / AD-4	20	70	SW	P-11-001
B-62	1	50.9	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-64	1	50.9	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-66	2	1.6	1.9	2.0	0.1	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	P-10-001
B-68	1	9.5	1.8	2.1	0.3	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-70	1	9.5	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-72	1	9.5	2.0	2.0	0	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-74	3	2.4	1.8	2.1	0.3	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	P-10-001
B-76	4	1.6	2.0	2.1	0.1	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-78	1	4.8	1.9	2.0	0.1	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	P-10-004
B-80	4	1.6	1.9	2.1	0.2	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-82	4	1.6	1.9	2.1	0.2	A	D	06/27/17	AD-5 / AD-4	20	75	10/SW	
B-84	1	19.1	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SW	Welded Bonnet
B-86	1	9.5	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SW	
B-88	1	9.5	0.1	0.2	0.1	A	D	06/27/17	AD-5 / AD-4	19	75	10/SW	
B-90	2	38.2	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	
B-92	1	19.1	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	
B-94	1	9.5	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	
B-96	1	9.5	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	
B-98	0.5	9.5	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	
B-100	1	19.1	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	
B-102	1	50.9	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	
B-104	1	6.4	0.1	0.1	0	A	D	06/27/17	AD-5 / AD-4	19	75	10/SSW	P-13-009
B-106	3	7.2	1.5	1.6	0.1	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	TVA #19 P-13-008
B-108	2	4.8	1.5	1.5	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	TVA #19 P-13-008
B-110	2	19.1	1.5	1.5	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	TVA #19 P-13-008
B-112	2	4.8	1.5	1.5	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	TVA #19 P-13-008
B-114	1	19.1	1.5	1.5	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Welded Bonnet P-13-008
B-116	2	4.8	1.5	1.5	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Welded Bonnet P-13-008
B-118	2	4.8	1.5	1.5	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Welded Bonnet P-13-008
B-120	1	9.5	1.5	1.5	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Second Platform up Bottom of Sight glass
B-122	1	9.5	1.4	1.6	0.2	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Welded Bonnet
B-124	1	9.5	1.4	1.4	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	
B-126	1	19.1	1.4	1.4	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Welded Bonnet
B-128	1	19.1	1.4	1.4	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Welded Bonnet
B-130	1	19.1	1.4	1.4	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	Welded Bonnet
B-132	1	19.1	1.4	1.4	0	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	
B-134	0.5	19.1	1.3	1.4	0.1	A	D	06/28/17	AD-5 / AD-4	19	60	7/SSW	
B-136	1	19.1	1.3	1.4	0.1	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	2nd Platform From Bottom of Sight glass
B-138	1	9.5	1.3	1.3	0	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	
B-140	0.5	19.1	1.2	1.3	0.1	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	Welded B
B-142	1	38.2	1.3	1.3	0	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	
B-144	0.5	19.1	1.2	1.3	0.1	P	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	Bonnet Partially Inaccessible
B-146	1	38.2	1.2	1.2	0	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	
B-148	1	9.5	1.3	1.3	0	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	
B-150	4	1.6	1.4	1.5	0.1	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	
B-152	2	9.5	1.3	1.3	0	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	Bottom Platform P-13-001
B-154	2	2.7	1.3	1.3	0	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	Bottom Platform P-13-001
B-156	2	4.8	1.2	1.2	0	A	D	06/28/17	AD-5 / AD-4	19	65	7/SSW	Bottom Platform P-13-001
B-158	2	3.2	1.3	1.4	0.1	A	D	06/28/17	AD-5 / AD-4	20	65	7/SSW	TVA #20 Exchanger E-836
B-160	1	19.1	1.3	1.4	0.1	A	D	06/28/17	AD-5 / AD-4	20	65	7/SSW	
B-162	1	19.1	1.3	1.4	0.1	A	D	06/28/17	AD-5 / AD-4	20	65	7/SSW	
B-164	8	15.3	1.2	216.1	214.9	A	D	06/28/17	AD-5 / AD-4	20	66	7/SSW	TVA #20 Exchanger E-836
B-166	2	3.8	1.9	1.9	0	A	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	TVA # 19 E-836
B-168	3	5.7	1.8	1.8	0	A	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	
B-170	1	19.1	1.7	1.8	0.1	A	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	
B-172	2	3.8	1.8	1.8	0	A	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	
B-174	1	1.9	1.7	1.7	0	P	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	Bonnet Partially inaccessible 8FV-136
B-176	1	19.1	1.7	1.8	0.1	A	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	Welded B
B-178	3	5.7	1.7	1.8	0.1	A	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	
B-180	4	7.6	1.8	1.8	0	A	D	06/28/17	AD-5 / AD-4	19	66	7/SSW	
B-182	0.5	9.5	1.0	1.1	0.1	A	D	06/28/17	AD-5 / AD-4	20	66	7/SSW	
B-184	1	38.2	1.0	1.0	0	A	D	06/28/17	AD-5 / AD-4	20	66	7/SSW	
B-186	1	19.1	1.0	1.1	0.1	A	D	06/28/17	AD-5 / AD-4	20	66	7/SSW	
B-188	1	76.4	1.0	1.1	0.1	A	D	06/28/17	AD-5 / AD-4	20	66	7/SSW	
B-190	3	5.7	1.0	1.1	0.1	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	TVA #20 P-10-005
B-192	1	1.9	1.1	1.2	0.1	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	P-10-005
B-194	1	19.1	1.0	1.0	0	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-196	2	3.2	1.0	1.0	0	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-198	0.5	4.8	1.0	1.2	0.2	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-200	0.5	4.8	1.0	1.1	0.1	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-202	2	3.8	1.0	1.2	0.2	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-204	2	3.8	1.1	1.2	0.1	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-206	1	19.1	1.1	1.2	0.1	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-208	5	15.9	1.0	1.2	0.2	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	To BPA FV-136
B-210	1	3.2	1.1	1.1	0	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-212	1	19.1	1.0	1.0	0	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	Welded Bonnet
B-214	2	6.4	1.0	1.1	0.1	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-216	1	19.1	1.0	1.0	0	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-218	6	114.6	1.0	14.4	13.4	A	D	06/28/17	AD-5 / AD-4	20	75	NA/SSW	
B-220	2	9.5	1.8	1.9	0.1	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	TVA #19
B-222	1	4.8	1.7	1.7	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-224	1	9.5	1.6	1.7	0.1	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	8FV-137
B-226	0.5	9.5	1.7	1.7	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	Welded B
B-228	1	19.1	1.6	1.7	0.1	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	Welded B
B-230	0.5	9.5	1.6	1.6	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-232	1	4.8	1.5	1.6	0.1	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-234	0.5	9.5	1.4	1.4	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-236	1	4.8	1.4	1.5	0.1	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-238	1	3.2	1.3	1.3	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-240	0.5	9.5	1.3	1.3	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-242	1	3.2	1.2	1.2	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-244	1	9.5	1.2	1.2	0	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	Welded B
B-246	7	66.8	1.2	62.2	61	A	D	06/28/17	AD-5 / AD-4	19	75	NA/SW	
B-248	4	19.1	0.8	1.8	1	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	TVA#20 P-11-006
B-250	2	9.5	1.0	1.1	0.1	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	
B-252	1	19.1	0.8	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	Welded Bonnet
B-254	1	6.4	0.8	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	8FV-135
B-256	1	6.4	0.7	0.7	0	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	
B-258	0.5	9.5	0.7	0.8	0.1	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	Welded Bonnet
B-260	2	9.5	0.7	0.8	0.1	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	
B-262	1	4.8	0.6	0.8	0.2	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	
B-264	0.5	9.5	0.6	0.6	0	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	Welded B
B-266	1	76.4	0.6	0.6	0	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	
B-268	1	19.1	0.6	0.6	0	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	
B-270	7	133.7	0.5	41.9	41.4	A	D	06/29/17	AD-5 / AD-4	20	69	NA/W	
B-272	1	4.8	1.0	1.2	0.2	A	D	06/29/17	AD-5 / AD-4	19	69	NA/W	TVA#19
B-274	6	28.6	1.0	9.8	8.8	A	D	06/29/17	AD-5 / AD-4	19	69	NA/W	
B-276	2	152.8	2.0	2.0	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	TVA#19
B-278-1	13	62.1	1.8	28.1	26.3	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	on bonnet: 28.1ppm on stem: 13.6 ppm
B-278-2	13	62.1	1.8	13.6	26.3	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	on bonnet: 28.1ppm on stem: 13.6 ppm
B-280	2	38.2	1.1	1.1	0	A	D	06/29/17	AD-5 / AD-4	20	70	NA/W	TVA #20
B-282	1	3.2	1.1	1.1	0	A	D	06/29/17	AD-5 / AD-4	20	70	NA/W	
B-284	2	19.1	1.0	1.1	0.1	A	D	06/29/17	AD-5 / AD-4	20	70	NA/W	
B-286	7	66.8	1.1	264.7	263.6	A	D	06/29/17	AD-5 / AD-4	20	70	NA/W	
B-288	2	6.4	1.7	1.7	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	TVA #19
B-290	5	15.9	1.4	3.9	2.5	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-292	1	19.1	1.7	1.7	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	Welded Bonnet
B-294	1	19.1	1.6	1.6	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-296	1	3.2	1.2	1.2	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-298	1	3.2	1.2	1.2	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-300	0.5	9.5	1.1	1.1	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	Welded Bonnet
B-302	5	15.9	1.1	2.2	1.1	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	TVA #19
B-304	0.5	9.5	1.0	1.0	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	Welded Bonnet
B-306	0.5	9.5	1.1	1.1	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-308	2	6.4	1.1	1.1	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-310	6	19.1	1.0	3.7	2.7	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-312	3	9.5	1.0	3.0	2	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-314	1	3.2	1.5	1.5	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-316	1	19.1	1.3	1.4	0.1	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-318	2	6.4	1.2	1.3	0.1	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-320	0.5	4.8	1.2	1.2	0	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-322	7	66.8	1.1	153.4	152.3	A	D	06/29/17	AD-5 / AD-4	19	70	NA/W	
B-324	2	9.5	0.9	1.7	0.8	A	D	06/29/17	AD-5 / AD-4	20	70	NA/W	TVA #20
B-326	1	4.8	0.9	0.9	0	A	D	06/29/17	AD-5 / AD-4	20	70	NA/W	
B-328	1	6.4	0.8	1.0	0.2	A	D	06/29/17	AD-5 / AD-4	20	70	NA/W	
B-330	1	6.4	0.8	0.9	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	
B-332	2	38.2	0.8	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	P-21-021
B-334	1	19.1	0.8	0.9	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	Welded Bonnet
B-336	1	19.1	0.8	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	Welded Bonnet
B-338	3	14.3	0.7	0.8	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	
B-340	1	4.8	0.8	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	
B-342	1	4.8	0.7	0.8	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	
B-344	1	19.1	0.8	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	
B-346	1	6.4	1.0	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	
B-348	3	14.3	0.8	2.1	1.3	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F-810 to u-200 Backwash from filters
B-350	1	19.1	0.8	1.0	0.2	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F-810 to u-200 Backwash from filters

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-352	0.5	9.5	0.9	0.9	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F-810 to u-200 Backwash from filters
B-354	0.5	9.5	0.9	0.9	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F-810 to u-200 Backwash from filters
B-356	1	6.4	0.8	0.9	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F-810 to u-200 Backwash from filters
B-358	2	12.7	0.8	0.9	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F-810 to u-200 Backwash from filters
B-360	2	38.2	0.7	0.9	0.2	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F-810 to u-200 Backwash from filters
B-362	2	9.5	0.7	0.8	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	5C-2 From PT-1
B-364	1	4.8	0.8	0.8	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	5C-2 From PT-1
B-366	1	19.1	0.8	0.9	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	Welded Bonnet
B-368	1	4.8	0.9	1.0	0.1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	Welded Bonnet
B-370	2	9.5	0.9	1.2	0.3	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	Welded Bonnet
B-372	1	19.1	0.9	0.9	0	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	Welded Bonnet
B-374	4	19.1	1.0	2.0	1	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	
B-376	2	9.5	0.8	1.0	0.2	A	D	06/29/17	AD-5 / AD-4	20	75	5/SSW	From F810- to u200 #7 Backwash from filters
B-378	3	57.3	0.2	0.9	0.7	A	D	06/29/17	AD-5 / AD-4	19	75	5/SSW	TVA #19 P-01-006, VTHGO -vacuum tower heavy gas oil
B-380	1	19.1	0.3	0.4	0.1	A	D	06/29/17	AD-5 / AD-4	19	75	5/SSW	
B-382	0.5	9.5	0.4	0.4	0	A	D	06/29/17	AD-5 / AD-4	19	75	5/SSW	
B-384	2	38.2	0.3	0.5	0.2	A	D	06/29/17	AD-5 / AD-4	19	75	5/SSW	
B-386	2	12.7	0.3	0.4	0.1	A	D	06/29/17	AD-5 / AD-4	19	75	5/SSW	HCGO from U-200
B-388	1	6.4	0.2	0.3	0.1	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	
B-390	0.5	9.5	0.2	0.2	0	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	
B-392	1	19.1	0.2	0.3	0.1	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	
B-394	2	12.7	0.2	0.3	0.1	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	
B-396	1	19.1	0.2	0.3	0.1	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	
B-398	1	19.1	0.2	0.2	0	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	Warm up oil from G- 312 to G-801 & 814
B-400	1	9.5	0.2	0.2	0	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	
B-402	3	7.2	0.1	0.3	0.2	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	VTHGO- from u-200 P-01-006
B-404	2	38.2	0.2	0.2	0	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	VTHGO- from u-200 P-01-006
B-406	2	4.8	0.1	0.3	0.2	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	VTHGO- from u-200 P-01-006
B-408	3	7.2	0.2	0.3	0.1	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	VTHGO- from u-200 P-01-006
B-410	1	19.1	0.1	0.1	0	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	VTHGO- from u-200 P-01-006
B-412	1	2.4	0.0	0.1	0.1	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	VTHGO- from u-200 P-01-006
B-414	1	19.1	0.0	0.2	0.2	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	VTHGO- from u-200 P-01-006
B-416	1	3.2	0.0	0.1	0.1	A	D	06/29/17	AD-5 / AD-4	19	Blank	Blank	ugo to Tank-280, UGO - unconverted gas oil
B-418	1	19.1	0.2	0.2	0	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to Tank-280
B-420	0.5	9.5	0.1	0.1	0	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to Tank-280
B-422	2	6.4	0.0	0.1	0.1	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to Tank-280
B-424	1	3.2	0.0	0.2	0.2	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to Tank-280
B-426	1	3.2	0.1	0.1	0	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to Tank-280
B-428	2	6.4	0.0	0.1	0.1	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to uk off grade
B-430	0.5	9.5	0.0	0.2	0.2	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to uk off grade
B-432	1	19.1	0.0	0.2	0.2	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to uk off grade
B-434	2	6.4	0.1	0.1	0	A	D	06/29/17	AD-5 / AD-4	19	80	6/SW	ugo to uk off grade
B-436	2	38.2	0.2	0.2	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	TVA #20
B-438	1	4.8	0.2	0.3	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-440	2	9.5	0.3	0.3	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-442	1	19.1	0.3	0.3	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-444	2	9.5	0.1	0.3	0.2	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-446	1	4.8	0.3	0.3	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-448	0.5	9.5	0.1	0.1	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	Welded Bonnet
B-450	0.5	9.5	0.0	0.0	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-452	2	6.4	0.0	0.0	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	P-10-007
B-454	1	3.2	0.0	0.1	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-456	0.5	9.5	0.0	0.0	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-458	2	6.4	0.0	0.1	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-460	0.5	1.6	0.1	0.1	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-462	0.5	9.5	0.1	0.1	0	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-464	4	76.4	0.1	3.5	3.4	A	D	07/05/17	AD-5 / AD-4	20	70	NA/W	
B-466	2	19.1	0.1	1.0	0.9	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	TVA#20 P-13-003
B-468	1	9.5	0.6	0.7	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-003
B-470	2	6.4	0.4	0.6	0.2	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-003
B-472	1	3.2	0.4	0.5	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-003
B-474	1	19.1	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-004
B-476	2	25.5	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-003
B-478	1	3.2	0.4	0.5	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-003
B-480	2	6.4	0.4	0.4	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-003
B-482	1	3.2	0.3	0.3	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-004
B-484	1	3.2	0.2	0.2	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	P-13-004
B-486	1	4.8	0.6	0.7	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	TVA #19
B-488	2	9.5	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-490	0.5	9.5	0.6	0.7	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	Welded B
B-492	0.5	4.8	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-494	2	9.5	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	TVA#19 @unit boundary (8FV048)
B-496	0.5	4.8	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-498	1	19.1	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-500	0.5	9.5	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-502	1	4.8	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-504	1	4.8	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-506	1	4.8	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-508	0.5	9.5	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-510	0.5	9.5	0.5	0.5	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-512	1	12.7	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-514	1	4.8	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-516	2	9.5	0.5	0.5	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-518	1	19.1	0.5	0.5	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-520	1	19.1	0.5	0.5	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-522	2	19.1	0.5	0.5	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	8FV-046
B-524	1	9.5	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	TVA #19
B-526	1	19.1	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	Welded B
B-528	2	9.5	0.6	0.6	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-530	1	4.8	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-532	1	19.1	0.5	0.5	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-534	0.5	9.5	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-536	1	9.5	0.5	0.6	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-538	1	2.4	0.5	0.5	0	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-540	2	4.8	0.4	0.5	0.1	A	D	07/05/17	AD-5 / AD-4	19	70	Blank	
B-542	2	6.4	1.5	1.6	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	TVA #20
B-544	0.5	9.5	1.4	1.5	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-546	2	6.4	1.5	1.5	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	8FV-047
B-548	1	3.2	1.4	1.6	0.2	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-550	0.5	9.5	1.4	1.4	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-552	2	4.8	1.5	1.5	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	TVA #20
B-554	1	2.4	1.4	1.4	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	ladder
B-556	1	12.7	1.4	1.5	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	ladder
B-558	1	12.7	1.5	1.5	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	ladder
B-560	1	3.2	1.4	1.5	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-562	2	9.5	2.2	2.7	0.5	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	recal #20 CV 8-FV-098
B-564	1	19.1	2.3	2.3	0	P	D	07/05/17	AD-5 / AD-4	20	70	Blank	Inaccessible Bonnet
B-566	1	19.1	2.3	2.3	0	P	D	07/05/17	AD-5 / AD-4	20	70	Blank	Inaccessible Bonnet
B-568	3	9.5	2.2	2.4	0.2	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-570	2	9.5	2.2	2.4	0.2	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-572	1	19.1	2.2	2.3	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-574	2	9.5	2.3	2.4	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	From 8G-810 A/B to Coner
B-576	2	9.5	2.3	2.3	0	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-578	1	19.1	2.3	2.4	0.1	A	D	07/05/17	AD-5 / AD-4	20	70	Blank	
B-580	1	19.1	2.2	2.3	0.1	A	D	07/05/17	AD-5 / AD-4	20	75	8/WSW	TVA #20 From 8G- 810 A/B to coner
B-582	2	9.5	2.3	2.3	0	A	D	07/05/17	AD-5 / AD-4	20	75	8/WSW	
B-584	7	66.8	2.1	2.2	0.1	P	D	07/05/17	AD-5 / AD-4	20	75	8/WSW	Inaccessible Bonnet
B-586	4	4.2	2.2	2.2	0	A	D	07/05/17	AD-5 / AD-4	20	75	8/WSW	
B-588	4	4.2	2.2	2.4	0.2	A	D	07/05/17	AD-5 / AD-4	20	75	8/WSW	
B-590	4	7.6	1.7	2.0	0.3	A	D	07/05/17	AD-5 / AD-4	19	75	8/WSW	TVA#19 P-11-002
B-592	2	3.8	1.0	1.0	0	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	TVA #20
B-594	1	38.2	1.0	1.0	0	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	
B-596	1	38.2	1.0	1.0	0	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	
B-598	2	4.8	0.9	1.2	0.3	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	On the deck W/ value LV 745
B-600	10	23.9	1.0	48.9	47.9	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	On the deck W/ value LV 745
B-602	1	4.8	1.9	2.1	0.2	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	On the deck W/ value LV 745
B-604	1	4.8	1.7	2.0	0.3	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	On the deck W/ value LV 745
B-606	1	3.2	1.7	1.9	0.2	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	On the deck W/ value LV 745
B-608	3	9.5	1.7	2.9	1.2	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	LV 745
B-610	1	4.8	1.6	2.0	0.4	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	
B-612	1	3.2	1.5	1.7	0.2	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	DX FEED
B-614	3	9.5	1.5	1.6	0.1	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	
B-616	1	38.2	1.5	1.5	0	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	
B-618	2	9.5	1.5	1.7	0.2	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	
B-620	1	19.1	1.4	1.4	0	A	D	07/10/17	AD-5 / AD-4	20	72	Blank	
B-622	2	19.1	1.4	1.5	0.1	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	TVA# 20
B-624	1	9.5	1.3	1.3	0	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	
B-626	2	19.1	1.3	1.4	0.1	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	
B-628	2	6.4	1.3	1.4	0.1	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	
B-630	1	3.2	1.3	1.3	0	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	
B-632	6	Unknown	0.8	397.0	396.2	A	D	07/10/17	AD-5 / AD-4	22	75	NA/W	TVA #22 Pump G-20, not running
B-634	3	Unknown	1.3	1.3	0	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	TVA #20 Pump G-459, running
B-636	8	Unknown	1.2	260.0	258.8	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	Pulsing leak Pump G-18, not running
B-638	2	Unknown	1.4	1.5	0.1	A	D	07/10/17	AD-5 / AD-4	20	75	NA/W	Pump G-25, not running
B-640	4	Unknown	1.1	25.3	24.2	P	D	07/10/17	AD-5 / AD-4	20	75	NA/W	Mostly inaccessible Pump G-460, running, solid shaft cover
B-642	2	Unknown	2.1	10.4	8.3	P	D	07/10/17	AD-5 / AD-4	22	75	NA/W	Mostly inaccessible Pump G-461, running, solid shaft cover
B-644	8	Unknown	1.3	2.1	0.8	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	TVA# 20; 2 housing running; G-208A
B-646	4	Unknown	0.8	2.4	1.6	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	2- housing; steamed running; G 2055
B-648	5	Unknown	1.2	1.2	0	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	Running, Steam G-204
B-650	5	Unknown	0.4	16.3	15.9	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	Running, Steam; GM-103

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-652	3	Unknown	2.3	2.3	0	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	running Steam; GM-104A
B-654	4	Unknown	1.3	2.0	0.7	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	running Steam; GM-104
B-656	2	Unknown	3.3	3.7	0.4	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	running Steam; GM-209
B-658	8	Unknown	1.1	2.6	1.5	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	GM-37; running steam
B-660	3	Unknown	1.2	1.3	0.1	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	GM-37A; running steam
B-662	3	Unknown	1.2	1.5	0.3	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	GM-234 steam running
B-664	3	Unknown	1.2	1.3	0.1	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	Om-234A steam Running
B-666	5	Unknown	1.0	1.4	0.4	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	G-105 running
B-668	7	Unknown	0.5	115.6	115.1	A	D	07/11/17	AD-4 / AD-8	19	59	6/SW	G-105A + leak @ shaft, running
B-670	8	Unknown	1.6	17.2	15.6	A	D	07/11/17	AD-4 / AD-8	19	59	6/SW	GM-212 running
B-672	3	Unknown	2.3	2.3	0	A	D	07/11/17	AD-4 / AD-8	19	59	6/SW	5M-212A not running
B-674	3	Unknown	1.3	1.5	0.2	A	D	07/11/17	AD-4 / AD-8	19	59	6/SW	G-38 not running
B-676	3	Unknown	1.1	1.3	0.2	A	D	07/11/17	AD-4 / AD-8	19	59	6/SW	G-38A not running
B-678	2	12.7	1.1	1.1	0	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	4th platform from Bottom
B-680	1	19.1	1.3	1.5	0.2	P	D	07/11/17	AD-4 / AD-8	20	59	6/SW	Inaccessible Bonnet 4th
B-682	1	19.1	1.3	1.3	0	P	D	07/11/17	AD-4 / AD-8	20	59	6/SW	Inaccessible Bonnet 4th
B-684	2	38.2	1.3	1.3	0	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	4th
B-686	0.5	9.5	1.2	1.3	0.1	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	4th
B-688	2	38.2	1.3	1.3	0	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	4th
B-690	1	19.1	1.2	1.2	0	P	D	07/11/17	AD-4 / AD-8	20	59	6/SW	Inaccessible Bonnet 4th
B-692	1	19.1	1.2	1.4	0.2	P	D	07/11/17	AD-4 / AD-8	20	59	6/SW	Inaccessible Bonnet 4th
B-694	1	19.1	1.2	1.3	0.1	A	D	07/11/17	AD-4 / AD-8	20	59	6/SW	4th
B-696	2	12.7	1.1	1.2	0.1	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-698	1	9.5	1.1	1.3	0.2	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-700	1	19.1	1.1	1.1	0	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-702	1	19.1	1.1	1.2	0.1	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-704	1	19.1	1.0	1.1	0.1	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-706	2	12.7	1.1	1.1	0	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-708	2	19.1	1.1	1.1	0	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-710	1	9.5	1.0	1.1	0.1	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-712	1	19.1	1.0	1.1	0.1	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	4th
B-714	6	3.2	1.0	1.2	0.2	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	2nd platform from bottom
B-716	2	4.8	1.2	1.6	0.4	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	on pump 213A
B-718	2	12.7	1.3	1.9	0.6	A	D	07/11/17	AD-4 / AD-8	20	75	12/S	on pump 213A
B-720	2	19.1	0.3	0.6	0.3	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	TVA #19 LV747
B-722	4	19.1	0.4	4.5	4.1	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-724	0.5	2.4	0.9	0.9	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-726	0.5	9.5	0.6	0.7	0.1	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-728	0.5	2.4	0.6	0.6	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-730	1	4.8	0.5	0.6	0.1	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-732	2	9.5	0.4	0.6	0.2	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-734	1	19.1	0.4	0.4	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-736	1	9.5	0.2	0.4	0.2	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-740	3	28.6	0.2	0.7	0.5	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-742	2	19.1	0.3	0.7	0.4	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-744	1	19.1	0.2	0.2	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-746	1	19.1	0.2	0.2	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-748	1	9.5	0.1	0.2	0.1	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-750	3	28.6	0.2	2.1	1.9	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-752	0.5	9.5	0.5	0.5	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	TVA # 19
B-754	7	66.8	0.4	48.1	47.7	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-756	3	28.6	1.1	3.5	2.4	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-758	2	19.1	1.4	1.4	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-760	1	9.5	0.7	0.7	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-762	2	9.5	0.4	0.4	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-764	4	76.4	0.2	17.9	17.7	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-766	1	19.1	0.2	5.2	5	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-768	0.5	9.5	0.3	0.3	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-770	1	19.1	0.3	0.3	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-772	0.5	9.5	0.2	0.2	0	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-774	1	19.1	0.1	0.2	0.1	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-776	1	9.5	0.2	0.8	0.6	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-778	1	9.5	0.2	0.4	0.2	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-780	1	9.5	0.0	1.8	1.8	A	D	07/12/17	AD-5 / AD-4	19	72	NA/W	
B-782	2	9.5	0.7	2.1	1.4	A	D	07/12/17	AD-5 / AD-4	19	75	NA/W	
B-784	2	9.5	0.3	1.0	0.7	A	D	07/12/17	AD-5 / AD-4	19	75	NA/W	
B-786	0.5	9.5	1.0	1.0	0	A	D	07/12/17	AD-5 / AD-4	19	75	NA/W	
B-788	2	4.8	1.0	1.1	0.1	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	TVA #20 Exchanger 214A
B-790	1	19.1	0.9	1.2	0.3	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Exchanger 214A
B-792	1	19.1	0.9	0.9	0	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Exchanger 214A
B-794	3	7.2	0.9	0.9	0	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Exchanger 214A
B-796	1	9.5	0.7	0.8	0.1	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Exchanger 214A
B-798	2	19.1	0.7	0.7	0	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Exchanger 214A
B-800	2	4.8	0.7	0.8	0.1	P	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Half inaccessible
B-802	1	9.5	0.6	0.7	0.1	P	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Half inaccessible

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-804	1	3.2	0.6	0.7	0.1	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	Exchanger 207-D
B-806	1	9.5	0.6	0.7	0.1	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	
B-808	1	3.2	0.6	0.9	0.3	A	D	07/12/17	AD-5 / AD-4	20	75	NA/W	
B-810	1	6.4	0.8	0.8	0	A	D	07/12/17	AD-5 / AD-4	20	75	7/SSW	TVA #20
B-812	2	6.4	0.8	0.9	0.1	A	D	07/12/17	AD-5 / AD-4	20	75	7/SSW	Exchanger 207-B
B-814	1	3.2	0.9	1.1	0.2	A	D	07/12/17	AD-5 / AD-4	20	75	7/SSW	
B-816	0.5	9.5	1.0	1.0	0	A	D	07/12/17	AD-5 / AD-4	20	75	7/SSW	
B-818	5	95.5	1.0	54.1	53.1	A	D	07/12/17	AD-5 / AD-4	20	75	7/SSW	
B-820	1	19.1	1.5	1.5	0	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	TVA #19
B-822	2	6.4	1.5	1.5	0	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-824	2	6.4	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-826	2	12.7	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-828	2	38.2	1.5	1.8	0.3	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-830	1	19.1	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	Exchanger 207D
B-832	1	19.1	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	Exchanger 207D
B-834	1	19.1	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	Exchanger 207B
B-836	1	19.1	1.5	1.5	0	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-838	2	9.5	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	TVA# 19
B-840	1	4.8	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-842	2	9.5	1.4	1.4	0	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	FV-539
B-844	1	4.8	1.4	1.5	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-846	2	9.5	1.4	1.4	0	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	4" Gate Valve
B-848	2	6.4	1.3	2.0	0.7	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	
B-850	4	12.7	1.3	1.4	0.1	A	D	07/12/17	AD-5 / AD-4	19	75	7/SSW	TV878
B-852	2	6.4	0.7	1.0	0.3	A	D	07/13/17	AD-5 / AD-4	19	70	NA/W	TVA #19
B-854	1	3.2	0.8	0.8	0	A	D	07/13/17	AD-5 / AD-4	19	70	NA/W	
B-856	1	3.2	0.7	0.7	0	A	D	07/13/17	AD-5 / AD-4	19	70	NA/W	
B-858	2	6.4	0.6	0.7	0.1	A	D	07/13/17	AD-5 / AD-4	19	70	NA/W	
B-860	1	19.1	0.7	0.7	0	A	D	07/13/17	AD-5 / AD-4	19	70	NA/W	
B-862	7	66.8	0.6	0.7	0.1	A	D	07/13/17	AD-5 / AD-4	19	70	NA/W	TV-762 E-102 Bypass
B-864	15	47.7	0.7	31.5	30.8	A	D	07/13/17	AD-5 / AD-4	19	70	NA/W	
B-866	5	15.9	0.4	1.1	0.7	A	D	07/13/17	AD-5 / AD-4	20	70	NA/W	TVA#20
B-868	2	6.4	1.1	1.1	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/W	
B-870	3	9.5	0.9	2.4	1.5	A	D	07/13/17	AD-5 / AD-4	20	70	NA/W	
B-872	3	9.5	1.2	2.6	1.4	A	D	07/13/17	AD-5 / AD-4	20	70	NA/W	
B-874	1	3.2	1.2	1.4	0.2	A	D	07/13/17	AD-5 / AD-4	20	70	NA/W	
B-876	0.5	9.5	1.1	1.1	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/W	
B-878	1	19.1	1.0	1.1	0.1	A	D	07/13/17	AD-5 / AD-4	20	70	NA/W	
B-880	4	12.7	0.9	6.0	5.1	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	TVA #20
B-882	1	3.2	2.4	2.4	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-884	4	12.7	2.0	4.3	2.3	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-886	0.5	9.5	2.1	2.1	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-888	2	38.2	2.0	6.0	4	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-890	2	9.5	1.4	1.4	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-892	1	4.8	1.8	1.8	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-894	1	38.2	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-896	1	4.8	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-898	1	4.8	1.0	1.0	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-900	1	3.2	0.8	0.9	0.1	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-902	1	19.1	0.8	1.0	0.2	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-904	1	3.2	1.0	1.0	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	Pic- 691
B-906	2	6.4	1.0	1.3	0.3	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-908	1	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	70	NA/SW	
B-910	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	TVA#20
B-912	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	
B-914	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	
B-916	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	
B-918	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	
B-920	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	
B-922	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	
B-924	0.5	19.1	1.2	1.2	0	A	D	07/13/17	AD-5 / AD-4	20	72	NA/SW	
B-926	0.5	9.5	1.8	1.9	0.1	A	D	07/13/17	AD-5 / AD-4	19	72	NA/SW	HPGLO To FV-910 From G-105
B-928	1	19.1	1.9	1.9	0	A	D	07/13/17	AD-5 / AD-4	19	72	NA/SW	
B-930	2	12.7	1.9	1.9	0	A	D	07/13/17	AD-5 / AD-4	19	72	NA/SW	FV-910
B-932	1	6.4	1.9	1.9	0	A	D	07/13/17	AD-5 / AD-4	19	72	NA/SW	
B-934	2	9.5	1.8	1.9	0.1	A	D	07/13/17	AD-5 / AD-4	19	72	NA/SW	
B-936	1	19.1	1.9	2.9	1	A	D	07/13/17	AD-5 / AD-4	19	72	NA/SW	
B-938	2	6.4	2.1	2.1	0	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-940	2	9.5	1.9	1.9	0	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-942	1	6.4	1.8	1.9	0.1	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-944	1	19.1	1.9	1.9	0	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-946	0.5	9.5	1.9	1.9	0	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-948	1	9.5	1.8	1.9	0.1	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	LV-755 B
B-950	0.5	4.8	1.7	1.8	0.1	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-952	0.5	9.5	1.7	1.8	0.1	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-954	1	6.4	1.7	1.8	0.1	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-956	1	6.4	1.7	1.8	0.1	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-958	1	9.5	1.8	1.8	0	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-960	1	9.5	1.6	1.7	0.1	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-962	1	9.5	1.7	1.7	0	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-964	2	6.4	1.5	1.9	0.4	A	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	
B-966	2	38.2	1.7	1.8	0.1	P	D	07/13/17	AD-5 / AD-4	19	75	5/SSW	Inaccessible Bonnet
B-968	2	38.2	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-970	1	19.1	1.4	1.5	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-972	1	25.5	1.4	1.5	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-974	1	9.5	1.4	1.5	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-976	0.5	9.5	1.5	1.6	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-978	0.5	4.8	1.5	1.6	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-980	2	6.4	1.5	1.6	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-982	0.5	1.6	1.5	1.6	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-984	2	6.4	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	HCGO from H-5 to prod. Manifold
B-986	1	3.2	1.5	1.6	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-988	1	9.5	1.5	1.6	0.1	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	PV-105
B-990	1	19.1	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-992	1	3.2	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-994	1	3.2	1.4	1.6	0.2	A	D	07/13/17	AD-5 / AD-4	20	77	5/SSW	
B-996	1	3.2	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-998	1	3.2	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1000	1	19.1	1.4	1.5	0.1	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	HPGLO To FV-910 From G-105
B-1002	1	19.1	1.5	1.5	0	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1004	1	19.1	1.4	1.4	0	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1006	1	6.4	1.4	1.5	0.1	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1008	2	9.5	1.4	1.4	0	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1010	1	6.4	1.4	1.5	0.1	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1012	3	19.1	1.4	4.5	3.1	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1014	2	12.7	2.2	2.4	0.2	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1016	1	6.4	2.2	2.2	0	A	D	07/13/17	AD-5 / AD-4	20	75	8/SW	
B-1018	1	6.4	0.5	0.5	0	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	TVA 20
B-1020	0.5	9.5	0.4	0.4	0	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1022	4	25.5	0.4	6.5	6.1	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1024	2	12.7	1.0	1.8	0.8	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1026	1	19.1	0.4	0.4	0	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1028	1	19.1	0.3	0.3	0	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1030	2	4.8	0.2	0.4	0.2	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1032	1	4.8	0.8	0.8	0	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1034	1	19.1	0.3	0.9	0.6	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1036	1	19.1	0.2	1.2	1	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1038	1	3.2	0.6	1.4	0.8	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1040	2	3.8	0.6	0.6	0	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1042	1	4.8	0.2	0.2	0	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1044	1	3.2	0.1	0.2	0.1	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1046	4	7.6	0.1	0.9	0.8	A	D	07/17/17	AD-5 / AD-4	20	70	NA/SW	
B-1048	2	9.5	1.0	1.5	0.5	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1050	1	4.8	0.7	0.7	0	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1052	1	4.8	0.7	0.7	0	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1054	2	19.1	0.1	0.7	0.6	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1056	2	19.1	0.4	0.7	0.3	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1058	1	2.4	0.2	0.5	0.3	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1060	1	3.2	0.4	0.5	0.1	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1062	1	3.2	0.5	0.5	0	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1064	0.5	9.5	0.4	0.5	0.1	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1066	2	38.2	0.4	0.4	0	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1068	0.5	4.8	0.3	0.3	0	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	FIC- 923A
B-1070	0.5	9.5	0.3	0.5	0.2	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1072	1	4.8	0.5	0.5	0	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1074	1	4.8	0.4	0.7	0.3	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	LIC- 539B
B-1076	2	4.8	0.1	0.5	0.4	A	D	07/17/17	AD-5 / AD-4	20	72	NA/SW	
B-1078	1	2.4	1.1	1.2	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-237 ABC to E-238, TVA #19
B-1080	1	19.1	0.8	0.9	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-239 to E-240
B-1082	1	19.1	0.8	0.9	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-239 to E-240
B-1084	1	6.4	0.8	0.8	0	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-239 to E-240
B-1086	1	2.4	0.7	0.9	0.2	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-239 to E-240
B-1088	1	2.4	0.8	0.8	0	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-239 to E-240
B-1090	1	2.4	0.7	0.7	0	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-239 to E-240
B-1092	2	38.2	0.8	0.8	0	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	VTHGO from E-239 to E-240
B-1094	1	2.4	0.7	0.8	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	
B-1096	2	4.8	0.7	0.8	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	
B-1098	1	9.5	0.7	0.8	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	
B-1100	1	19.1	0.7	0.7	0	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	
B-1102	1	3.2	0.6	0.7	0.1	P	D	07/17/17	AD-5 / AD-4	19	85	3/SW	Bonnet inaccessible, to B-102 Henter

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1104	1	19.1	0.6	0.6	0	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	
B-1106	0.5	25.5	0.6	0.6	0	A	D	07/17/17	AD-5 / AD-4	19	85	3/SW	
B-1108	1	50.9	0.5	0.6	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	5/SW	SCT Bottoms To B-102 Heater
B-1110	1	19.1	0.5	0.6	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	5/SW	SCT Bottoms To B-102 Heater
B-1112	2	12.7	0.5	2.1	1.6	A	D	07/17/17	AD-5 / AD-4	19	85	5/SW	SCT Bottoms To B-102 Heater
B-1114	1	6.4	0.8	0.8	0	A	D	07/17/17	AD-5 / AD-4	19	85	5/SW	PIC- 1486
B-1116	1	19.1	0.6	0.7	0.1	A	D	07/17/17	AD-5 / AD-4	19	85	5/SW	PIC-1486
B-1118	1	3.2	0.6	0.6	0	P	D	07/17/17	AD-5 / AD-4	19	85	5/SW	PIC-1486, Bonnet Inaccessible
B-1120	2	6.4	0.5	0.8	0.3	P	D	07/17/17	AD-5 / AD-4	19	85	5/SW	PIC-1486, Bonnet Inaccessible
B-1122	1	19.1	0.5	0.5	0	A	D	07/17/17	AD-5 / AD-4	19	85	5/SW	SCGTO to E-103
B-1124	9	28.6	0.5	47.9	47.4	A	D	07/17/17	AD-5 / AD-4	19	85	5/SW	SCGTO to E-103
B-1126	2	6.4	1.8	2.1	0.3	A	D	07/17/17	AD-5 / AD-4	20	85	5/SW	
B-1128	1	19.1	1.8	1.9	0.1	A	D	07/17/17	AD-5 / AD-4	20	85	5/SW	Swap to TVA #20
B-1130	3	14.3	1.8	4.7	2.9	A	D	07/17/17	AD-5 / AD-4	20	85	5/SW	FV-209
B-1132	3	14.3	2.2	3.6	1.4	A	D	07/17/17	AD-5 / AD-4	20	85	5/SW	FV-209
B-1134	5	23.9	2.1	4.6	2.5	A	D	07/17/17	AD-5 / AD-4	20	85	5/SW	
B-1136	4	12.7	2.4	33.8	31.4	A	D	07/17/17	AD-5 / AD-4	20	85	5/SW	SCGTO to E-103
B-1138	6	11.5	1.4	9.3	7.9	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1140	3	5.7	2.3	2.8	0.5	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1142	1	3.2	2.0	2.5	0.5	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1144	5	31.8	1.9	1.9	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1146	1	6.4	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1148	0.5	3.2	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1150	1	19.1	1.6	1.6	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1152	1	1.9	1.6	1.6	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1154	1	19.1	1.4	1.4	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1156	0.5	9.5	1.2	1.2	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1158	1	19.1	1.2	1.3	0.1	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1160	1	19.1	1.3	1.4	0.1	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1162	1	19.1	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1164	1	38.2	1.4	1.5	0.1	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1166	1	38.2	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1168	0.5	9.5	2.2	2.1	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1170	1	6.4	1.3	1.3	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1172	2	12.7	1.2	1.5	0.3	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1174	1	19.1	1.2	1.3	0.1	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1176	1	19.1	1.2	1.2	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1178	1	6.4	1.1	1.2	0.1	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1180	2	9.5	1.2	1.2	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1182	2	6.4	1.1	1.4	0.3	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1184	1	9.5	1.1	1.1	0	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1186	1	9.5	1.0	1.2	0.2	A	D	07/18/17	AD-5 / AD-1	19	Blank	Blank	
B-1188	1	9.5	1.4	1.5	0.1	A	D	07/18/17	AD-5 / AD-1	20	Blank	Blank	TVA #20
B-1190	0.5	9.5	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	20	Blank	Blank	
B-1192	0.5	9.5	1.4	1.6	0.2	A	D	07/18/17	AD-5 / AD-1	20	Blank	Blank	
B-1194	1	19.1	1.4	1.5	0.1	A	D	07/18/17	AD-5 / AD-1	20	Blank	Blank	
B-1196	1	19.1	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	20	Blank	Blank	
B-1198	0.5	2.4	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1200	1	4.8	1.4	1.5	0.1	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1202	1	6.4	1.4	1.5	0.1	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1204	2	12.7	1.4	1.6	0.2	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1206	1	3.2	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1208	1	9.5	1.4	1.6	0.2	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1210	1	9.5	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1212	3	9.5	1.4	1.6	0.2	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1214	1	3.2	1.5	1.7	0.2	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1216	1	4.8	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1218	3	7.2	1.4	4.0	2.6	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1220	2	4.8	1.7	1.8	0.1	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1222	1	19.1	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1224	1	19.1	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1226	1	3.2	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	20	64	Blank	
B-1228	2	6.4	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	TVA #20
B-1230	1	19.1	1.6	1.6	0	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1232	1	2.1	1.5	1.6	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1234	1	2.1	1.6	1.6	0	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1236	2	4.2	1.6	1.6	0	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1238	1	4.8	1.6	1.6	0	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1240	7	16.7	2.1	2.1	0	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	TVA #20
B-1242	1	4.8	1.9	2.0	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1244	2	19.1	1.5	1.7	0.2	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1246	1	12.7	1.5	1.6	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1248	1	38.2	1.5	1.6	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1250	1	19.1	1.6	1.6	0	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1252	1	19.1	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1254	1	12.7	1.5	1.5	0	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1256	1	12.7	1.3	1.4	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	Blank	
B-1258	1	19.1	1.0	1.1	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1260	0.5	9.5	1.0	1.1	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1262	0.5	4.8	1.0	1.1	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1264	3	9.5	1.0	1.2	0.2	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1266	1	4.8	1.1	1.4	0.3	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	FV-720
B-1268	2	6.4	1.2	1.3	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1270	2	6.4	1.3	1.5	0.2	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1272	1	3.2	1.7	1.6	0	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1274	0.5	9.5	1.3	1.5	0.2	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1276	2	9.5	1.6	1.7	0.1	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1278	4	12.7	1.5	1.7	0.2	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	Valve is closed
B-1280	1	9.5	1.4	1.6	0.2	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1282	2	9.5	1.8	2.4	0.6	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1284	1	4.8	1.5	2.0	0.5	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1286	1	19.1	1.7	1.7	0	A	D	07/18/17	AD-5 / AD-1	20	75	NA/W	
B-1288	1	2.4	0.6	0.9	0.3	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	
B-1290	1	9.5	0.5	0.6	0.1	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	Valve Closed
B-1292	1	12.7	0.4	0.7	0.3	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	
B-1294	1	9.5	0.5	0.6	0.1	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	
B-1296	3	7.2	0.5	4.6	4.1	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	Valve open
B-1298	3	7.2	1.0	5.8	4.8	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	
B-1300	1	2.4	1.4	1.4	0	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	75% open
B-1302	6	14.3	1.0	47.7	46.7	A	D	07/19/17	AD-5 / AD-6	16	65	3/SSW	After #1302 SWAP to TVA # 16
B-1306	4	9.5	0.7	11.1	10.4	A	D	07/19/17	AD-5 / AD-6	16	65	3/SSW	Open green ribbon
B-1308	3	9.5	1.2	2.2	1	A	D	07/19/17	AD-5 / AD-6	16	65	3/SSW	Closed Ladder
B-1310	2	6.4	0.9	2.1	1.2	P	D	07/19/17	AD-5 / AD-6	16	65	3/SSW	50% of circumference ladder checked
B-1312	1	9.5	0.7	1.1	0.4	A	D	07/19/17	AD-5 / AD-6	16	65	3/SSW	
B-1314	5	11.9	0.7	119.0	118.3	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	Swap to TVA #20
B-1316	4	9.5	1.7	11.4	9.7	A	D	07/19/17	AD-5 / AD-6	20	65	3/SSW	open
B-1318	4	50.9	2.4	1213.0	1210.6	A	D	07/19/17	AD-5 / AD-6	16	66	3/SSW	Swap to TVA # 16 after #1318
B-1320	2	4.8	1.3	1.3	0	A	D	07/19/17	AD-5 / AD-6	16	66	3/SSW	50% open
B-1322	1	2.4	1.2	1.4	0.2	A	D	07/19/17	AD-5 / AD-6	16	66	3/SSW	
B-1324	4	9.5	1.2	6.2	5	A	D	07/19/17	AD-5 / AD-6	16	66	3/SSW	open
B-1326	5	15.9	1.8	37.6	35.8	A	D	07/19/17	AD-5 / AD-6	16	66	3/SSW	valve closed, ladder
B-1328	3	9.5	1.8	1.8	0	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	Ladder
B-1330	1	19.1	1.7	1.8	0.1	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	sample station
B-1332	2	50.9	1.7	3.2	1.5	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	
B-1334	1	19.1	1.9	1.9	0	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	Closed
B-1336	1	19.1	1.8	1.9	0.1	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	
B-1338	2	4.8	1.8	1.8	0	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	
B-1340	2	4.8	1.7	1.8	0.1	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	open
B-1342	0.5	9.5	1.7	1.9	0.2	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	closed
B-1344	0.5	9.5	1.8	1.8	0	A	D	07/19/17	AD-5 / AD-6	21	66	3/SSW	
B-1346	1	9.5	1.7	1.7	0	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1348	1	4.8	1.6	1.8	0.2	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1350	1	19.1	1.5	1.7	0.2	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	closed
B-1352	1	4.8	1.5	1.5	0	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1354	2	9.5	1.4	1.6	0.2	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1356	1	3.2	1.5	1.6	0.1	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1358	1	3.2	1.5	1.6	0.1	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1360	1	19.1	1.5	1.5	0	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	closed
B-1362	1	19.1	1.4	1.5	0.1	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	threaded connector
B-1364	1	19.1	1.4	1.5	0.1	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1366	2	12.7	1.4	1.7	0.3	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	
B-1368	2	38.2	1.5	1.5	0	A	D	07/19/17	AD-5 / AD-6	21	Blank	Blank	carbon monoxide alarm 72ppm, staff left the unit
B-1370	2	4.8	-2.0	-1.0	1	A	R	03/06/18	B-7	202017072540	51	10/N	G/4 7 Ft NE D-713
B-1372	0.5	12.7	-2.0	-2.0	0	A	R	03/06/18	B-7	202017072540	51	10/N	G/1 7 Ft NE D-713
B-1374	0.5	12.7	-2.0	-2.0	0	A	R	03/06/18	B-7	202017072540	51	10/N	G/1 7 Ft NE D-713
B-1376	1	3.2	-2.0	-1.0	1	A	R	03/06/18	B-7	202017072540	51	10/N	G/3 NSD D-713
B-1378	2	4.8	-2.0	-2.0	0	A	R	03/06/18	B-7	202017072540	51	10/N	G/5 NSD D-713
B-1380	2	4.8	-1.8	-1.0	0.8	A	R	03/06/18	B-7	202017072540	51	10/N	G/5 NSD D-713
B-1382	1	25.5	-2.8	-2.7	0.1	A	R	03/06/18	B-7	202017072540	51	10/N	G/6 NSD D-713
B-1384	1	25.5	-2.8	-1.8	1	A	R	03/06/18	B-7	202017072540	51	10/N	G/7 NSD D-713
B-1386	3	9.5	-2.7	-1.4	1.3	A	R	03/06/18	B-7	202017072540	51	10/N	G/8 NSD D-713
B-1388	1	25.5	-2.5	-2.4	0.1	A	R	03/06/18	B-7	202017072540	51	10/N	G/6 SWSD E-709
B-1390	1	25.5	-2.1	-2.1	0	A	R	03/06/18	B-7	202017072540	51	10/N	G/6 SWSD E-709
B-1392	0.5	19.1	-2.1	-2.1	0	A	R	03/06/18	B-7	202017072540	51	10/N	G/6 SWSD E-709
B-1394	2	76.4	-2.0	29.0	31	A	R	03/06/18	B-7	202017072540	51	10/N	G/3 SWSD E-709 *High reading*
B-1396	2	152.8	-2.0	550.0	552	A	R	03/06/18	B-7	202017072540	51	10/N	G/3 SWSD E-709 *Avg leak due to leak*
B-1398	3	76.4	0.2	10.4	10.2	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/3 N of E-709
B-1400	2	50.9	0.1	0.9	0.8	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/1 S of E-709
B-1402	3	76.4	-1.0	-1.0	0	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/1 S of E-709
B-1404	3	38.2	-3.0	-0.4	2.6	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/2 W of Tank 721

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1406	3	38.2	-3.0	-3.0	0	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/2 W of Tank 721
B-1408	3	2.4	-3.8	-3.3	0.5	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/3 W of Tank 721
B-1410	2	25.5	-3.8	-3.3	0.5	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/3 E of Tank 721
B-1412	1	12.7	-3.9	-3.4	0.5	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/3 E of Tank 721
B-1414	2	25.5	-3.8	-3.3	0.5	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/3 N of Tank 721
B-1416	3	14.3	-3.4	-3.2	0.2	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/3 N of Tank 721
B-1418	3	114.6	-3.5	-3.2	0.3	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/1 NW of Tank 721
B-1420	2	19.1	2.5	2.6	0.1	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/1 NW of Tank 721
B-1422	2	19.1	2.3	2.9	0.6	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/1 NW of Tank 721
B-1424	2	19.1	2.3	2.5	0.2	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/1 20 feet W of Tank 721 By stairs
B-1426	2	19.1	2.3	2.6	0.3	A	R	03/07/18	B-5 / B-6	202017072540	54	3-5/NA	G/3 Road 7 Platform 20 ft W Tank 721
B-1428	1	9.5	2.1	2.4	0.3	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 Road 7 Platform 20 ft W Tank 721
B-1430	2	50.9	2.1	2.5	0.4	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 Road 7 Platform 20 ft W Tank 721
B-1432	2	50.9	2.1	2.3	0.2	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 Road 7 Platform 20 ft W Tank 721
B-1434	2	50.9	2.2	2.2	0	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 Road 7 Platform 20 ft W Tank 721
B-1436	2	19.1	2.1	2.2	0.1	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 Road 7 Platform 20 ft W Tank 721
B-1438	1	9.5	2.1	2.2	0.1	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 Road 7 Platform 20 ft W Tank 721
B-1440	2	19.1	2.2	2.5	0.3	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/4 40 ft west Tank 721
B-1442	2	19.1	2.0	2.3	0.3	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/4 40 ft west Tank 721
B-1444	2	50.9	2.0	2.1	0.1	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/4 E SD 721
B-1446	1	19.1	2.0	2.0	0	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/5 E SD 721
B-1448	2	25.5	2.0	2.5	0.5	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 E SD 721
B-1450	2	25.5	2.3	2.3	0	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/3 NE SD 721
B-1452	2	50.9	1.9	2.1	0.2	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/1 E SD 721
B-1454	2	50.9	1.9	1.9	0	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/1 E SD 721
B-1456	2	50.9	1.6	1.8	0.2	A	R	03/07/18	B-5 / B-6	202017072540	60	5-10/NA	G/1 E SD 721
B-1458	3	76.4	1.5	2.0	0.5	A	R	03/07/18	B-5 / B-6	202017072540	67	5-6/NA	G/5 E SD 721
B-1460	2	38.2	1.6	1.9	0.3	A	R	03/07/18	B-5 / B-6	202017072540	67	5-6/NA	G/5 E SD 721
B-1462	3	76.4	1.3	17.4	16.1	A	R	03/07/18	B-5 / B-6	202017072540	67	5-6/NA	G/5 E SD 721
B-1464	3	76.4	2.3	14.5	12.2	A	R	03/07/18	B-5 / B-6	202017072540	67	5-6/NA	G/5 E SD 721
B-1466	2	50.9	2.3	310.0	307.7	A	R	03/07/18	B-5 / B-6	202017072540	67	5-6/NA	G/5 E SD 721
B-1468	1	25.5	-0.1	-0.1	0	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	G/7 W Side B-103
B-1470	1	19.1	-1.4	-1.0	0.4	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	G/7 W Side B-103
B-1472	2	25.5	-1.0	29.0	30	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	G/3 W Side B-103
B-1474	1	12.7	-1.0	-1.7	0	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	G/3 W Side B-103
B-1476	1	76.4	-2.0	1.0	3	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1478	0.5	38.2	-2.0	-2.0	0	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1480	1	76.4	-1.6	-1.0	0.6	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1482	1	76.4	-2.4	-2.0	0.4	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1484	1	76.4	-2.0	-2.0	0	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1486	1	76.4	-2.0	-1.4	0.6	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1488	1	76.4	-2.0	-1.9	0.1	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1490	1	76.4	-2.0	-2.0	0	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1492	0.5	38.2	-1.9	-1.8	0.1	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1494	1	76.4	-2.0	-2.0	0	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1496	1	76.4	-2.7	-2.1	0.6	A	R	03/08/18	B-7 / B-9	202017072540	51	15/N	1/4 20 ft N D-104
B-1498	1	76.4	-2.7	-2.4	0.3	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	1/4 20 ft N D-104
B-1500	1	76.4	-2.7	-2.6	0.1	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	1/4 20 ft N D-104
B-1502	1	9.5	-2.9	-2.5	0.4	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/7 10 feet S E-314
B-1504	1	12.7	-2.9	-2.4	0.5	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/6 10 feet S E-314
B-1506	0.5	4.8	-2.8	-2.7	0.1	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/6 10 feet S E-314
B-1508	1	12.7	-2.6	-2.5	0.1	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/5 10 feet S E-314
B-1510	1	38.2	-2.7	-2.4	0.3	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1512	1	25.5	-2.6	-2.4	0.2	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1514	2	76.4	-2.7	-1.4	1.3	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1516	0.5	19.1	-2.5	-2.1	0.4	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1518	1	38.2	-2.8	-2.4	0.4	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1520	1	12.7	-2.6	-2.6	0	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/5 10 feet S E-314
B-1522	1	19.1	-2.8	-2.7	0.1	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/5 10 feet S E-314
B-1524	1	9.5	-2.6	-2.1	0.5	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/6 10 feet S E-314
B-1526	2	19.1	-2.9	-2.6	0.3	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/6 10 feet S E-314
B-1528	0.5	19.1	-2.6	-2.6	0	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1530	0.5	19.1	-3.1	-3.0	0.1	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1532	0.5	19.1	-3.1	-3.0	0.1	A	R	03/08/18	B-7 / B-9	202017072540	60	10/N	G/4 10 feet S E-314
B-1534	2	9.5	-2.0	-1.8	0.2	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/6 W side E-309
B-1536	1	4.8	-1.9	-1.7	0.2	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/8 W side E-309
B-1538	2	9.5	-1.9	-1.6	0.3	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 W side E-309
B-1540	0.5	19.1	-1.8	-1.0	0.8	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/4 W side E-309
B-1542	1	38.2	-1.8	-1.6	0.2	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	No bonnet
B-1544	3	5.7	-2.0	3.2	5.2	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/8 E side G-306A
B-1546	1	38.2	-1.0	-0.9	0.1	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/7 E side G-306A
B-1548	1	38.2	-1.7	-1.6	0.1	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/7 E side G-306A
B-1550	1	38.2	-1.9	-1.4	0.5	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/6 N side G-306
B-1552	1	38.2	-1.5	-1.5	0	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/6 N side G-306
B-1554	1	38.2	-1.6	-1.6	0	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 N side G-306

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1556	1	38.2	-1.7	-1.4	0.3	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 N side G-306
B-1558	1	38.2	-1.8	-1.8	0	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/3 N side G-306
B-1560	1	4.8	-2.0	-1.7	0.3	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	1/3 10 feet E E-308
B-1562	2	9.5	-2.1	-1.6	0.5	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	1/2 10 feet E E-308
B-1564	1	4.8	-2.1	-1.5	0.6	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	1/5 10 feet E E-308
B-1566	1	4.8	-2.3	-2.0	0.3	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	1/3 10 feet E E-308
B-1568	4	7.6	-2.0	55.0	57	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 S side D-207
B-1570	1	1.9	-5.0	-4.8	0.2	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/3 S side D-207
B-1572	1	1.9	-5.0	-4.2	0.8	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/3 S side D-207
B-1574	2	3.8	-5.0	-3.9	1.1	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 S side D-207
B-1576	2	3.8	-3.0	-3.2	0	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/6 S side D-207
B-1578	0.5	38.2	-2.7	-2.0	0.7	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 20 feet N E-106B
B-1580	0.5	38.2	-2.9	-2.9	0	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 20 feet N E-106B
B-1582	0.5	38.2	-3.5	-3.4	0.1	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 20 feet N E-106B
B-1584	0.5	19.1	-4.0	-4.0	0	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 20 feet N E-106B
B-1586	1	38.2	-4.2	-4.2	0	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 20 feet N E-106B
B-1588	1	38.2	-4.4	-4.2	0.2	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 20 feet N E-106B
B-1590	1	76.4	-4.4	-4.3	0.1	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/5 20 feet N E-106B
B-1592	6	14.3	-4.7	112.0	116.7	A	R	03/09/18	B-7 / B-9	202017072515	51	10/N	G/3 W side B-101
B-1594	1	2.4	-3.5	-3.5	0	A	R	03/09/18	B-7 / B-9	202017072515	64	15/N	G/3 W side B-101
B-1596	1	25.5	-4.5	-4.0	0.5	A	R	03/09/18	B-7 / B-9	202017072515	64	15/N	G/1 W side B-101
B-1598	1	25.5	-4.3	-4.3	0	A	R	03/09/18	B-7 / B-9	202017072515	64	15/N	G/1 W side B-101
B-1600	1	1.9	-4.6	-3.8	0.8	P	R	03/09/18	B-7 / B-9	202017072515	64	15/N	Bonnet Insulated
B-1602	6	11.5	-3.3	50.0	53.3	A	R	03/09/18	B-7 / B-9	202017072515	64	15/N	G/7 W side B-101
B-1604	1	9.5	0.4	0.4	0	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/3 E side GM-400
B-1606	1	25.5	0.2	0.5	0.3	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/2 NE side GM-400
B-1608	1	38.2	0.2	0.3	0.1	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/4 NE side GM-400
B-1610	1	25.5	0.2	0.3	0.1	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/5 NE side GM-400
B-1612	1	25.5	0.2	0.3	0.1	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/6 NE side GM-400
B-1614	0.5	19.1	0.3	0.4	0.1	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/5 NE side GM-400
B-1616	1	25.5	0.2	0.5	0.3	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/5 NE side GM-400
B-1618	1	25.5	0.5	0.5	0	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/5 N side GM-400
B-1620	1	38.2	0.4	0.4	0	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/5 N side GM-400
B-1622	1	6.4	0.2	0.4	0.2	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/3 N side GM-400
B-1624	2	12.7	0.3	0.6	0.3	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/9 15 feet NW GM-400
B-1626	2	12.7	0.2	0.8	0.6	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/4 15 feet NW GM-400
B-1628	1	6.4	0.3	0.3	0	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	G/4 15 feet NW GM-400
B-1630	1	25.5	0.3	0.5	0.2	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	No bonnet
B-1632	1	25.5	0.4	0.4	0	A	R	03/12/18	B-7 / B-9	202017072515	50	2/E	No bonnet
B-1634	1	38.2	0.7	0.8	0.1	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/6 15 feet NW GM-400
B-1636	1	38.2	0.4	0.9	0.5	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	No bonnet
B-1638	2	50.9	0.5	1.2	0.7	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	No bonnet
B-1640	1	38.2	0.8	0.8	0	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/3 15 feet NW GM-400
B-1642	1	6.4	1.0	1.0	0	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/4 15 feet NW GM-400
B-1644	2	50.9	1.3	1.3	0	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	No bonnet
B-1646	2	76.4	0.9	1.4	0.5	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/6 20 feet NW GM-400
B-1648	2	50.9	0.8	2.2	1.4	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/2 20 feet NW GM-400
B-1650	2	9.5	0.9	2.2	1.3	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/3 22 feet NW GM-400
B-1652	1	6.4	0.5	0.5	0	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/5 22 feet NW GM-400
B-1654	1	25.5	0.6	0.9	0.3	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	No bonnet
B-1656	1	25.5	0.5	0.8	0.3	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	No bonnet
B-1658	1	38.2	0.4	0.8	0.4	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/4 22 feet NW GM-400
B-1660	1	25.5	0.0	0.8	0.8	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/2 22 feet NW GM-400
B-1662	3	114.6	0.4	4.0	3.6	A	R	03/12/18	B-7 / B-9	202017072515	56	2/E	G/2 22 feet NW GM-400
B-1664	2	50.9	0.3	0.4	0.1	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/2 NW side E-612
B-1666	1	38.2	0.3	0.3	0	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/2 NW side E-612
B-1668	2	38.2	0.2	0.3	0.1	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/5 NW side E-612
B-1670	1	25.5	0.2	0.3	0.1	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/2 S side E-619A
B-1672	1	38.2	0.2	0.4	0.2	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/2 S side E-619A
B-1674	3	14.3	0.4	0.6	0.2	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/4 S side E-619A
B-1676	5	15.9	0.8	0.8	0	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/6 N side G-612A
B-1678	2	6.4	0.7	0.8	0.1	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/5 N side G-612A
B-1680	3	28.6	0.7	0.8	0.1	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/4 N side G-612A
B-1682	3	14.3	0.7	0.9	0.2	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/5 E side G-612A
B-1684	2	9.5	0.6	0.7	0.1	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/6 E side G-612A
B-1686	2	50.9	0.6	0.8	0.2	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	No bonnet
B-1688	1	38.2	0.6	0.9	0.3	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/8 E side G-612A
B-1690	3	19.1	0.7	0.8	0.1	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/8 E side G-612A
B-1692	2	12.7	0.7	0.9	0.2	A	R	03/19/18	B-5 / B-1 / B-2	202017072540	42	3/NE	G/8 E side G-612A
B-1694	2	4.8	0.7	0.9	0.2	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/6 N side G-615
B-1696	2	4.8	0.8	1.1	0.3	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/5 N side G-615
B-1698	1	25.5	1.0	1.1	0.1	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	No bonnet
B-1700	1	38.2	1.0	1.3	0.3	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/4 NE side G-615
B-1702	5	11.9	1.1	1.4	0.3	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/7 NE side G-615
B-1704	4	9.5	1.2	2.4	1.2	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/8 NE side G-615

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1706	2	19.1	1.7	1.7	0	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/4 NW side G-615
B-1708	1	19.1	1.3	1.4	0.1	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	No bonnet
B-1710	2	12.7	1.2	1.3	0.1	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/5 5 feet NW G-615
B-1712	4	38.2	1.3	14.6	13.3	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/6 5 feet NW G-615
B-1714	1	6.4	1.9	1.9	0	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/4 5 feet W G-615
B-1716	1	25.5	1.6	1.7	0.1	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	No bonnet
B-1718	2	76.4	1.5	1.6	0.1	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/2 5 feet W G-615
B-1720	1	50.9	1.5	1.6	0.1	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/3 5 feet W G-615
B-1722	2	6.4	1.1	1.4	0.3	A	R	03/19/18	B-5 / B-2	202017072540	42	3/NE	G/2 5 feet W G-615
B-1724	1	25.5	0.0	0.0	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	No bonnet
B-1726	0.5	19.1	0.0	0.0	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/2 W side G-615
B-1728	2	19.1	0.0	0.2	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/4 W side G-615
B-1730	2	19.1	0.1	0.1	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 W side G-615
B-1732	2	3.2	0.0	0.1	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/7 N side G-617
B-1734	2	19.1	0.2	0.4	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/6 N side G-617
B-1736	2	19.1	0.2	0.2	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/6 N side G-617
B-1738	2	9.5	0.3	0.3	0	P	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	Bonnet covered with insulation
B-1740	1	4.8	0.0	0.3	0.3	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 E side G-617
B-1742	3	14.3	0.2	0.4	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/7 15 feet NW B-601
B-1744	3	14.3	0.4	0.6	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/3 16 feet NW B-601
B-1746	3	14.3	0.6	0.8	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/4 16 feet NW B-601
B-1748	2	50.9	1.1	1.2	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/2 15 feet NW B-601
B-1750	3	14.3	1.0	1.1	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/3 15 feet NW B-601
B-1752	2	50.9	1.0	1.1	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/2 14 feet NW B-601
B-1754	2	76.4	0.7	0.8	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/2 14 feet NW B-601
B-1756	4	12.7	0.5	0.6	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/3 14 feet NW B-601
B-1758	2	6.4	0.6	3.2	2.6	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/3 13 feet NW B-601
B-1760	3	28.6	1.2	1.2	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/4 10 feet NW B-601
B-1762	2	50.9	1.2	1.3	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/4 10 feet NW B-601
B-1764	1	38.2	1.1	1.2	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/4 10 feet NW B-601
B-1766	2	19.1	1.1	1.1	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/3 10 feet NW B-601
B-1768	2	50.9	0.7	0.8	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 10 feet NW B-601
B-1770	1	38.2	0.6	0.8	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 10 feet NW B-601
B-1772	1	38.2	0.6	0.8	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 12 feet NW B-601
B-1774	1	38.2	0.7	0.7	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 12 feet NW B-601
B-1776	1	38.2	0.5	0.6	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 13 feet NW B-601
B-1778	1	38.2	0.5	0.6	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 13 feet NW B-601
B-1780	1	38.2	0.5	0.7	0.2	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/4 13 feet NW B-601
B-1782	1	38.2	0.5	0.6	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	G/5 13 feet NW B-601
B-1784	1	25.5	-0.3	-0.3	0	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	No bonnet
B-1786	1	38.2	-0.3	-0.2	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	1/5 NW side F-607
B-1788	1	25.5	-0.4	-0.3	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	No bonnet
B-1790	1	38.2	-0.4	-0.3	0.1	A	R	03/19/18	B-5 / B-2	202017072540	56	11/ENE	1/2 NW side F-607
B-1792	5	47.7	0.8	1.0	0.2	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/4 W side F-607
B-1794	4	38.2	0.9	1.2	0.3	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/3 W side F-607
B-1796	2	19.1	0.9	1.1	0.2	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/3 W side F-607
B-1798	4	38.2	1.1	3.5	2.4	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/2 W side F-607
B-1800	3	28.6	1.2	1.4	0.2	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/4 W side F-607
B-1802	2	50.9	1.4	1.4	0	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	No bonnet
B-1804	1	25.5	1.3	1.4	0.1	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	No bonnet
B-1806	2	38.2	1.2	1.3	0.1	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/5 W side F-607
B-1808	2	50.9	1.3	1.4	0.1	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	No bonnet
B-1810	1	38.2	1.3	1.4	0.1	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/5 W side F-607
B-1812	1	25.5	1.3	1.4	0.1	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	No bonnet
B-1814	1	38.2	1.3	1.4	0.1	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	F-607
B-1816	4	38.2	1.4	1.8	0.4	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/1 Btm F-607
B-1818	4	38.2	1.5	1.8	0.3	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/6 Top F-607
B-1820	3	28.6	1.4	1.6	0.2	A	R	03/21/18	B-5 / B-1	202016121827	53	6/NE	1/6 Top F-607
B-1822	3	76.4	1.4	1.6	0.2	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/6 top F-607
B-1824	2	50.9	1.4	1.5	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/7 top F-607
B-1826	1	38.2	0.9	0.9	0	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/6 top F-607
B-1828	3	28.6	0.9	0.9	0	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/6 top F-607
B-1830	2	50.9	0.7	0.8	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/7 top F-607
B-1832	2	76.4	0.8	0.9	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/7 top F-607
B-1834	4	38.2	0.8	1.1	0.3	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/6 top F-607
B-1836	2	19.1	0.9	1.0	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/6 top F-607
B-1838	3	76.4	0.8	1.1	0.3	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/7 top F-607
B-1840	1	25.5	0.9	1.0	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/7 top F-607
B-1842	2	76.4	0.9	1.0	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/7 top F-607
B-1844	2	76.4	0.8	1.8	1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/7 top F-607
B-1846	4	38.2	1.3	1.4	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/6 S side F-607
B-1848	6	57.3	1.1	3.3	2.2	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/2 S side F-607
B-1850	3	28.6	1.3	1.4	0.1	A	R	03/21/18	B-5 / B-1	202016121827	54	6/NE	1/6 S side F-607
B-1852	2	76.4	0.9	1.0	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/4 10 feet SW E-603B
B-1854	2	76.4	0.8	1.0	0.2	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/5 10 feet SW E-603B

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-1856	2	76.4	0.9	1.1	0.2	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/5 10 feet SW E-603B
B-1858	2	76.4	0.9	1.0	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/5 10 feet SW E-603B
B-1860	1	25.5	1.1	1.1	0	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/7 10 feet W E-603B
B-1862	2	50.9	1.0	3.3	2.3	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/7 10 feet W E-603B
B-1864	3	38.2	1.3	1.3	0	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/6 10 feet W E-603B
B-1866	3	38.2	1.1	1.2	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/6 10 feet W E-603B
B-1868	2	25.5	1.2	1.3	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/6 10 feet W E-603B
B-1870	4	38.2	1.2	1.2	0	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/3 10 feet W E-603B
B-1872	2	19.1	1.2	1.2	0	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/3 10 feet W E-603B
B-1874	3	57.3	1.1	1.2	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/2 10 feet W E-603B
B-1876	3	76.4	1.1	1.2	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/1 10 feet W E-603B
B-1878	1	38.2	1.0	1.1	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/1 10 feet W E-603B
B-1880	2	19.1	1.0	1.2	0.2	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/2 10 feet W E-603B
B-1882	4	38.2	1.0	1.3	0.3	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/3 10 feet W E-603B
B-1884	1	9.5	1.1	1.2	0.1	A	R	03/21/18	B-5 / B-1	202016121827	56	6/NE	2/3 10 feet W E-603B
B-1886	3	9.5	1.2	1.2	0	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/6 15 feet E G-618
B-1888	2	9.5	1.0	1.2	0.2	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/3 15 feet E G-618
B-1890	2	9.5	1.2	1.2	0	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/3 15 feet E G-618
B-1892	2	76.4	1.2	1.2	0	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/1 15 feet E G-618
B-1894	1	38.2	1.2	1.3	0.1	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/1 15 feet E G-618
B-1896	2	76.4	1.2	1.2	0	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	No bonnet
B-1898	3	14.3	1.2	1.4	0.2	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/5 15 feet E G-618
B-1900	3	14.3	1.4	1.5	0.1	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/5 15 feet E G-618
B-1902	2	50.9	1.2	1.2	0	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	No bonnet
B-1904	1	25.5	1.1	1.4	0.3	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/6 15 feet E G-618
B-1906	2	50.9	1.1	1.2	0.1	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	No bonnet
B-1908	3	9.5	1.1	1.2	0.1	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/3 7 feet E HV-1501
B-1910	1	25.5	1.3	1.3	0	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/5 7 feet E HV-1501
B-1912	2	50.9	1.1	1.2	0.1	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	1/5 7 feet E HV-1501
B-1914	3	9.5	1.0	1.1	0.1	A	R	03/23/18	B-5 / B-7	202016121827	43	6/S	G/4 1 foot S FV-1194
B-1916	1	50.9	1.1	1.1	0	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/2 PV-1694
B-1918	2	101.9	1.0	1.1	0.1	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/2 PV-1694
B-1920	2	9.5	0.9	1.0	0.1	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/2 PV-1694
B-1922	2	50.9	0.9	1.2	0.3	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/1 Blw PV-1694
B-1924	1	25.5	1.0	1.2	0.2	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/1 Blw PV-1694
B-1926	4	12.7	1.0	1.2	0.2	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/4 E side PV-1694
B-1928	2	9.5	1.0	1.2	0.2	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/7 Abv PV-1694
B-1930	1	25.5	1.1	1.0	0	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	No bonnet
B-1932a	1	25.5	1.0	1.0	0	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	No bonnet
B-1932b	2	19.1	0.2	0.3	0.1	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	
B-1934	1	38.2	1.0	1.0	0	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/3 N side PV-1694
B-1936	2	76.4	1.0	1.1	0.1	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/3 N side PV-1694
B-1938	1	25.5	1.0	1.2	0.2	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/3 10 feet N PV-1698
B-1940	2	12.7	1.0	1.7	0.7	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/3 FV 1888
B-1942	1	38.2	1.0	1.1	0.1	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	G/1 Blw FV-1888
B-1944	Unknown	Unknown	1.0	2.0	1	A	R	03/23/18	B-5 / B-6	202016121827	50	0-5/NA	No bonnet
B-1946	1	6.4	-2.7	-2.6	0.1	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-1948	2	50.9	-2.6	-2.6	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1950	1	25.5	-2.6	-2.5	0.1	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	No bonnet
B-1952	1	38.2	-2.5	-2.5	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-1954	2	76.4	-2.5	-2.4	0.1	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	No bonnet
B-1956	1	38.2	-2.5	-2.4	0.1	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	No bonnet
B-1958	3	114.6	-2.3	-2.3	0	P	R	03/23/18	B-5 / B-7	202017072540	58	10/N	Bonnet Insulated
B-1960	1	38.2	-2.5	-2.3	0.2	P	R	03/23/18	B-5 / B-7	202017072540	58	10/N	Bonnet Insulated
B-1962	1	38.2	-2.4	-2.4	0	P	R	03/23/18	B-5 / B-7	202017072540	58	10/N	Bonnet Insulated
B-1964	1	38.2	-2.2	-2.2	0	P	R	03/23/18	B-5 / B-7	202017072540	58	10/N	Bonnet Insulated
B-1966	2	152.8	-2.3	-2.0	0.3	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-1968	1	76.4	-2.3	-2.3	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1970	1	76.4	-2.3	-2.3	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1972	1	38.2	-2.3	-2.1	0.2	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1974	3	57.3	-2.4	-2.1	0.3	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1976	2	76.4	-2.3	-2.3	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-1978	2	76.4	-2.4	-2.4	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-1980	1	38.2	-2.3	-2.3	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-1982	2	76.4	-2.2	-2.2	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1984	2	38.2	-2.2	-2.2	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1986	1	38.2	-2.1	-2.1	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1988	2	76.4	-2.0	-2.0	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/2 S side D-604
B-1990	2	76.4	-2.1	-2.1	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/3 S side D-604
B-1992	1	38.2	-2.2	-2.2	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/3 S side D-604
B-1994	1	38.2	-2.0	-2.0	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/3 S side D-604
B-1996	2	38.2	-2.2	-2.2	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-1998	3	114.6	-2.1	-2.1	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-2000	1	38.2	-2.2	-2.2	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/1 S side D-604
B-2002	2	76.4	-2.2	-2.2	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/4 S side D-604

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
B-2004	1	38.2	-2.1	-2.1	0	A	R	03/23/18	B-5 / B-7	202017072540	58	10/N	1/4 S side D-604
B-2006	1	25.5	0.3	0.3	0	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/7 S side D-604
B-2008	2	50.9	0.3	0.3	0	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/7 S side D-604
B-2010	2	76.4	0.0	0.1	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/7 S side D-604
B-2012	1	25.5	0.1	0.1	0	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/7 S side D-604
B-2014	0.5	38.2	0.1	0.1	0	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/7 S side D-604
B-2016	2	50.9	0.1	0.2	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/6 S side D-604
B-2018	1	25.5	0.0	0.1	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/6 S side D-604
B-2020	3	76.4	0.0	0.0	0	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/6 S side D-604
B-2022	2	50.9	0.0	0.0	0	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	No bonnet
B-2024	2	50.9	0.0	0.1	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/3 S side D-604
B-2026	2	38.2	0.0	0.1	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/2 S side D-604
B-2028	1	25.5	0.0	0.1	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/2 S side D-604
B-2030	1	25.5	0.0	0.1	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	1/1 S side D-604
B-2032	1	25.5	0.0	0.0	0	P	R	03/23/18	B-5 / B-7	202017072515	58	15/N	Bonnet Insulated
B-2034	1	25.5	0.0	0.1	0.1	A	R	03/23/18	B-5 / B-7	202017072515	58	15/N	No bonnet
B-2036	3	Unknown	1.0	107.0	106	A	R	03/29/18	B-6 / B-2	202017072515	58	0-5/NA	Cent.
B-2038	3	Unknown	4.4	10.2	5.8	A	R	03/29/18	B-6 / B-2	202017072515	58	0-5/NA	Cent.
B-2040	11	Unknown	2.3	158.0	155.7	A	R	03/29/18	B-6 / B-2	202017072515	58	0-5/NA	Cent.
B-2042	2	Unknown	0.8	947.0	946.2	A	R	03/29/18	B-6 / B-2	202017072515	58	0-5/NA	liquid present
B-2044	-	-	-	-	NA	U	R	03/29/18	B-6 / B-2	202017072515	58	0-5/NA	Contaminated w/product
B-2200	3	Unknown	0.6	1.0	0.4	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2202	13	Unknown	0.7	15.6	14.9	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2204	4	Unknown	1.0	1.4	0.4	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2206	5	Unknown	1.0	1.3	0.3	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2208	4	Unknown	0.9	1.8	0.9	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2210	5	Unknown	0.2	1.1	0.9	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2212	4	Unknown	0.7	0.8	0.1	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2214	6	Unknown	0.6	0.8	0.2	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2216	1	25.5	0.2	0.4	0.2	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2218	2	76.4	0.2	7.0	6.8	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2220	2	76.4	1.2	1.0	0	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2222	2	76.4	0.8	0.8	0	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2224	2	76.4	0.4	0.4	0	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
B-2226	1	25.5	0.3	0.7	0.4	A	R	03/29/18	B-1 / B-8	202016121827	67	3/E	
C-101-20157-P	2	Unknown	1.9	8.5	6.6	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20157-P	3	Unknown	1.9	2.0	0.1	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20172-P	1	Unknown	0.6	1.1	0.5	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20172-P	2	Unknown	0.6	1.6	1	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20195-P	3	Unknown	1.4	1.6	0.2	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20195-P	3	Unknown	1.5	1.7	0.2	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20210-P	1	Unknown	0.9	1.3	0.4	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20210-P	2	Unknown	0.9	1.2	0.3	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20219-P	2	Unknown	1.4	1.6	0.2	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20219-P	5	Unknown	1.5	1.6	0.1	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20230-P	2	Unknown	1.2	3.1	1.9	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20230-P	2	Unknown	1.2	2.9	1.7	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20254-P	3	Unknown	1.3	1.9	0.6	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20254-P	6	Unknown	1.7	3.5	1.8	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20267-P	1	Unknown	1.2	1.6	0.4	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20267-P	3	Unknown	1.2	1.9	0.7	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20282-P	2	Unknown	1.5	2.6	1.1	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20282-P	3	Unknown	1.9	1.5	0	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20329-P	1	Unknown	0.7	1.5	0.8	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20329-P	2	Unknown	0.7	1.9	1.2	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20345-P	2	Unknown	1.6	2.3	0.7	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20345-P	4	Unknown	1.5	2.5	1	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20369-P	1	Unknown	0.9	1.8	0.9	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20369-P	2	Unknown	0.9	2.1	1.2	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20379-P	4	Unknown	1.7	6.8	5.1	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20379-P	8	Unknown	1.7	6.2	4.5	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-20397-P	1	Unknown	0.9	1.8	0.9	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-20397-P	3	Unknown	0.9	1.8	0.9	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-21152-P	2	Unknown	1.0	2.1	1.1	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-21152-P	9	Unknown	1.2	4.0	2.8	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-21199-P	3	Unknown	0.5	0.9	0.4	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2314
C-101-21199-P	6	Unknown	0.5	77.0	76.5	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2314
C-101-21226-P	3	Unknown	0.8	2.6	1.8	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-21226-P	8	Unknown	1.0	3.6	2.6	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-21508-P	2	Unknown	0.6	10.0	9.4	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-21508-P	3	Unknown	0.6	1.0	0.4	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-101-21519-P	5	Unknown	2.1	11.0	8.9	A	R	03/05/18	C-1	2612	40	4/NE	
C-101-21519-P	7	Unknown	3.2	3.2	0	A	R	03/05/18	C-1	2612	40	4/NE	
C-105-20005-P	5	Unknown	2.1	2.2	0.1	A	R	03/05/18	C-1	2612	40	4/NE	
C-105-20005-P	3	Unknown	1.9	1.9	0	A	R	03/05/18	C-1	2612	40	4/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-105-20041-P	2	Unknown	0.2	0.6	0.4	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-105-20041-P	2	Unknown	0.6	0.6	0	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-105-20052-P	1	Unknown	1.9	1.9	0	A	R	03/05/18	C-1	2612	40	4/NE	
C-105-20052-P	5	Unknown	1.9	1.8	0	A	R	03/05/18	C-2	2635	40	4/NE	
C-110-20017-P	3	Unknown	1.5	6.4	4.9	A	R	03/05/18	C-2	2635	40	4/NE	
C-110-20017-P	2	Unknown	1.5	2.2	0.7	A	R	03/05/18	C-1	2612	40	4/NE	
C-110-20045-P	3	Unknown	1.7	15.1	13.4	A	R	03/05/18	C-1	2612	40	4/NE	Centrifugal
C-110-20045-P	5	Unknown	4.9	5.2	0.3	A	R	03/05/18	C-2	2635	40	4/NE	
C-110-20059-P	3	Unknown	0.5	59.0	58.5	A	R	03/05/18	C-2	2635	55	4/NNE	TVA #2635
C-110-20059-P	3	Unknown	0.5	2.0	1.5	A	R	03/05/18	C-2	2635	40	4/NE	TVA #2635
C-110-20073-P	2	Unknown	2.2	2.3	0.1	A	R	03/05/18	C-1	2612	40	4/NE	Centrifugal
C-110-20073-P	5	Unknown	2.0	2.6	0.6	A	R	03/05/18	C-1	2612	40	4/NE	
C-110-20085-P	3	Unknown	2.1	42.0	39.9	A	R	03/05/18	C-2	2635	55	4/NNE	TVA #2635
C-120-20001-P	3	Unknown	0.7	0.8	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-120-20001-P	4	Unknown	0.7	0.7	0	A	R	03/09/18	C-2	2314	47	3/S	LO/TO
C-120-20066-P	1	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20066-P	1	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20109-P	2	Unknown	0.5	0.5	0	A	R	03/09/18	C-2	2314	47	3/S	N/A Casing
C-120-20197-P	1	Unknown	1.3	1.4	0.1	P	R	03/09/18	C-3	2954	47	3/S	Housing Insulated
C-120-20214-P	2	Unknown	1.3	1.5	0.2	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20214-P	5	Unknown	1.4	1.5	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20277-P	2	Unknown	0.6	0.6	0	P	R	03/09/18	C-2	2314	47	3/S	Casing Insulated
C-120-20301-P	2	Unknown	0.6	0.6	0	P	R	03/09/18	C-2	2314	47	3/S	Casing Insulated
C-120-20339-P	1	Unknown	1.4	1.5	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20339-P	2	Unknown	1.4	1.5	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20402-P	1	Unknown	1.4	1.5	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20437-P	2	Unknown	0.4	0.6	0.2	A	R	03/12/18	C-4	2612	50	2/E	
C-120-20437-P	2	Unknown	0.2	0.7	0.5	A	R	03/12/18	C-4	2612	50	2/E	
C-120-20491-P	2	Unknown	0.3	0.7	0.4	P	R	03/09/18	C-2	2314	47	3/S	Casing Insulated
C-120-20498-P	2	Unknown	1.3	1.4	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-120-20534-P	2	Unknown	0.3	0.4	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-120-20534-P	2	Unknown	0.4	0.4	0	A	R	03/09/18	C-2	2314	47	3/S	LO/TO
C-120-20582-P	2	Unknown	0.4	0.4	0	P	R	03/09/18	C-2	2314	47	3/S	Casing Insulated
C-120-20630-P	4	Unknown	0.4	0.5	0.1	P	R	03/09/18	C-2	2314	47	3/S	Casing Insulated
C-120-20668-P	1	Unknown	0.8	0.8	0	P	R	03/09/18	C-2	2314	47	3/S	Blanket Insulated
C-120-20715-P	1	Unknown	0.6	0.6	0	P	R	03/09/18	C-2	2314	47	3/S	Blanket Insulated
C-120-20736-P	2	Unknown	0.5	1.5	1	P	R	03/09/18	C-2	2314	47	3/S	Blanket Insulated
C-1604-20007-P	4	Unknown	0.2	0.3	0.1	A	R	03/12/18	C-2	2954	51	2/E	Seal not exposed
C-1604-20016-P	1	Unknown	0.2	0.3	0.1	P	R	03/09/18	C-3	2954	60	7/SW	Housing Insulated
C-1604-20048-P	5	Unknown	0.3	0.4	0.1	A	R	03/12/18	C-2	2954	51	2/E	Seal not exposed
C-1604-20089-P	2	Unknown	0.2	0.4	0.2	P	R	03/12/18	C-2	2954	51	2/E	Insulated Casing
C-1620-20067-P	1	Unknown	0.0	0.6	0.6	A	R	03/12/18	C-4	2612	50	2/E	
C-1620-20067-P	2	Unknown	0.0	19.9	19.9	A	R	03/12/18	C-4	2612	50	2/E	
C-1620-20086-P	3	Unknown	0.8	0.9	0.1	A	R	03/12/18	C-2	2954	51	2/E	
C-1620-20086-P	2	Unknown	0.9	1.7	0.8	A	R	03/12/18	C-2	2954	51	2/E	
C-1620-20197-P	2	Unknown	0.2	0.7	0.5	A	R	03/12/18	C-4	2612	50	2/E	
C-1620-20197-P	1	Unknown	0.5	0.7	0.2	A	R	03/12/18	C-4	2612	50	2/E	
C-1620-20236-P	2	Unknown	0.8	3.6	2.8	A	R	03/12/18	C-2	2954	51	2/E	
C-1620-20236-P	2	Unknown	1.0	14.6	13.6	A	R	03/12/18	C-2	2954	51	2/E	
C-1620-20293-P	3	Unknown	0.0	8.6	8.6	A	R	03/12/18	C-4	2612	50	2/E	
C-1620-20293-P	1	Unknown	2.7	2.9	0.2	A	R	03/12/18	C-4	2612	50	2/E	
C-1620-20370-P	3	Unknown	0.8	13.5	12.7	A	R	03/12/18	C-2	2954	51	2/E	
C-1620-20370-P	8	Unknown	2.0	54.9	52.9	A	R	03/12/18	C-2	2954	51	2/E	
C-1621-20105-P	1	Unknown	0.1	0.1	0	P	R	03/12/18	C-4	2612	50	2/E	Housing Insulated
C-1621-20158-P	3	Unknown	0.0	1.4	1.4	P	R	03/12/18	C-2	2954	51	2/E	Insulated Casing
C-1626-20005-P	2	Unknown	0.2	0.3	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20005-P	3	Unknown	0.2	0.3	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20005-P	2	Unknown	0.8	0.9	0.1	A	R	03/12/18	C-2	2954	51	2/E	
C-1626-20005-P	2	Unknown	0.8	0.8	0	A	R	03/12/18	C-2	2954	51	2/E	
C-1626-20075-P	1	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20075-P	2	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20110-P	1	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20110-P	1	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20216-P	2	Unknown	0.2	0.2	0	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20216-P	2	Unknown	0.2	0.2	0	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20259-P	2	Unknown	0.2	0.2	0	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20259-P	2	Unknown	0.2	0.2	0	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20299-P	2	Unknown	0.2	0.3	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20299-P	2	Unknown	0.2	0.3	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20379-P	2	Unknown	0.2	0.2	0	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20379-P	1	Unknown	0.2	0.2	0	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20442-P	2	Unknown	0.2	0.3	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20442-P	2	Unknown	0.2	0.3	0.1	A	R	03/09/18	C-2	2314	47	3/S	
C-1626-20455-P	1	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20455-P	3	Unknown	1.2	1.3	0.1	A	R	03/09/18	C-3	2954	47	3/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-1626-20517-P	2	Unknown	1.2	1.4	0.2	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20517-P	1	Unknown	1.3	1.3	0	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20547-P	4	Unknown	1.2	1.2	0	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20547-P	2	Unknown	1.2	1.2	0	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20556-P	8	Unknown	1.1	1.3	0.2	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20556-P	3	Unknown	1.2	2.9	1.7	A	R	03/09/18	C-3	2954	47	3/S	
C-1626-20569-P	3	Unknown	0.2	0.3	0.1	A	R	03/09/18	C-2	2161	47	3/S	
C-1626-20569-P	4	Unknown	0.3	0.4	0.1	A	R	03/09/18	C-2	2161	47	3/S	
C-1626-20604	1	19.1	2.4	2.5	0.1	A	R	03/29/18	C-5	1993	73	4/NNE	Both PRD's tie in together
C-1626-20607	1	19.1	2.4	2.5	0.1	A	R	03/29/18	C-5	1993	73	4/NNE	Same point to monitor
C-1627-20033-P	2	Unknown	0.7	1.8	1.1	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20033-P	3	Unknown	0.9	1.2	0.3	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20033-P	2	Unknown	0.9	0.9	0	A	R	03/09/18	C-3	2954	60	7/SW	
C-1627-20033-P	4	Unknown	0.6	0.8	0.2	A	R	03/09/18	C-3	2954	60	7/SW	
C-1627-20055-P	3	Unknown	0.7	0.8	0.1	A	R	03/09/18	C-3	1993	60	7/SW	
C-1627-20070-P	2	Unknown	0.0	0.0	0	A	R	03/09/18	C-3	1993	60		
C-1627-20087-P	4	Unknown	0.2	0.3	0.1	A	R	03/12/18	C-2	2954	51	2/E	
C-1627-20087-P	3	Unknown	0.3	0.2	0	A	R	03/12/18	C-2	2954	51	2/E	
C-1627-20095-P	2	Unknown	0.8	0.9	0.1	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20095-P	2	Unknown	0.8	0.9	0.1	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20113-P	2	Unknown	0.8	0.9	0.1	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20113-P	2	Unknown	0.9	0.9	0	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20129-P	2	Unknown	0.7	1.0	0.3	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20129-P	2	Unknown	0.9	0.9	0	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20156-P	3	Unknown	0.7	0.9	0.2	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20156-P	5	Unknown	0.8	0.8	0	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20241-P	2	Unknown	0.7	0.8	0.1	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20241-P	5	Unknown	0.8	9.1	8.3	A	R	03/09/18	C-2	2161	60	7/SW	
C-1627-20252-P	3	Unknown	0.2	0.2	0	A	R	03/12/18	C-4	2612	50	2/E	
C-1627-20252-P	1	Unknown	-0.3	0.4	0.7	A	R	03/12/18	C-4	2612	50	2/E	
C-1627-20319-P	2	Unknown	0.4	0.5	0.1	A	R	03/09/18	C-3	1993	60	7/SW	
C-401-20010	3	7.2	0.7	0.0	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20010.3	1	2.4	0.5	0.0	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20011	2	6.4	0.5	1.0	0.5	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20011.3	1	3.2	0.5	0.9	0.4	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20014-P	1	Unknown	3.9	4.8	0.9	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-20014-P	2	Unknown	3.9	4.8	0.9	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-20015	3	76.4	0.5	2.9	2.4	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20015.3	1	38.2	1.0	2.2	1.2	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20016	2	6.4	0.3	1.4	1.1	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20016.3	1	3.2	0.3	0.7	0.4	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20017	2	50.9	0.3	1.0	0.7	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20017.3	1	25.5	0.9	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20018	2	6.4	0.3	1.4	1.1	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20018.3	1	3.2	0.4	1.0	0.6	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20019	2	6.4	0.6	1.3	0.7	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20019.3	1	3.2	0.4	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20020	2	50.9	0.4	1.1	0.7	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20020.3	1	25.5	0.5	0.8	0.3	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20021	2	50.9	0.3	1.0	0.7	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20021.3	1	25.5	0.5	1.0	0.5	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20023	2	12.7	0.3	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20023.3	1	6.4	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20024	2	50.9	0.1	0.0	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20024.3	1	25.5	0.1	0.0	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20025	2	19.1	0.1	0.0	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20025.3	1	9.6	0.1	0.0	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20026	2	50.9	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20026.3	1	25.5	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20027	3	19.1	0.6	0.9	0.3	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20027.3	1	6.4	0.7	0.9	0.2	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20028	3	9.6	0.9	0.9	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20028.3	1	3.2	0.8	0.8	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20029	2	50.9	0.1	0.1	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20029.3	1	25.5	0.1	0.1	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20032	3	9.6	0.2	0.2	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20032.3	2	6.4	0.2	0.2	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20033	3	9.6	0.3	0.1	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20033.3	1	3.2	0.2	0.2	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20034	2	50.9	0.2	0.2	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20034.3	1	25.5	0.2	0.2	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20035	2	50.9	0.2	0.2	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20036	3	9.6	0.1	0.1	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20036.3	7	22.3	0.1	0.1	0	A	R	03/28/18	C-2	1993	69	7/NE	
C-401-20037	2	50.9	0.2	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20037.3	1	25.5	0.2	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20038	2	9.6	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20038.3	1	4.8	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20039	2	50.9	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20039.3	1	25.5	0.2	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20040	3	7.2	0.2	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20040.3	1	2.4	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20041	2	9.6	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20041.3	1	4.8	0.2	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20042	3	7.2	0.2	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20042.3	1	2.4	0.1	0.1	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20043	2	50.9	0.2	0.3	0.1	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20043.3	1	25.5	0.2	0.2	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20044	2	50.9	0.3	1.6	1.3	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20044.3	1	25.5	0.3	1.3	1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20045	2	9.6	0.3	1.7	1.4	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20045.3	1	4.8	0.9	1.3	0.4	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20046	2	9.6	0.8	2.2	1.4	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20046.3	1	4.8	1.2	3.7	2.5	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20047	2	50.9	0.9	2.9	2	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20047.3	1	25.5	0.8	2.2	1.4	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20048	2	19.1	0.9	2.7	1.8	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20048.3	1	9.6	0.8	2.4	1.6	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20049	2	19.1	0.9	2.7	1.8	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20049.3	1	9.6	0.7	2.1	1.4	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20050	2	50.9	0.8	1.5	0.7	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20050.3	1	25.5	0.8	1.2	0.4	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20053	1	38.2	1.0	1.8	0.8	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20053.3	1	38.2	0.8	1.7	0.9	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20054	1	38.2	0.7	0.3	0	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20054.3	1	38.2	0.2	0.3	0.1	A	R	03/28/18	C-2	2635	69	7/NE	
C-401-20055	2	50.9	0.7	1.8	1.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20055.3	2	50.9	0.6	2.1	1.5	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20059	2	6.4	0.9	1.0	0.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20059.3	1	3.2	0.8	1.0	0.2	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20060	2	50.9	0.9	1.0	0.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20060.3	1	25.5	0.9	1.0	0.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20061	2	4.8	0.6	1.2	0.6	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20061.3	1	2.4	0.9	1.0	0.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20063	3	7.2	0.9	1.0	0.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20063.3	1	2.4	0.8	1.0	0.2	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20064	2	50.9	0.7	1.0	0.3	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20064.3	1	25.5	0.9	1.0	0.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20069	2	19.1	0.9	0.9	0	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20069.3	1	9.6	0.9	0.8	0	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20070	2	19.1	0.7	0.9	0.2	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20070.3	1	9.6	0.9	1.0	0.1	A	R	03/29/18	C-2	1993	53	2/SE	
C-401-20132	2	50.9	0.7	0.8	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20132.3	1	25.5	0.6	0.7	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20133	2	50.9	0.7	0.7	0	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20133.3	1	25.5	0.6	0.8	0.2	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20134	2	50.9	0.6	0.7	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20134.3	1	25.5	0.6	0.7	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20135	1	25.5	0.7	0.8	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20135.3	1	25.5	0.7	1.0	0.3	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20136	1	25.5	0.7	0.9	0.2	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20136.3	1	25.5	0.8	2.8	2	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20137	1	25.5	0.9	1.2	0.3	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20137.3	2	50.9	0.9	0.9	0	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20138	1	25.5	0.8	1.1	0.3	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20138.3	1	25.5	0.8	0.8	0	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20139	1	25.5	0.8	0.8	0	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20139.3	1	25.5	0.7	0.8	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20140	2	50.9	0.7	0.8	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-20143	1	19.1	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20143	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20143.3	1	25.5	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20144	2	50.9	0.8	0.8	0	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20144.3	1	38.2	0.7	0.9	0.2	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20145	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20146	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20146.3	1	25.5	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20151	3	5.7	0.8	0.0	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20151	4	7.6	1.1	1.3	0.2	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20151.3	1	1.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20151.3	2	3.8	1.1	2.0	0.9	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20152	1	25.5	0.9	1.0	0.1	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20153	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20153	2	50.9	0.9	1.1	0.2	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20153.3	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20153.3	1	25.5	0.9	1.0	0.1	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20154	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20154	1	25.5	0.9	1.0	0.1	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20154.3	2	50.9	0.9	1.0	0.1	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20154.5	1	25.5	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20155	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20155	1	25.5	1.0	1.2	0.2	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20155.3	1	25.5	0.1	0.1	0	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20155.3	1	25.5	1.1	1.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20156	2	25.5	1.0	1.1	0.1	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20157	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20157	2	50.9	0.9	1.1	0.2	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20157.3	1	25.5	0.9	0.9	0	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20157.4	1	25.5	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20158	2	19.1	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20158	1	12.7	0.9	0.9	0	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20158.3	1	12.7	0.7	0.9	0.2	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20159	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20159	2	50.9	0.7	0.8	0.1	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20159.3	1	25.5	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20159.3	1	25.5	0.7	0.8	0.1	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20160	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20160	2	50.9	0.6	0.8	0.2	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20160.1	1	25.5	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	
C-401-20160.3	1	25.5	0.7	0.8	0.1	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20161	3	76.4	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20161	2	50.9	0.6	0.8	0.2	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20161.3	1	25.5	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20161.3	0.5	12.7	0.7	0.8	0.1	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20163	2	38.2	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20163	1	19.1	0.6	0.7	0.1	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20164	3	9.6	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20164	1	3.2	0.8	0.8	0	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20164.3	1	3.2	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20164.3	1	3.2	0.7	0.9	0.2	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20165	2	50.9	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20165	2	50.9	0.6	0.8	0.2	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20166	3	9.6	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20166	2	4.8	0.8	0.8	0	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20166.3	1	3.2	0.1	0.1	0	A	R	03/29/18	C-2	2635	53	2/SE	P-104
C-401-20166.3	1	2.4	0.7	1.1	0.4	A	R	04/02/18	C-4	1993	69	10/E	P-104
C-401-20171-V	3	57.3	0.8	4.4	3.6	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20172	2	25.5	0.1	0.1	0	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20222	2	12.7	0.1	1.9	1.8	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20222.3	1	6.4	0.9	1.6	0.7	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20223	2	12.7	1.0	1.5	0.5	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20223.3	1	6.4	1.0	1.8	0.8	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20224	1	6.4	1.0	1.2	0.2	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20224.3	1	6.4	1.0	1.6	0.6	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20226	2	50.9	1.0	1.9	0.9	A	R	03/29/18	C-2	2612	53	2/SE	E-153
C-401-20226	1	25.5	1.0	2.0	1	A	R	03/29/18	C-2	2612	53	2/SE	E-153
C-401-20227	1	25.5	1.0	2.0	1	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20228	2	50.9	1.0	2.0	1	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20228.3	1	38.2	1.0	1.8	0.8	A	R	03/29/18	C-2	2612	53	2/SE	
C-401-20241-V	1	25.5	2.1	2.2	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20242-V	1	25.5	2.0	2.2	0.2	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20243-V	1	25.5	2.3	2.3	0	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20244.2	2	50.9	2.0	8.6	6.6	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20244-V	1	25.5	2.0	2.1	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20245-V	1	25.5	2.0	2.5	0.5	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20246-V	1	25.5	0.8	1.0	0.2	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20247.2	1	25.5	0.9	0.9	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20247-V	0.5	12.7	0.8	1.0	0.2	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20248-V	0.5	12.7	0.9	1.0	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20249-V	0.5	12.7	1.0	1.0	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20250.2	1	25.5	0.9	1.0	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20250-V	1	25.5	0.9	1.0	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20251-V	1	19.1	1.2	1.2	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20288-V	1	25.5	0.8	1.0	0.2	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20289-V	1	25.5	0.9	1.1	0.2	A	R	03/29/18	C-5	2954	53	2/SE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20290.2	0.5	12.7	0.9	0.9	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20290-V	1	25.5	0.9	0.9	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20291-V	1	25.5	0.9	1.0	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20292-V	1	25.5	1.0	1.0	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20293-V	1	25.5	1.1	1.2	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20294.2	0.5	12.7	1.1	1.2	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20294-V	1	25.5	1.0	1.1	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20295-V	1	25.5	1.0	1.1	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20296-V	1	25.5	1.1	1.1	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20297-V	1	19.1	1.1	1.2	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20316.2	1	25.5	1.1	1.2	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20316-V	1	25.5	1.2	1.2	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20317-V	1	25.5	1.2	1.3	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20318-V	1	25.5	1.4	1.3	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20319.2	1	25.5	1.3	2.6	1.3	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20319-V	1	25.5	1.4	1.4	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20320-V	1	25.5	1.2	2.8	1.6	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20321-V	1	25.5	1.2	1.2	0	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20322.3	0.5	12.7	1.0	1.1	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20322-V	0.5	12.7	1.1	1.2	0.1	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20323-V	1	25.5	1.2	1.4	0.2	A	R	03/29/18	C-5	2954	53	2/SE	
C-401-20324-V	1	25.5	1.4	1.4	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20325-V	1	12.7	1.5	1.6	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20412-V	2	50.9	2.0	2.1	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20413-V	1	25.5	2.0	2.0	0	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20414.2	1	25.5	2.0	2.0	0	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20414-V	1	25.5	2.2	2.1	0	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20415-V	0.5	12.7	2.2	2.4	0.2	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20416-V	1	25.5	2.2	2.3	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20417.2	0.5	12.7	2.2	2.5	0.3	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20417-V	0.5	12.7	2.1	2.2	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20418-V	1	25.5	2.0	2.2	0.2	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20419-V	1	25.5	2.0	2.1	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20420.2	0.5	12.7	2.0	2.1	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20420-V	1	25.5	2.1	2.2	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20423-V	1	25.5	2.1	2.4	0.3	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20424	4	101.9	0.2	0.3	0.1	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20424.2	1	25.5	2.0	2.2	0.2	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20424.3	1	25.5	0.3	0.3	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20424-V	0.5	12.7	2.1	2.2	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20425	2	50.9	0.1	0.1	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20425-V	0.5	12.7	2.2	2.2	0	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20426	5	127.3	0.2	0.2	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20426.3	1	25.5	0.2	0.1	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20426-V	2	50.9	2.3	2.3	0	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20427	2	50.9	0.1	1.1	1	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20427.2	1	25.5	2.5	4.4	1.9	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20427.3	1	25.5	0.0	0.3	0.3	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20427-V	1	25.5	2.5	2.6	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20428	2	50.9	0.0	0.1	0.1	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20428.3	1	25.5	0.0	0.2	0.2	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20428-V	1	25.5	2.6	2.7	0.1	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20429	2	50.9	0.0	0.2	0.2	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20429.3	1	25.5	0.0	0.1	0.1	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20429-V	1	25.5	2.1	2.7	0.6	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20430	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20430.2	0.5	12.7	2.0	2.4	0.4	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20430.3	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20430-V	1	25.5	2.1	2.1	0	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20431	2	50.9	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20431-V	1	25.5	2.0	2.2	0.2	A	R	03/29/18	C-5	2161	53	2/SE	
C-401-20438-P	1	Unknown	1.4	1.5	0.1	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-401-20438-P	2	Unknown	1.4	1.5	0.1	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-401-20448	9	17.2	2.0	5484.0	5482	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20448.3	2	3.8	2.3	3.8	1.5	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20455	2	50.9	0.7	0.7	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20455.3	1	25.5	0.6	0.6	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20456	3	76.4	1.3	1.6	0.3	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20456.3	1	50.9	0.9	0.9	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20457	2	50.9	0.6	0.6	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20457.3	1	25.5	0.6	0.6	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20461	1	12.7	0.7	0.9	0.2	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20462	2	50.9	0.7	3.2	2.5	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20463	2	4.8	0.9	2.8	1.9	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20463.3	1	2.4	1.5	0.7	0	A	R	04/02/18	C-4	2314	66	8/W	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20464	1	25.5	1.1	7.5	6.4	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20464.3	1	25.5	0.9	0.9	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20474	2	19.1	0.7	1.0	0.3	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20474.3	1	9.6	1.6	0.7	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20484	2	50.9	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20484.3	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20485	2	50.9	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20485.3	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20486	2	50.9	0.0	0.2	0.2	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20486.3	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20487	1	25.5	0.0	0.3	0.3	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20487.3	1	25.5	0.0	0.1	0.1	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20488	1	25.5	0.0	0.4	0.4	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20488.3	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20489	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20489.3	0.5	12.7	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20490	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20490.3	1	25.5	0.0	0.4	0.4	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20491	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20491.3	1	25.5	0.0	0.0	0	A	R	04/02/18	C-4	2635	69	10/E	
C-401-20492	2	25.5	1.3	1.3	0	A	R	04/02/18	C-4	1993	69	10/E	
C-401-20514	2	50.9	0.7	1.9	1.2	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20514.3	1	25.5	0.5	1.3	0.8	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20515	2	50.9	1.4	1.2	0	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20515.3	1	25.5	1	1.4	0.4	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20516	2	50.9	1	4.6	3.6	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20516.3	1	25.5	0.3	0.5	0.2	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20517	2	50.9	0.7	4.2	3.5	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20517.3	1	25.5	0.4	1.3	0.9	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20518	2	50.9	0.4	4.8	4.4	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20518.3	1	25.5	0.5	4.8	4.3	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20519	1	25.5	0.3	3.3	3	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20519.3	1	25.5	1.2	2.1	0.9	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20520	2	50.9	0.3	4.0	3.7	A	R	04/02/18	C-4	2314	66	8/W	
C-401-20520.3	1	25.5	0.9	3.5	2.6	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20521	2	50.9	2.0	3.0	1	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20521.3	1	25.5	1.9	2.5	0.6	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20522	2	50.9	1.8	4.1	2.3	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20522.3	3	76.4	0.9	17.0	16.1	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20523	2	19.1	2.5	5.4	2.9	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20530	2	6.4	2.1	2.5	0.4	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20530.3	1	3.2	1.7	1.8	0.1	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20531	2	12.7	1.9	0.9	0	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20531.3	0.5	3.2	1.8	1.9	0.1	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20532	2	19.1	1.9	3.2	1.3	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20532.3	1	9.6	1.8	1.8	0	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20534	2	19.1	1.7	2.9	1.2	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20534.3	1	9.6	1.5	1.4	0	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20535	2	6.4	1.4	1.4	0	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20535.3	1	3.2	1.1	1.6	0.5	A	R	04/02/18	C-4	2612	66	8/W	
C-401-20540-P	3	Unknown	-2.1	0.0	2.1	A	R	03/06/18	C-1	2635	47	9/ENE	LO/TO OOS
C-401-20540-P	10	Unknown	-2.1	0.0	2.1	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20559-P	4	Unknown	-2.2	0.0	2.2	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20559-P	4	Unknown	-2.1	-2.2	0	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20612-P	4	Unknown	-2.1	0.0	2.1	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20612-P	5	Unknown	-2.2	0.0	2.2	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20630-P	2	Unknown	1.9	6.1	4.2	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-20630-P	3	Unknown	1.9	6.1	4.2	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-20679	2	25.5	0.0	0.7	0.7	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20680	2	50.9	0.1	0.3	0.2	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20680.3	1	25.5	0.2	0.2	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20681	2	50.9	0.1	0.1	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20681.3	1	25.5	0.1	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20681-V	1	25.5	1.0	1.2	0.2	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20682	2	25.5	0.1	0.1	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20682.2	0.5	12.7	0.8	1.0	0.2	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20682-V	0.5	12.7	0.3	0.5	0.2	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20684.3	0.5	38.2	0.2	0.3	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20684.6	1	76.4	0.2	0.3	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20684.9	1	76.4	0.1	0.2	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20684-V	1	76.4	0.3	0.3	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20685.3	1	25.5	0.1	0.2	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20685-V	1	25.5	0.1	0.2	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20686.2	0.5	12.7	0.1	0.2	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20686.5	1	25.5	0.1	0.1	0	A	R	03/28/18	C-4	2954	69	7/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20686-V	1	25.5	0.1	0.2	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20687.3	0.5	38.2	0.1	0.1	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20687.6	0.5	38.2	0.0	0.1	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20687.9	1	76.4	0.0	0.1	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20687-V	1	76.4	0.0	0.1	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20688.3	1	76.4	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20688.6	1	76.4	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20688.9	0.5	38.2	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20688-V	1	76.4	0.0	0.1	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20689.3	0.5	12.7	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20689.5	1	76.4	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20689-V	1	25.5	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20690.4	0.5	12.7	1.3	1.4	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20690-V	1	25.5	1.2	1.4	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20691.2	1	76.4	1.1	1.3	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20691.5	0.5	38.2	1.0	1.2	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20691.8	1	76.4	1.1	1.1	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20691-V	1	76.4	1.1	1.3	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20692.3	0.5	38.2	0.4	0.6	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20692.6	0.5	38.2	0.4	0.5	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20692.9	1	76.4	0.4	0.4	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20692-V	2	152.8	0.4	0.6	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20693.2	1	25.5	0.3	0.4	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20693.5	1	25.5	0.1	0.4	0.3	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20693-V	1	25.5	0.2	0.4	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20694.3	1	25.5	0.2	0.3	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20694-V	1	25.5	0.1	0.4	0.3	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20695.3	1	76.4	0.2	0.4	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20695.6	0.5	38.2	0.2	0.4	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20695.9	1	76.4	0.3	0.4	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20695-V	1	76.4	0.4	0.5	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20696.3	1	76.4	0.0	0.2	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20696.6	1	76.4	0.2	0.2	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20696.9	0.5	38.2	0.1	0.2	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20696-V	1	76.4	0.2	0.2	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20697.2	1	25.5	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20697.5	0.5	12.7	0.1	0.1	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20697-V	1	25.5	0.0	0.2	0.2	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20698.3	0.5	12.7	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20698-V	1	25.5	0.0	0.1	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20699.4	1	76.4	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20699-V	1	76.4	0.0	0.0	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20700.3	1	76.4	1.3	1.4	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20700.6	2	152.8	1.2	1.5	0.3	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20700.9	1	76.4	1.1	1.2	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20700-V	2	152.8	1.3	1.3	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20701.3	2	50.9	1.1	1.2	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20701-V	1	25.5	1.0	1.2	0.2	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20702.2	1	25.5	1.1	1.1	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20702.5	1	25.5	1.0	1.1	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20702-V	1	25.5	1.1	1.2	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20703.2	1	76.4	0.9	1.1	0.2	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20703.5	1	76.4	0.9	0.9	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20703.8	1	76.4	1.0	1.0	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20703-V	1	76.4	1.0	1.1	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20704.3	1	25.5	1.0	1.0	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20704-V	1	25.5	1.0	1.0	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20705.2	1	25.5	1.0	1.0	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20705.5	1	25.5	1.0	1.0	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20705-V	1	25.5	1.0	1.0	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20706-V	1	25.5	1.0	1.1	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20707-V	3	4.8	0.8	3.0	2.2	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20708-V	2	50.9	1.4	1.4	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20710-V	1	25.5	1.5	1.5	0	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20716-V	3	4.8	1.2	6.4	62.8	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20717.2	1	25.5	2.0	2.3	0.3	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20717-V	1	25.5	2.4	2.4	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20718.3	2	3.2	1.5	2.7	1.2	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20718-V	3	4.8	1.7	1.6	0	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20719-V	1	25.5	1.5	1.6	0.1	A	R	03/29/18	C-5	2314	53	2/SE	
C-401-20720-V	2	2.1	0.1	0.3	0.2	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20721.3	1	76.4	0.0	0.1	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20721.6	1	76.4	0.1	0.1	0	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20721-V	1	76.4	0.0	0.1	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20722.3	1	76.4	0.0	0.8	0.8	A	R	03/27/18	C-4	1993	68	2/N	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20722.6	1	76.4	0.3	0.3	0	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20722-V	1	76.4	0.0	0.1	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20723.3	0.5	12.7	2.3	2.3	0	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20723.6	0.5	12.7	2.0	2.1	0.1	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20723-V	1	25.5	0.0	0.0	0	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20724.3	0.5	12.7	1.9	2.0	0.1	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20724.6	1	25.5	1.9	2.0	0.1	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20724-V	1	25.5	2.0	2.1	0.1	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20725.3	1	2.4	0.4	1.1	0.7	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20725-V	4	9.6	1.9	2.8	0.9	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20726-V	0.5	12.7	0.8	1.4	0.6	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20727.2	0.5	12.7	0.8	1.0	0.2	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20727-V	1	25.5	1.0	1.1	0.1	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20728-V	0.5	12.7	0.7	0.9	0.2	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20729-V	1	25.5	0.8	1.0	0.2	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20730.2	1	2.4	0.5	1.0	0.5	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20730-V	2	4.8	0.8	0.8	0	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20731-V	0.5	12.7	0.5	0.5	0	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20732-V	0.5	12.7	0.4	0.6	0.2	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20762-V	1	25.5	0.6	0.7	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20733.3	1	25.5	0.4	0.7	0.3	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20733-V	1	25.5	0.4	0.6	0.2	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20734.2	1	25.5	0.4	0.9	0.5	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20734-V	1	25.5	0.5	0.7	0.2	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20735.3	1	25.5	0.6	0.6	0	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20735.6	1	25.5	0.4	0.5	0.1	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20736.3	1	25.5	0.4	0.4	0	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20736.6	1	2.4	0.4	0.5	0.1	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20736-V	1	25.5	0.2	0.5	0.3	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20737.4	1	25.5	0.9	0.9	0	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20737-V	1	25.5	0.9	0.9	0	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20738.3	1	25.5	0.9	1.0	0.1	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20738.6	1	2.4	0.8	1.0	0.2	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20738-V	1	25.5	0.9	1.0	0.1	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20739-V	2	4.8	0.9	1.1	0.2	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20740-V	1	25.5	0.9	0.9	0	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20741.2	0.5	12.7	0.9	0.9	0	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20741-V	1	25.5	0.8	1.1	0.3	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20742.3	1	25.5	0.9	1.0	0.1	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20742-V	0.5	12.7	0.9	1.2	0.3	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20743-V	1	25.5	0.9	0.9	0	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20744.3	2	4.8	0.7	0.9	0.2	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20744-V	2	4.8	0.8	0.9	0.1	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20745-V	1	25.5	1.4	1.7	0.3	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20746.3	0.5	12.7	1.3	1.4	0.1	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20746-V	1	25.5	1.3	1.4	0.1	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20747.3	0.5	12.7	1.2	1.3	0.1	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20747-V	1	25.5	1.3	1.4	0.1	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20749-V	1	25.5	1.2	1.4	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20750.3	0.5	12.7	1.2	1.4	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20750-V	1	25.5	1.3	1.5	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20751.4	1	25.5	1.2	1.4	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20751-V	0.5	12.7	1.2	1.4	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20752.3	1	25.5	1.1	1.3	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20752-V	1	25.5	1.0	1.2	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20753.2	0.5	12.7	1.1	1.3	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20753-V	0.5	12.7	1.0	1.3	0.3	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20754-V	2	4.8	1.1	1.7	0.6	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20755-V	1	25.5	1.4	1.6	0.2	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20756.2	0.5	12.7	1.4	1.9	0.5	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20756-V	1	25.5	1.3	1.6	0.3	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20757.3	0.5	12.7	1.5	1.5	0	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20757-V	1	25.5	1.3	1.4	0.1	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20758.2	4	101.9	1.3	16.1	14.8	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20758-V	1	25.5	1.2	1.5	0.3	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20759-V	3	7.2	1.5	1.9	0.4	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20735-V	1	25.5	0.3	0.5	0.2	A	R	03/27/18	C-4	2314	68	2/N	
C-401-20760-V	1	25.5	1.7	1.8	0.1	A	R	03/28/18	C-4	2314	52	2/SSE	
C-401-20761.2	1	25.5	0.6	0.7	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20761-V	1	25.5	0.6	0.7	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20762.3	0.5	12.7	0.6	0.6	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20763-V	1	25.5	0.2	0.5	0.3	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20764.3	1	25.5	0.4	0.5	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20764-V	1	25.5	0.4	0.5	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20765.4	1	25.5	0.3	0.4	0.1	A	R	03/28/18	C-4	2954	69	7/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20765.6	1	2.4	0.4	0.4	0	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20765-V	1	25.5	0.4	0.5	0.1	A	R	03/28/18	C-4	2954	69	7/NE	
C-401-20768-P	4	Unknown	0.1	1.9	1.8	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20768-P	4	Unknown	-0.1	3.9	4	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20769.3	1	3.2	1.3	2.5	1.2	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20769-V	1	3.2	1.1	1.8	0.7	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20770.2	2	6.4	2.2	3.7	1.5	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20770-V	1	25.5	0.9	1.2	0.3	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20771.3	0.5	12.7	1.3	3.4	2.1	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20771-V	0.5	12.7	1.6	1.8	0.2	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20772.3	1	25.5	2.0	3.0	1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20772-V	3	76.4	1.4	7.9	6.5	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20773.2	1	3.2	1.3	3.5	2.2	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20773-V	1	3.2	1.2	1.5	0.3	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20774-V	2	50.9	1.3	2.5	1.2	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20775-V	0.5	9.6	1.5	4.2	2.7	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20776.3	1	19.1	1.0	2.5	1.5	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20776-V	2	50.9	1.4	4.1	2.7	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20777-V	1	19.1	1.6	2.4	0.8	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20777-V	1	25.5	1.1	3.0	1.9	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20778-V	1	19.1	1.3	3.6	2.3	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20779-V	2	3.8	1.8	2.9	1.1	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20780-V	1	25.5	1.2	1.4	0.2	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20781.3	0.5	12.7	1.4	2.7	1.3	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20781-V	0.5	12.7	1.6	3.8	2.2	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20782.3	1	25.5	1.4	1.9	0.5	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20782-V	1	25.5	1.5	2.6	1.1	A	R	03/28/18	C-4	2954	52	2/SSE	
C-401-20784.2	0.5	12.7	1.2	1.4	0.2	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20784-V	1	25.5	1.2	1.3	0.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20785-V	0.5	9.6	1.3	1.3	0	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20786.3	1	19.1	1.4	1.7	0.3	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20786-V	0.5	12.7	1.2	1.3	0.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20787-V	0.5	12.7	1.3	1.4	0.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20788-V	1	19.1	1.1	1.2	0.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20789.2	1	25.5	1.3	1.3	0	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20789-V	1	25.5	1.1	1.4	0.3	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20790.3	1	9.6	1.1	1.2	0.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20790-V	1	9.6	1.1	1.3	0.2	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20791-V	1	25.5	1.1	1.2	0.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20792-V	1	25.5	1.0	1.1	0.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20793.2	1	25.5	1.3	1.5	0.2	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20793-V	1	25.5	1.2	23.0	21.8	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20794.3	1	25.5	1.7	1.7	0	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20794-V	1	25.5	1.1	2.9	1.8	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20795-V	1	25.5	1.6	1.6	0	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20796.3	1	25.5	1.6	2.7	1.1	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20796.6	1	25.5	1.0	2.7	1.7	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20796-V	1	25.5	1.0	2.8	1.8	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20797-P	3	Unknown	0.5	0.6	0.1	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20797-P	4	Unknown	-0.1	5.8	5.9	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20798.3	0.5	12.7	0.8	1.3	0.5	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20798-V	1	25.5	0.5	2.0	1.5	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20799-V	1	25.5	1.0	1.6	0.6	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20800-V	1	25.5	0.4	0.6	0.2	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20802.3	1	25.5	1.4	1.4	0	A	R	03/28/18	C-4	1993	52	2/SSE	
C-401-20802-V	1	25.5	0.2	0.3	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20803-V	2	50.9	0.4	1.0	0.6	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20804-V	2	50.9	0.7	1.6	0.9	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20805.3	1	25.5	0.4	0.7	0.3	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20805-V	1	25.5	0.7	1.4	0.7	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20807.3	0.5	12.7	1.5	1.5	0	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20807.3	0.5	12.7	1.5	1.5	0	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20807.6	1	25.5	1.4	1.6	0.2	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20807-V	1	25.5	1.4	1.6	0.2	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20808-V	0.5	12.7	1.4	1.6	0.2	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20809-V	1	19.1	1.5	1.6	0.1	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20810-V	1	25.5	1.4	1.5	0.1	A	R	03/27/18	C-4	2612	50	7/N	
C-401-20811.3	1	25.5	0.4	0.6	0.2	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20811-V	1	25.5	0.6	0.7	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20812-V	1	12.7	0.5	0.6	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20815.2	0.5	12.7	0.4	0.5	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20815-V	0.5	12.7	0.5	0.6	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20816.3	1	38.2	0.5	0.6	0.1	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20816-V	1	25.5	0.4	0.6	0.2	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20817.3	0.5	1.2	0.5	0.5	0	A	R	03/27/18	C-4	1993	68	2/N	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-20817-V	3	7.2	0.6	1.1	0.5	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20818-V	1	6.4	0.4	1.1	0.7	A	R	03/27/18	C-4	1993	68	2/N	
C-401-20912-P	3	Unknown	-0.3	1.4	1.7	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20912-P	5	Unknown	-1.3	1.3	2.6	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-20933	3	5.7	0.6	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20933.3	1	1.9	0.1	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20950-P	2	Unknown	3.4	5.2	1.8	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-20950-P	3	Unknown	3.4	5.2	1.8	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-20965	2	50.9	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20965.3	1	25.5	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20967	2	50.9	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20969	2	50.9	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	P-102A
C-401-20969	1	38.2	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	P-102A
C-401-20970	2	25.5	0.1	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20970.3	1	12.7	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20971	2	50.9	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20971.3	1	25.5	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20972	2	50.9	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20972.3	1	25.5	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20973	2	25.5	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20974	5	9.6	1.2	0.1	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20974.3	2	3.8	0.1	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20977	2	38.2	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20977.3	1	19.1	0.0	0.0	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-20988	2	50.9	1.3	2.0	0.7	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-20988.3	1	38.2	1.7	1.7	0	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-20989	2	50.9	1.7	1.8	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-20996	2	50.9	1.4	1.7	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-20996.3	1	25.5	1.4	1.5	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-20999	2	50.9	1.4	1.8	0.4	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-20999.3	1	38.2	1.4	2.0	0.6	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21200.3	1	6.4	0.3	2.9	2.6	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21008	2	50.9	1.0	1.8	0.8	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21008.1	1	25.5	1.0	1.7	0.7	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21009	2	50.9	1.0	1.2	0.2	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21009.3	1	25.5	0.9	1.0	0.1	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21012	2	50.9	1.0	1.1	0.1	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21013	2	50.9	1.0	1.2	0.2	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21013.3	1	25.5	1.0	1.1	0.1	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21014	2	50.9	1.0	1.4	0.4	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21014.3	1	25.5	1.1	1.2	0.1	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21015	3	7.2	1.0	1.5	0.5	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21015.3	1	2.4	1.1	1.5	0.4	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21016	2	50.9	1.1	1.1	0	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21017	2	50.9	1.0	1.7	0.7	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21018	2	50.9	1.0	2.0	1	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21019	2	50.9	1.0	2.0	1	A	R	03/27/18	C-2	2954	68	2/N	
C-401-21023	2	50.9	1.4	1.6	0.2	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21024	2	50.9	1.4	1.8	0.4	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21024.3	1	25.5	1.4	1.7	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21025	2	50.9	1.4	1.7	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21025.3	2	76.4	1.5	13.6	12.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21026	2	50.9	1.4	2.5	1.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21027	2	4.8	1.6	1.7	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21027.3	1	2.4	1.5	1.7	0.2	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21028	2	4.8	1.4	1.7	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21101-P	5	Unknown	1.0	1.2	0.2	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-21101-P	4	Unknown	-1.3	-5.5	0	A	R	03/06/18	C-1	2635	47	9/ENE	
C-401-21192	2	6.4	1.0	1.5	0.5	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21119-P	3	Unknown	1.4	12.2	10.8	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-21119-P	5	Unknown	3.9	19.7	15.8	A	R	03/06/18	C-2	2161	46	7/NE	TVA #2161
C-401-21172	2	25.5	0.7	0.7	0	A	R	04/02/18	C-4	1993	69	10/E	
C-401-21178-V	1	12.7	0.4	0.7	0.3	A	R	03/27/18	C-4	1993	68	2/N	
C-401-21181	1	12.7	0.1	0.1	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-21182	2	25.5	1.4	1.5	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21182.3	1	19.1	1.4	1.6	0.2	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21191	3	9.6	1.0	1.7	0.7	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21191.3	1	3.2	1.0	1.5	0.5	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21192.3	1	3.2	1.0	1.8	0.8	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21193	2	25.5	1.0	1.7	0.7	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21193.3	1	12.7	1.0	1.6	0.6	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21964	2	25.5	1.5	1.9	0.4	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21964.3	1	12.7	1.5	1.7	0.2	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21965	1	12.7	1.5	1.8	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21965.3	1	12.7	1.5	1.8	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-21966	2	50.9	1.5	1.8	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21966.3	1	25.5	1.5	1.7	0.2	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21967	2	50.9	1.5	1.6	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21967.3	1	25.5	1.5	1.8	0.3	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21198	3	76.4	1.0	1.3	0.3	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21198.3	1	25.5	1.0	1.9	0.9	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21983	2	25.5	1.7	1.8	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21983.3	1	19.1	1.6	1.8	0.2	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21199	3	19.1	1.0	2.0	1	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21199.3	2	12.7	1.0	2.4	1.4	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21200	2	12.7	0.3	2.7	2.4	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21202	2	6.4	1.0	2.0	1	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21202.3	1	3.2	1.0	1.9	0.9	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21203	2	50.9	1.0	1.7	0.7	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21203.3	1	25.5	1.0	1.4	0.4	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21204	2	19.1	1.0	1.5	0.5	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21204.3	1	9.6	1.0	1.4	0.4	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21205	2	19.1	1.0	1.2	0.2	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21205.3	1	9.6	1.0	1.3	0.3	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21206	4	12.7	0.4	0.6	0.2	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21206.3	2	6.4	0.4	0.7	0.3	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21207	3	7.2	0.3	0.5	0.2	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21207.3	1	2.4	0.4	1.3	0.9	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21208	2	50.9	0.4	1.1	0.7	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21208.3	1	25.5	0.5	1.2	0.7	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21209	2	50.9	0.5	1.1	0.6	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21209.3	1	25.5	0.9	1.1	0.2	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21210	3	28.7	1.0	36.1	35.1	A	R	03/27/18	C-2	2161	50	7/N	ICO Short Loop System
C-401-21210.3	1	9.6	1.0	1.6	0.6	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21211	2	25.5	0.9	1.1	0.2	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21211.3	1	12.7	0.9	1.6	0.7	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21212	2	4.8	0.9	1.1	0.2	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21212.3	1	2.4	0.9	1.1	0.2	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21214	2	38.2	0.9	1.1	0.2	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21214.3	1	19.1	1.2	1.2	0	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21215	3	5.7	1.0	2.3	1.3	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21215.3	1	1.9	1.0	2.4	1.4	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21216	3	9.6	0.9	1.5	0.6	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21216.3	1	3.2	0.8	1.3	0.5	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21218	3	38.2	1.0	1.6	0.6	A	R	03/27/18	C-2	2161	50	7/N	
C-401-21222	2	9.6	0.3	1.9	1.6	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21222.3	1	4.8	0.3	1.8	1.5	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21223	2	76.4	0.5	1.4	0.9	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21223.3	1	38.2	0.4	1.6	1.2	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21224	2	38.2	0.7	1.7	1	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21224.3	1	19.1	1.0	1.7	0.7	A	R	03/27/18	C-2	2161	68	2/N	
C-401-21240	2	19.1	0.4	1.0	0.6	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21240.3	1	9.6	0.4	1.0	0.6	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21243	4	101.9	0.6	2.5	1.9	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21243.3	1	25.5	0.5	1.5	1	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21244	8	15.3	0.5	1.4	0.9	A	R	03/27/18	C-2	2954	50	7/N	67-MOV-180 B.L.
C-401-21244.3	2	3.8	0.5	1.0	0.5	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21244	3	5.7	0.5	1.0	0.5	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21245	2	50.9	0.5	4.2	3.7	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21245.3	1	25.5	0.5	4.2	3.7	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21257.3	3	28.7	2.0	4.8	2.8	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21257-V	2	19.1	2.8	6.2	3.4	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21258.3	1	25.5	2.8	2.8	0	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21258-V	1	25.5	2.6	3.3	0.7	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21259-V	1	12.7	2.7	4.1	1.4	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21260.2	0.5	12.7	0.0	0.6	0.6	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21260-V	0.5	12.7	0.7	2.6	1.9	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21261.3	0.5	3.2	0.0	0.0	0	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21261-V	1	6.4	0.0	0.0	0	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21262.3	1	25.5	0.0	0.0	0	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21262.6	1	25.5	0.0	0.0	0	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21262-V	1	25.5	0.0	0.0	0	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21263.3	1	9.6	0.4	0.7	0.3	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21263-V	2	19.1	0.2	1.1	0.9	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21264.2	2	12.7	0.1	2.1	2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21264-V	2	12.7	0.0	0.2	0.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21265.4	0.5	12.7	0.7	0.9	0.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21265-V	1	25.5	1.0	2.2	1.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21266.3	1	4.8	1.5	1.5	0	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21266-V	1	25.5	1.7	1.7	0	A	R	03/27/18	C-4	2612	50	7/N	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-21267-V	2	9.6	1.2	1.5	0.3	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21268-V	5	23.9	1.0	8.6	7.6	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21270.2	0.5	12.7	2.4	2.2	0	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21270-V	0.5	12.7	2.0	2.8	0.8	A	R	03/27/18	C-4	2612	50	7/N	
C-401-21817	1	25.5	1.0	1.1	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21818	1	50.9	1.0	1.0	0	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21818.3	1	50.9	0.9	1.0	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21819	1	50.9	0.9	1.0	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21819	1	25.5	0.8	0.9	0.1	A	R	04/02/18	C-4	2954	69	10/E	Sample Valve
C-401-21819.3	0.5	25.5	0.8	3.8	3	A	R	04/02/18	C-4	2954	69	10/E	OEL
C-401-21819.3	1	25.5	0.8	0.8	0	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21820	1	19.1	1.2	1.2	0	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21820.3	1	19.1	1.0	1.1	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21821	2	38.2	1.4	1.7	0.3	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21821.3	1	19.1	1.2	1.3	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21822	3	114.6	0.7	0.8	0.1	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21822.3	3	114.6	0.6	15.1	14.5	A	R	04/02/18	C-4	2954	69	10/E	
C-401-21851	4	50.9	0.5	0.8	0.3	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21851.3	1	12.7	0.5	0.4	0	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21852	2	50.9	0.4	0.2	0	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21852.3	1	25.5	0.2	1.5	1.3	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21853	3	14.3	0.2	0.9	0.7	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21853.3	1	4.8	0.2	1.0	0.8	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21854	2	19.1	0.3	1.7	1.4	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21854.3	1	9.6	0.3	3.1	2.8	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21855	2	9.6	0.3	0.9	0.6	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21855.3	1	4.8	0.3	0.9	0.6	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21856	2	50.9	0.3	1.1	0.8	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21856.3	1	25.5	0.3	0.0	0	A	R	03/26/18	C-2	2161	62	10/NW	
C-401-21857	2	50.9	0.9	1.4	0.5	A	R	03/27/18	C-2	2954	50	7/N	FC-2536 Drain To E-2530A/B Fin Fan
C-401-21858	2	50.9	0.8	1.2	0.4	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21858.5	1	25.5	0.8	1.2	0.4	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21859	2	50.9	0.9	1.2	0.3	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21859.3	1	25.5	1.0	0.9	0	A	R	03/27/18	C-2	2954	50	7/N	FC-2536 Drain To E-2530A/B Fin Fan
C-401-21860.3	2	3.8	0.2	1.5	1.3	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21860-V	1	1.9	0.1	0.3	0.2	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21861.3	1	25.5	0.6	2.1	1.5	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21861-V	1	25.5	0.7	1.2	0.5	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21862.3	2	3.8	0.7	1.0	0.3	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21862-V	5	9.6	0.6	134.3	133.7	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21863-V	1	25.5	1.3	1.6	0.3	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21864	3	5.7	0.9	1.2	0.3	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21864.3	4	7.6	0.0	0.0	0	A	R	03/26/18	C-4	2635	60	9/NW	
C-401-21865.3	1	1.9	0.1	0.4	0.3	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21865-V	1	1.9	0.3	1.4	1.1	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21866.3	3	5.7	0.0	1.6	1.6	A	R	03/26/18	C-4	2635	60	9/NW	
C-401-21866-V	2	3.8	0.0	0.1	0.1	A	R	03/26/18	C-4	2635	60	9/NW	
C-401-21869.3	1	1.9	0.1	0.5	0.4	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21869-V	2	3.8	0.0	1.2	1.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21870.2	1	25.5	0.6	1.0	0.4	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21870-V	1	25.5	0.1	0.5	0.4	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21871.3	1	1.9	0.2	1.8	1.6	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21871-V	2	3.8	0.0	0.1	0.1	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21872-V	2	3.8	0.4	1.6	1.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21876	5	31.8	0.8	1.2	0.4	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21876.3	2	12.7	0.8	2.0	1.2	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21878	2	9.6	0.8	1.0	0.2	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21878.3	2	9.6	0.9	2.4	1.5	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21879	2	12.7	0.9	2.1	1.2	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21879.3	1	6.4	0.9	1.2	0.3	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21880	3	14.3	0.8	1.5	0.7	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21880.3	1	4.8	0.8	1.6	0.8	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21881	2	50.9	0.8	0.5	0	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21881.3	1	25.5	0.4	0.5	0.1	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21882-P	2	Unknown	1.3	2.0	0.7	A	R	03/07/18	C-2	2612	66	6/S	
C-401-21882-P	3	Unknown	1.3	1.6	0.3	A	R	03/07/18	C-2	2612	66	6/S	
C-401-21883	1	25.5	1.0	3.0	2	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21883.3	1	25.5	1.0	1.6	0.6	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21884	1	25.5	1.0	2.3	1.3	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21885	5	11.9	1.0	4.1	3.1	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21885.3	1	2.4	1.1	3.4	2.3	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21886	1	25.5	1.0	1.0	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21887	3	9.6	1.0	1.6	0.6	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21887.3	1	3.2	1.0	2.0	1	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21889	1	25.5	1.9	4.1	2.2	A	R	03/26/18	C-2	2612	62	10/NW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-401-21890	2	50.9	1.3	2.1	0.8	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21896	1	25.5	0.8	1.0	0.2	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21896.3	1	38.2	0.7	0.7	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21897	1	25.5	1.0	1.8	0.8	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21897.3	1	25.5	1.0	1.6	0.6	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21898	1	25.5	1.1	1.3	0.2	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21898.3	1	25.5	0.8	0.8	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21899	2	50.9	0.5	0.9	0.4	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21899.3	1	25.5	0.5	0.5	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21900	2	50.9	0.5	0.5	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21900.3	1	25.5	0.5	0.5	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21900.4	1	25.5	0.5	0.5	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21901	2	76.4	0.5	0.5	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21901.3	1	38.2	0.5	0.5	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21902.3	1	38.2	0.5	1.0	0.5	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21904	2	50.9	0.5	0.6	0.1	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21905	2	50.9	0.5	1.3	0.8	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21905.3	1	38.2	0.5	0.6	0.1	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21906	1	25.5	0.5	0.6	0.1	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21906.3	1	25.5	0.5	0.6	0.1	A	R	03/26/18	C-2	2612	62	10/NW	
C-401-21908	2	50.9	0.5	0.6	0.1	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21908.3	3	76.4	0.5	0.5	0	A	R	03/27/18	C-2	2954	50	7/N	
C-401-21915-V	1	25.5	0.1	0.1	0	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21916	2	25.5	1.4	1.5	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21916.3	1	3.2	0.3	0.7	0.4	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21916.3	1	12.7	1.4	1.5	0.1	A	R	03/28/18	C-2	2161	52	2/SSE	
C-401-21916-V	1	3.2	0.2	0.3	0.1	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21917.3	1	3.2	0.0	0.1	0.1	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21917-V	2	6.4	0.2	0.6	0.4	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21928	2	3.8	0.6	0.6	0	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21928.2	2	50.9	0.4	1.6	1.2	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21929-V	0.5	12.7	0.7	0.9	0.2	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21931-V	4	7.6	1.0	738.0	737	P	R	03/26/18	C-4	1993	60	9/NW	Unable to reach half bonnet
C-401-21932.3	1	25.5	1.4	1.5	0.1	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21932.6	0.5	12.7	1.2	1.4	0.2	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21932-V	1	25.5	1.4	1.5	0.1	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21933-V	2	50.9	1.0	1.3	0.3	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21934.3	1	25.5	0.9	1.2	0.3	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21934-V	1	25.5	0.9	1.1	0.2	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21935.3	1	9.6	1.0	1.2	0.2	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21935-V	1	9.6	0.7	1.7	1	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21936.3	1	25.5	0.0	0.1	0.1	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21936.6	1	25.5	0.0	0.2	0.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21936-V	1	25.5	0.1	0.5	0.4	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21937.11	0.5	12.7	0.0	0.0	0	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21937.2	1	25.5	0.0	0.3	0.3	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21937.5	1	25.5	0.0	0.2	0.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21937.8	0.5	12.7	0.0	0.2	0.2	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21937-V	1	25.5	0.0	0.0	0	A	R	03/27/18	C-4	2635	50	7/N	
C-401-21938.1	0.5	38.2	1.6	2.0	0.4	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21938.10	0.5	38.2	1.8	1.8	0	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21938.4	1	76.4	1.8	2.4	0.6	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21938.7	0.5	38.2	4.8	2.5	0	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21938-V	0.5	38.2	1.0	2.9	1.9	A	R	03/26/18	C-4	1993	60	9/NW	
C-401-21940.3	1	25.5	0.0	0.0	0	A	R	03/26/18	C-4	2635	60	9/NW	
C-401-21940-V	1	25.5	0.0	0.2	0.2	A	R	03/26/18	C-4	2635	60	9/NW	
C-401-21956	3	38.2	0.1	0.1	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-21956.3	1	12.7	0.2	0.3	0.1	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-21957	2	19.1	0.2	0.2	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-21957.3	1	12.7	0.1	0.1	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-21959	2	50.9	0.1	0.1	0	A	R	03/28/18	C-2	2635	52	2/SSE	
C-401-21902	2	76.4	0.5	0.5	0	A	R	03/26/18	C-2	2612	62	10/NW	
C-402-200019-P	2	Unknown	2.1	3.6	1.5	A	R	03/07/18	C-4	2314	66	6/S	
C-402-200019-P	1	Unknown	1.1	2.4	1.3	A	R	03/07/18	C-4	2314	66	6/S	
C-402-20010-P	5	Unknown	1.6	2.7	1.1	A	R	03/07/18	C-2	2612	66	6/S	
C-402-20010-P	3	Unknown	1.6	1.6	0	A	R	03/07/18	C-2	2612	66	6/S	
C-402-20088-P	3	Unknown	1.1	1.5	0.4	A	R	03/08/18	C-2	2314	54	4/SE	Blinded Discharge
C-402-20088-P	1	Unknown	1.0	2.2	1.2	A	R	03/08/18	C-2	2314	54	4/SE	Blinded on Discharge
C-402-20101-P	2	Unknown	0.1	1.1	1	A	R	03/07/18	C-4	2314	66	6/S	
C-402-20101-P	3	Unknown	0.4	1.2	0.8	A	R	03/07/18	C-4	2314	66	6/S	
C-402-20121-P	5	Unknown	0.8	8.8	8	A	R	03/07/18	C-2	2612	66	6/S	
C-402-20121-P	5	Unknown	1.3	1.4	0.1	A	R	03/07/18	C-2	2612	66	6/S	
C-403-20006-P	3	Unknown	1.0	4.3	3.3	A	R	03/08/18	C-2	2314	54	4/SE	OOS LO/TO
C-403-20006-P	7	Unknown	1.0	2.2	1.2	A	R	03/08/18	C-2	2314	54	4/SE	OOS LO/TO
C-403-20019-P	1	Unknown	1.0	1.4	0.4	A	R	03/08/18	C-4	2954	53	4/SSE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-403-20019-P	4	Unknown	1.0	2.4	1.4	A	R	03/08/18	C-4	2954	53	4/SSE	
C-403-20222-P	3	Unknown	1.3	2.8	1.5	A	R	03/08/18	C-4	2954	53	4/SSE	
C-403-20222-P	9	Unknown	1.6	5.5	3.9	A	R	03/08/18	C-4	2954	53	4/SSE	
C-403-20236-P	7	Unknown	6.4	96.1	89.7	A	R	03/08/18	C-2	2314	54	4/SE	
C-403-20236-P	5	Unknown	1.9	5.9	4	A	R	03/08/18	C-2	2314	54	4/SE	
C-404-20001-P	3	Unknown	1.9	4.8	2.9	A	R	03/08/18	C-2	2314	54	4/SE	
C-404-20001-P	2	Unknown	1.0	5.4	4.4	A	R	03/08/18	C-2	2314	54	4/SE	
C-404-20009-P	3	Unknown	1.0	1.2	0.2	A	R	03/08/18	C-4	2954	53	4/SSE	
C-404-20009-P	1	Unknown	1.6	1.9	0.3	A	R	03/08/18	C-4	2954	53	4/SSE	
C-404-20201-P	5	Unknown	0.7	4.8	4.1	A	R	03/08/18	C-2	2314	54	4/SE	
C-404-20201-P	3	Unknown	1.0	5.4	4.4	A	R	03/08/18	C-2	2314	54	4/SE	
C-404-20228-P	3	Unknown	1.5	2.7	1.2	A	R	03/08/18	C-4	2954	53	4/SSE	
C-404-20228-P	6	Unknown	1.9	2.6	0.7	A	R	03/08/18	C-4	2954	53	4/SSE	
C-406-20051-P	1	Unknown	1.7	3.5	1.8	A	R	03/08/18	C-4	2954	53	4/SSE	
C-406-20051-P	6	Unknown	1.2	2.4	1.2	A	R	03/08/18	C-4	2954	53	4/SSE	
C-406-20078-P	3	Unknown	1.0	3.0	2	A	R	3/8/2018	C-2	2314	54	4/SE	
C-406-20078-P	6	Unknown	1.0	3.8	2.8	A	R	3/8/2018	C-2	2314	54	4/SE	
C-406-20108-P	3	Unknown	0.8	4.2	3.4	A	R	03/08/18	C-4	2954	53	4/SSE	
C-406-20108-P	5	Unknown	1.2	6.8	5.6	A	R	03/08/18	C-4	2954	53	4/SSE	
C-406-20126-P	6	Unknown	2.2	3.5	1.3	A	R	03/08/18	C-4	2954	53	4/SSE	
C-406-20126-P	4	Unknown	1.0	1.2	0.2	A	R	03/08/18	C-4	2954	53	4/SSE	
C-410-20001-P	3	Unknown	3.5	4.4	0.9	A	R	03/08/18	C-4	2954	53	4/SSE	
C-410-20001-P	2	Unknown	0.8	4.6	3.8	A	R	03/08/18	C-4	2954	53	4/SSE	
C-412-20058-P	10	Unknown	2.1	2.1	0	A	R	03/08/18	C-2	2314	54	4/SE	
C-412-20058-P	10	Unknown	8.2	7.4	0	A	R	03/08/18	C-2	2314	54	4/SE	Blew Out Hose After
C-412-20064-P	1	Unknown	0.9	0.0	0	A	R	03/08/18	C-4	2954	53	4/SSE	
C-412-20064-P	4	Unknown	-0.8	0.0	0.8	A	R	03/08/18	C-4	2954	53	4/SSE	
C-414-20101-P	3	Unknown	-3.1	-3.2	0	A	R	03/06/18	C-1	2635	47	9/ENE	
C-414-20101-P	4	Unknown	-3.1	0.0	3.1	A	R	03/06/18	C-1	2635	47	9/ENE	
C-414-20105-P	2	Unknown	-0.5	5.0	5.5	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-414-20105-P	8	Unknown	-0.5	0.3	0.8	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-414-20173-P	2	Unknown	0.9	0.9	0	A	R	03/07/18	C-2	2612	53	3/SSE	
C-414-20173-P	4	Unknown	0.9	1.1	0.2	A	R	03/07/18	C-2	2612	53	3/SSE	
C-415-20339-P	1	Unknown	0.1	0.8	0.7	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20339-P	2	Unknown	0.1	0.8	0.7	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20359-P	3	Unknown	1.4	2.7	1.3	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20359-P	4	Unknown	1.4	1.5	0.1	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20373-P	1	Unknown	0.2	0.2	0	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-415-20373-P	3	Unknown	0.2	0.2	0	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20373-P	2	Unknown	1.9	2.0	0.1	A	R	03/07/18	C-4	1993	53	3/SSE	
C-415-20373-P	6	Unknown	2.0	2.8	0.8	A	R	03/07/18	C-4	1993	66	6/S	
C-415-20393-P	1	Unknown	1.5	1.4	0	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20393-P	3	Unknown	1.4	1.5	0.1	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20411-P	2	Unknown	-1.0	0.0	1	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-415-20411-P	2	Unknown	0.0	0.0	0	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20438-P	4	Unknown	1.4	4.0	2.6	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20438-P	3	Unknown	1.6	4.0	2.4	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20556-P	2	Unknown	1.7	2.4	0.7	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-415-20556-P	2	Unknown	1.7	2.4	0.7	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20570-P	3	Unknown	1.3	1.7	0.4	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20570-P	3	Unknown	1.3	2.1	0.8	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20594-P	2	Unknown	1.7	3.4	1.7	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-415-20594-P	3	Unknown	1.7	2.4	0.7	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20595-P	2	Unknown	1.2	2.7	1.5	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20595-P	8	Unknown	1.2	1.5	0.3	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20627-P	2	Unknown	1.4	1.9	0.5	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-415-20627-P	2	Unknown	1.4	1.9	0.5	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20628-P	3	Unknown	1.2	1.7	0.5	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20628-P	4	Unknown	1.3	1.4	0.1	A	R	03/06/18	C-1	2314	67	8/NE	
C-415-20687-P	2	Unknown	2.3	8.7	6.4	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-415-20687-P	3	Unknown	2.3	3.1	0.8	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-415-20706-P	4	Unknown	1.2	30.2	29	A	R	03/06/18	C-1	2314	67	8/NE	Seal leak at 3 O clock position. Pump was off. Suction and Discharge valves were closed
C-415-20706-P	4	Unknown	1.3	3.3	2	A	R	03/06/18	C-1	2314	67	8/NE	
C-416-20002	3	Unknown	1.4	1.4	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20015-V	2	Unknown	1.4	1.6	0.2	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20016.2	1	Unknown	1.4	1.4	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20016.4	1	Unknown	1.2	1.3	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20016-V	4	Unknown	1.1	4.8	3.7	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20017.3	2	Unknown	1.1	2.4	1.3	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20017-V	2	Unknown	1.1	1.2	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20018.2	1	Unknown	1.0	1.2	0.2	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20018-V	1	Unknown	0.9	1.1	0.2	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20019.1	1	Unknown	1.0	1.0	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20019.12	1	Unknown	1.1	1.2	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20019.2	1	Unknown	1.0	1.0	0	A	R	03/14/18	C-4	2161	51	9/SSW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-416-20019.4	0.5	Unknown	1.1	1.1	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20019.6	0.5	Unknown	1.0	1.0	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20019.9	1	Unknown	0.9	1.0	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20019-V	1	Unknown	0.9	1.3	0.4	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20021.2	1	Unknown	1.0	Blank	NA	U	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20021.4	0.5	Unknown	1.0	1.4	0.4	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20021-V	1	Unknown	0.9	1.1	0.2	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20022.2	1	Unknown	0.9	1.0	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20022-V	0.5	Unknown	0.9	1.0	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20023.4	0.5	Unknown	0.9	1.0	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-416-20023-V	1	25.5	0.8	0.8	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20024.10	1	38.2	0.7	0.7	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20024.2	1	38.2	0.7	0.8	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20024.5	FLAG		Blank	Blank	NA	U	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20024.8	1	38.2	0.7	0.7	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20024-V	1	38.2	0.7	0.7	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20025.10	1	38.2	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20025.2	0.5	19.1	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20025.5	1	38.2	0.6	0.8	0.2	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20025.8	1	38.2	0.6	0.8	0.2	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20025-V	1	38.2	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20026.10	1	38.2	0.6	0.6	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20026.2	1	38.2	0.6	0.6	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20026.5	0.5	19.1	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20026.8	1	38.2	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20026-V	1	38.2	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20027-V	3	14.3	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20028.3	1	25.5	0.5	0.5	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20028-V	2	50.9	0.5	0.6	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20029.2	1	25.5	0.5	0.6	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20029-V	1	25.5	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20031.3	1	4.8	0.5	0.6	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20034-V	1	25.5	0.5	0.7	0.2	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20037-V	1	25.5	0.6	0.7	0.1	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20039.2	1	25.5	0.5	0.5	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20039-V	2	50.9	0.4	1.0	0.6	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20040.2	2	4.8	0.4	0.8	0.4	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20040-V	2	4.8	0.6	0.6	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20041.2	1	9.6	0.5	0.5	0	A	R	03/19/18	C-4	2314	43	4/NNE	
C-416-20041.3	1	9.6	-0.3	0.0	0.3	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20041-V	1	9.6	-0.3	0.0	0.3	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20042.3	1	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20042-V	1	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20043.2	0.5	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20043-V	0.5	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20044.3	0.5	12.7	0.0	0.2	0.2	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20044-V	1	25.5	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20045.3	1	25.5	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20045-V	1	25.5	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20046.11	0.5	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20046.3	1	38.2	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20046-V	1	38.2	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20048.2	0.5	12.7	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20048-V	1	25.5	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20049.4	1	25.5	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20049-V	1	25.5	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20050-V	1	25.5	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20051.2	1	9.6	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20051-V	1	9.6	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20052.3	0.5	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20089-P	1	Unknown	1.1	1.2	0.1	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-416-20089-P	1	Unknown	1.1	1.2	0.1	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-416-20103-P	2	Unknown	0.7	1.7	1	A	R	03/07/18	C-2	2612	53	3/SSE	
C-416-20103-P	4	Unknown	0.7	1.6	0.9	A	R	03/07/18	C-2	2612	53	3/SSE	
C-416-20105.3	1	3.2	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20105-V	4	12.7	0.0	0.8	0.8	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20113-V	1	9.6	0.0	0.2	0.2	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20115.3	0.5	9.6	0.0	0.1	0.1	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20115-V	1	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20116.2	0.5	9.6	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20116-V	1	19.1	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20117-V	1	12.7	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20118.2	1	9.6	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20118-V	1	9.6	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20119-V	1	12.7	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-416-20120-V	1	12.7	0.0	0.0	0	A	R	03/19/18	C-4	2954	43	4/NNE	
C-416-20135-V	1	25.5	2.0	2.0	0	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20138-V	1	25.5	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20139-V	1	25.5	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20144-V	1	25.5	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20145.3	1	19.1	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20145-V	1	25.5	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20146-V	1	25.5	1.8	2.0	0.2	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20147.2	2	12.7	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20148.2	1	6.4	1.8	2.0	0.2	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20148-V	1	6.4	1.9	1.9	0	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20149.3	1	6.4	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20149-V	1	6.4	1.9	1.9	0	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20150.2	1	6.4	1.8	1.9	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20150-V	2	12.7	1.8	2.1	0.3	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20151.2	0.5	12.7	1.8	1.9	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20151-V	0.5	12.7	1.8	1.9	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20153.2	0.5	9.6	1.9	1.9	0	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20153-V	2	38.2	1.9	2.0	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20154.2	1	25.5	1.8	1.9	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20154-V	1	25.5	1.8	1.9	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20155-V	1	12.7	1.6	1.9	0.3	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20162-V	2	12.7	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20166-V	1	25.5	1.7	1.9	0.2	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20168.2	1	6.4	1.8	1.8	0	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20168-V	2	12.7	1.8	1.8	0	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20177-V	1	25.5	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20178-V	1	25.5	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20179.2	0.5	12.7	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20179-V	1	25.5	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20181.2	0.5	4.8	1.6	1.8	0.2	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20181-V	1	9.6	1.7	1.8	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20182-V	0.5	19.1	1.6	1.9	0.3	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20183-V	1	38.2	1.7	1.8	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20184-V	0.5	19.1	1.7	1.8	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20185-V	1	38.2	1.7	1.8	0.1	A	R	03/19/18	C-4	1993	57	7/ENE	
C-416-20186.2	1	76.4	0.5	0.6	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20186.5	1	76.4	0.5	0.5	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20186-V	0.5	19.1	0.5	0.6	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20187-V	0.5	19.1	0.5	0.8	0.3	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20188.7	0.5	19.1	0.5	0.6	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20189-P	2	Unknown	1.1	1.4	0.3	A	R	03/06/18	C-2	2612	64	7/NNE	TVA #2612
C-416-20189-P	3	Unknown	1.1	1.4	0.3	A	R	03/06/18	C-2	2612	46	7/NE	TVA #2612
C-416-20190-V	3	76.4	0.4	0.4	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20191-V	1	25.5	0.3	0.4	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20192-V	1	25.5	0.4	0.4	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20193-V	0.5	12.7	0.3	0.4	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20194-V	1	25.5	0.4	0.4	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20195-P	4	Unknown	1.0	1.1	0.1	A	R	03/07/18	C-2	2612	53	3/SSE	
C-416-20195-P	6	Unknown	1.0	1.1	0.1	A	R	03/07/18	C-2	2612	53	3/SSE	
C-416-20196-V	0.5	12.7	0.4	0.4	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20197-V	1	25.5	0.3	0.4	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20198-V	1	25.5	0.3	0.4	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20199-V	1	25.5	0.2	0.4	0.2	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20200-V	0.5	12.7	0.3	0.3	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20201-V	1	25.5	0.2	0.4	0.2	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20202-V	0.5	12.7	0.3	0.3	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20203-V	1	25.5	0.3	0.4	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20204-V	0.5	12.7	0.1	0.4	0.3	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20205-V	1	25.5	0.2	0.4	0.2	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20206-V	2	50.9	0.3	0.3	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20207-V	2	50.9	0.3	0.4	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20208-V	1	3.2	0.3	0.3	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20209-V	1	25.5	0.2	0.3	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20210-V	1	25.5	0.2	0.3	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20211-V	1	6.4	0.3	0.3	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20212-V	0.5	12.7	0.2	0.3	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20213-V	0.5	12.7	0.2	0.3	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20214-V	0.5	1.6	0.3	0.3	0	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20215-V	2	12.7	0.3	0.4	0.1	A	R	03/19/18	C-4	2612	57	7/ENE	
C-416-20223-V	1	25.5	0.3	0.7	0.4	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20224-V	1	25.5	0.4	0.7	0.3	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20225	1	6.4	0.3	0.5	0.2	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20226-V	1	6.4	0.6	0.6	0	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20227-V	1	6.4	0.3	0.4	0.1	A	R	03/21/18	C-4	2314	57	7/ENE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-416-20228-V	0.5	12.7	0.4	0.4	0	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20290-V	1	25.5	0.8	1.0	0.2	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20291.3	1	4.8	0.8	0.9	0.1	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20229-V	1	3.2	0.3	0.4	0.1	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20230-V	1	25.5	0.4	1.0	0.6	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20231-V	0.5	12.7	0.2	0.3	0.1	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20232-V	1	3.2	0.2	0.5	0.3	A	R	03/21/18	C-4	2314	57	7/ENE	
C-416-20234.2	2	6.4	0.8	1.3	0.5	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20234.3	1	3.2	0.8	1.2	0.4	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20234-V	Unknown	Unknown	0.5	1.3	0.8	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20235.3	1	25.5	1.0	1.2	0.2	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20235-V	2	12.7	0.6	1.4	0.8	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20236.2	1	25.5	0.9	1.1	0.2	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20236-V	2	50.9	1.0	1.1	0.1	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20237.2	1	6.4	1.0	1.1	0.1	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20237-V	2	12.7	1.0	2.8	1.8	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20238.2	1	25.5	1.0	1.0	0	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20238-V	1	25.5	1.0	1.5	0.5	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20239.3	1	6.4	1.0	1.0	0	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20239-V	2	12.7	1.0	1.0	0	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20240.3	1	6.4	1.0	1.8	0.8	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20240-V	2	12.7	1.0	1.8	0.8	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20241.2	1	25.5	1.0	1.7	0.7	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20241-V	1	25.5	1.0	1.2	0.2	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20242.3	2	50.9	1.0	3.0	2	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20242-V	2	50.9	1.0	2.2	1.2	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20243.3	1	4.8	1.0	1.2	0.2	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20243-V	2	50.9	1.0	1.5	0.5	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20244-V	2	50.9	1.0	2.1	1.1	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20245.3	2	6.4	1.0	2.8	1.8	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20245-V	2	50.9	1.0	1.8	0.8	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20246.11	1	76.4	1.0	0.6	0	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20246.2	1	38.2	0.5	0.8	0.3	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20246.3	1	38.2	0.5	0.8	0.3	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20246.8	1	38.2	0.5	1.1	0.6	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20246-V	6	229.2	0.5	8.4	7.9	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20247.3	2	50.9	0.5	71.0	70.5	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20247-V	3	76.4	0.6	0.8	0.2	A	R	03/19/18	C-2	1993	43	4/NNE	
C-416-20248.5	1	38.2	0.1	0.9	0.8	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20248-V	2	50.9	0.5	0.0	0	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20249.3	1	4.8	0.0	3.9	3.9	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20249-V	2	9.6	0.2	4.5	4.3	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20250-V	2	9.6	0.5	3.8	3.3	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20251.2	3	19.1	0.6	0.0	0	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20251-V	2	12.7	0.5	4.2	3.7	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20252-V	4	25.5	0.0	7.7	7.7	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20253.2	1	6.4	0.2	1.0	0.8	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20253-V	2	12.7	0.1	1.0	0.9	A	R	03/19/18	C-2	2635	43	4/NNE	
C-416-20254-V	3	28.7	0.1	1.7	1.6	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20255.2	2	12.7	0.7	1.6	0.9	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20255-V	2	12.7	0.8	1.8	1	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20256.3	1	6.4	0.9	0.8	0	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20256-V	2	12.7	0.5	1.7	1.2	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20259.2	1	6.4	1.0	1.5	0.5	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20259-V	2	12.7	0.9	1.7	0.8	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20260.2	1	6.4	1.0	1.0	0	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20260.3	1	6.4	1.0	1.4	0.4	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20260-V	2	12.7	0.9	1.4	0.5	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20261.2	1	25.5	0.8	1.2	0.4	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20261-V	2	50.9	0.7	0.9	0.2	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20262.3	1	25.5	0.7	0.9	0.2	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20262-V	2	50.9	0.8	1.3	0.5	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20263.1	1	38.2	0.9	1.1	0.2	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20263.2	1	38.2	1.0	1.8	0.8	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20263.6	1	38.2	1.0	1.7	0.7	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20267-V	6	114.6	0.5	1.5	1	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20268-V	1	25.5	0.6	1.0	0.4	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20269-V	2	25.5	0.8	1.3	0.5	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20270-V	2	25.5	0.7	1.7	1	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20271-V	2	25.5	0.6	1.2	0.6	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20272-V	1	4.8	0.9	1.1	0.2	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20273.2	1	4.8	0.8	0.9	0.1	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20273-V	2	9.6	0.8	0.9	0.1	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20274.2	1	25.5	0.9	1.1	0.2	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20274-V	1	25.5	0.7	0.9	0.2	A	R	03/19/18	C-2	2635	57	4/ENE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-416-20275.2	1	25.5	0.9	1.3	0.4	A	R	03/19/18	C-2	2635	57	4/ENE	
C-416-20275-V	1	25.5	0.5	1.1	0.6	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20276.2	1	25.5	0.5	1.0	0.5	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20276-V	1	25.5	0.3	0.7	0.4	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20277.2	1	25.5	0.6	1.1	0.5	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20277-V	1	25.5	0.5	1.0	0.5	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20280.2	2	50.9	0.4	0.7	0.3	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20280-V	1	25.5	0.3	1.2	0.9	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20281.3	1	3.2	0.6	1.0	0.4	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20281-V	2	50.9	0.7	0.9	0.2	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20282.2	1	9.6	0.9	2.6	1.7	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20282-V	1	9.6	0.6	2.1	1.5	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20283.2	1	38.2	0.9	1.0	0.1	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20283.5	1	38.2	0.8	1.0	0.2	A	R	03/19/18	C-2	2161	57	4/ENE	
C-416-20283.8	1	38.2	0.5	1.0	0.5	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20283-V	3	114.6	0.6	2.9	2.3	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20284.2	1	25.5	0.9	1.0	0.1	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20284.5	1	38.2	0.9	0.9	0	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20284-V	1	25.5	0.9	0.9	0	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20285.3	1	25.5	0.9	0.8	0	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20285.4	1	25.5	0.8	2.2	1.4	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20285-V	3	76.4	0.6	1.3	0.7	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20286.1	1	38.2	0.0	0.0	0	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20286.12	1	38.2	0.0	0.1	0.1	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20286.4	0.5	19.1	0.0	0.0	0	A	R	03/21/18	C-4	2635	55	4/SSE	
C-416-20286.5	1	38.2	0.0	0.2	0.2	A	R	03/21/18	C-4	2635	55	4/SSE	
C-416-20286.7	1	38.2	0.0	0.2	0.2	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20286-V	1	38.2	0.1	0.1	0	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20287.3	0.5	12.7	0.0	0.2	0.2	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20287-V	0.5	12.7	0.1	0.1	0	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20288.4	1	25.5	0.0	0.1	0.1	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20288-V	1	25.5	0.0	0.1	0.1	A	R	03/21/18	C-4	2612	57	7/ENE	
C-416-20289.2	1	6.4	1.0	1.1	0.1	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20289-V	3	19.1	0.7	2.2	1.5	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20292.2	2	9.6	0.9	0.8	0	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20292-V	3	14.3	0.7	1.2	0.5	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20293.2	2	9.6	0.8	1.1	0.3	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20293.3	2	9.6	0.8	0.9	0.1	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20293-V	3	14.3	0.6	1.1	0.5	A	R	03/19/18	C-2	2161	57	7/ENE	
C-416-20294-V	1	25.5	0.7	1.0	0.3	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20296-V	1	4.8	0.7	1.1	0.4	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20297-V	2	50.9	1.0	1.5	0.5	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20298.2	0.5	12.7	0.9	1.2	0.3	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20298.3	0.5	12.7	1.0	1.2	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20298.6	1	25.5	1.0	1.2	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20298.7	0.5	12.7	1.0	1.1	0.1	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20298-V	0.5	12.7	1.2	1.4	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20299-V	0.5	19.1	1.7	1.8	0.1	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20300.2	1	38.2	1.0	1.2	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20300-V	1	38.2	0.9	1.3	0.4	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20301-V	1	38.2	1.1	1.4	0.3	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20302.2	0.5	19.1	0.9	1.2	0.3	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20302.5	1	38.2	0.8	0.8	0	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20302-V	0.5	19.1	0.8	1.0	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20303.3	1	38.2	0.6	1.0	0.4	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20303.4	1	38.2	0.7	0.9	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20303-V	1	6.4	0.6	0.8	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20304.2	0.5	3.2	0.8	1.3	0.5	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20304-V	2	50.9	0.7	1.4	0.7	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20305.2	1	25.5	1.1	1.2	0.1	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20305-V	1	4.8	0.9	1.0	0.1	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20306.3	1	4.8	0.8	1.3	0.5	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20306-V	2	19.1	1.1	1.4	0.3	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20307.3	1	9.6	1.0	1.6	0.6	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20307-V	8	76.4	1.0	21.8	20.8	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20308.3	1	9.6	0.9	1.1	0.2	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20308-V	1	9.6	0.7	1.0	0.3	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20309.3	1	9.6	0.8	4.4	3.6	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20309-V	1	9.6	1.9	2.0	0.1	A	R	03/21/18	C-4	2635	55	4/NA	
C-416-20310-V	2	50.9	1.8	22.0	20.2	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20311.1	1	6.4	0.0	0.1	0.1	A	R	03/21/18	C-4	2314	59	7/NA	
C-416-20311-V	1	6.4	0.0	0.1	0.1	A	R	03/21/18	C-4	2314	59	7/NA	
C-416-20312.3	1	38.2	1.3	1.4	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20312-V	1	38.2	1.4	1.6	0.2	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20313.2	1	3.2	1.4	1.4	0	A	R	03/21/18	C-4	1993	55	4/NA	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-416-20313-V	1	3.2	1.4	1.6	0.2	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20314	0.5	12.7	1.3	1.4	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20314.2	1	25.5	1.4	1.4	0	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20315.10	0.5	19.1	1.2	1.3	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20315.2	0.5	19.1	1.2	1.3	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20315.5	1	38.2	1.1	1.2	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20315.8	0.5	19.1	1.1	1.2	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20316.10	1	76.4	1.3	1.4	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20316.13	0.5	19.1	1.3	1.3	0	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20316.3	1	38.2	1.3	1.3	0	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20316.6	0.5	19.1	1.3	1.4	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20316.9	1	76.4	1.1	1.2	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20316-V	1	38.2	1.2	1.3	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20317.3	1	19.1	1.2	1.2	0	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20317-V	1	19.1	1.2	1.4	0.2	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20318.2	1	19.1	1.2	1.2	0	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20318.4	0.5	9.6	1.1	1.2	0.1	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20319-V	0.5	12.7	1.3	1.3	0	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20320.1	2	50.9	1.2	1.4	0.2	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20320-V	1	25.5	1.3	1.5	0.2	A	R	03/21/18	C-4	1993	55	4/NA	
C-416-20321.2	1	25.5	0.1	0.1	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20321-V	4	101.9	0.1	0.1	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20326-V	3	76.4	0.0	0.1	0.1	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20338-V	1	25.5	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20340.3	2	6.4	1.0	4.3	3.3	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20340.4	1	3.2	0.6	1.0	0.4	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20340-V	3	9.6	0.9	5.7	4.8	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20354.3	2	12.7	0.3	0.3	0	A	R	03/21/18	C-4	2314	59	7/NA	
C-416-20354-V	1	6.4	0.0	0.1	0.1	A	R	03/21/18	C-4	2314	59	7/NA	
C-416-20355-V	2	50.9	0.0	0.2	0.2	A	R	03/21/18	C-4	2314	59	7/NA	
C-416-20356.2	1	6.4	0.1	0.2	0.1	A	R	03/21/18	C-4	2314	59	7/NA	
C-416-20373.2	1	9.6	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20373-V	1	9.6	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20376.2	0.5	12.7	0.0	0.1	0.1	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20376-V	1	25.5	0.2	0.3	0.1	A	R	03/26/18	C-4	2314	44	7/NNW	
C-416-20419.2	0.5	9.6	0.0	0.0	0	A	R	03/21/18	C-4	2314	59	7/SSE	
C-416-20419-V	1	19.1	0.0	0.2	0.2	A	R	03/21/18	C-4	2314	59	7/SSE	
C-416-20420.2	0.5	9.6	0.0	0.5	0.5	A	R	03/21/18	C-4	2314	59	7/SSE	
C-416-20420-V	0.5	9.6	0.1	0.3	0.2	A	R	03/21/18	C-4	2314	59	7/SSE	
C-416-20421.2	1	19.1	0.2	0.1	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20421.4	1	19.1	0.3	0.5	0.2	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20421-V	2	38.2	0.2	0.2	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20422.2	1	19.1	0.4	0.4	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20422-V	2	38.2	0.4	0.5	0.1	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20423-V	2	38.2	0.3	0.3	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20424.4	1	19.1	0.3	0.3	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20424-V	1	19.1	0.3	0.3	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20425.2	1	19.1	0.3	0.2	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20425-V	2	38.2	0.3	0.3	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20426.2	1	25.5	0.3	0.4	0.1	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20426-V	2	50.9	0.2	0.3	0.1	A	R	03/21/18	C-2	2161	55	4/SSE	
C-416-20428.2	1	25.5	1.0	2.0	1	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20428-V	2	50.9	0.7	2.3	1.6	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20429.2	1	25.5	0.2	0.2	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20429-V	3	76.4	0.9	0.2	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20430.2	1	25.5	0.2	0.2	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20430-V	2	50.9	0.2	0.2	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20431.3	2	9.6	0.3	0.3	0	A	R	03/26/18	C-2	2954	44	7/NNW	
C-416-20431-V	2	9.6	3.0	9.0	6	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20432-V	2	50.9	3.0	5.6	2.6	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20433.3	2	9.6	2.1	2.6	0.5	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20433-V	5	23.9	2.4	2.7	0.3	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20434.2	2	6.4	2.0	2.3	0.3	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20434-V	1	3.2	2.1	4.2	2.1	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20435.2	2	50.9	3.1	3.1	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20435-V	8	203.7	2.1	5.8	3.7	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20436.2	1	3.2	2.0	2.5	0.5	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20436-V	3	9.6	2.0	4.2	2.2	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20437.2	2	6.4	2.0	4.0	2	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20437.3	2	6.4	2.0	4.2	2.2	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20437-V	5	15.9	2.0	4.4	2.4	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20438-V	2	50.9	2.0	3.0	1	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20439.3	2	6.4	2.0	3.8	1.8	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20439-V	3	9.6	2.0	4.8	2.8	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20440.2	4	12.7	4.0	7.0	3	A	R	03/21/18	C-2	NA	55	4/SSE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-416-20440-V	2	6.4	3.0	4.0	1	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20441.2	1	25.5	3.0	3.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20441-V	2	50.9	3.0	3.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20442.2	2	6.4	3.0	4.0	1	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20442-V	2	6.4	3.1	3.9	0.8	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20443.2	1	3.2	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20443-V	2	6.4	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20444.2	6	152.8	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20444-V	2	50.9	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20445.3	1	3.2	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20445-V	2	6.4	2.0	2.9	0.9	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20446.2	1	3.2	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20446-V	3	9.6	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20447.2	1	25.5	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20447-V	2	50.9	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20448.2	1	3.2	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20448-V	3	9.6	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20449.2	1	3.2	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20449-V	8	25.5	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20450-V	1	3.2	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20451.2	2	50.9	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20451-V	2	50.9	2.0	2.0	0	A	R	03/21/18	C-2	NA	55	4/SSE	
C-416-20452.2	2	6.4	0.9	1.7	0.8	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20452-V	3	9.6	0.9	1.7	0.8	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20453-V	2	6.4	0.7	1.6	0.9	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20454.2	2	6.4	0.8	1.8	1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20454-V	3	9.6	0.8	1.8	1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20455.3	1	9.6	0.9	1.7	0.8	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20455-V	2	19.1	1.0	1.7	0.7	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20456.2	2	6.4	1.0	1.6	0.6	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20456-V	3	9.6	1.0	1.9	0.9	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20457.2	3	9.6	0.8	2.0	1.2	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20457-V	3	9.6	0.7	2.1	1.4	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20458.2	1	25.5	0.8	1.9	1.1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20458-V	3	76.4	0.8	1.8	1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20459.2	1	4.8	0.9	2.0	1.1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20459-V	2	9.6	0.7	1.9	1.2	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20460.3	1	25.5	1.0	1.5	0.5	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20460-V	2	50.9	0.7	2.0	1.3	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20461.2	1	4.8	1.0	2.1	1.1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20461.4	1	4.8	1.0	2.0	1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20461-V	2	9.6	0.5	2.3	1.8	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20462-V	2	9.6	0.9	2.0	1.1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20463.3	1	4.8	0.7	1.0	0.3	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20463-V	2	9.6	0.6	1.9	1.3	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20464.2	1	9.6	0.5	0.8	0.3	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20464-V	2	19.1	0.7	1.0	0.3	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20465.3	1	3.2	0.6	0.7	0.1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20465-V	3	9.6	0.6	1.8	1.2	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20466-V	1	25.5	0.7	1.7	1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20467.2	2	6.4	0.6	1.8	1.2	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20467.3	1	3.2	0.5	0.9	0.4	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20467-V	3	9.6	0.9	1.9	1	A	R	03/21/18	C-2	2161	59	7/SSE	
C-416-20468.2	1	4.8	0.2	0.8	0.6	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20468-V	2	9.6	0.3	0.8	0.5	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20469.3	2	9.6	0.3	1.0	0.7	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20469-V	3	14.3	0.8	0.8	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-416-20470-V	2	50.9	0.3	0.3	0	A	R	03/21/18	C-2	2954	59	7/SSE	
C-417-20005-P	3	Unknown	1.7	2.9	1.2	A	R	03/07/18	C-4	1993	53	3/SSE	
C-417-20005-P	9	Unknown	1.7	2.7	1	A	R	03/07/18	C-4	1993	66	6/S	
C-417-20015-P	6	Unknown	1.3	1.5	0.2	A	R	03/07/18	C-2	2612	53	3/SSE	
C-417-20015-P	7	Unknown	1.3	1.2	0	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20336-P	4	Unknown	1.5	6.6	5.1	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20336-P	7	Unknown	1.4	1.7	0.3	A	R	03/07/18	C-4	1993	66	6/S	
C-418-20362-P	4	Unknown	0.9	1.0	0.1	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20362-P	5	Unknown	1.0	4.6	3.6	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20394-P	1	Unknown	1.7	1.8	0.1	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20394-P	4	Unknown	0.7	0.5	0	A	R	03/07/18	C-4	1993	66	6/S	
C-418-20408-P	1	Unknown	0.5	0.8	0.3	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20408-P	3	Unknown	0.3	1.6	1.3	A	R	03/07/18	C-4	1993	66	6/S	
C-418-20507-P	2	Unknown	0.4	0.6	0.2	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20507-P	4	Unknown	1.3	1.4	0.1	A	R	03/07/18	C-4	1993	66	6/S	
C-418-20508-P	1	Unknown	-0.6	-0.8	0	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20508-P	3	Unknown	0.2	1.9	1.7	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20518-P	10	Unknown	1.3	1.7	0.4	A	R	03/07/18	C-2	2612	53	3/SSE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-418-20518-P	5	Unknown	1.3	1.2	0	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20523-P	4	Unknown	1.2	1.7	0.5	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20523-P	11	Unknown	1.0	2.7	1.7	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20564-P	3	Unknown	0.8	1.3	0.5	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20564-P	4	Unknown	1.0	1.0	0	A	R	03/07/18	C-2	2612	53	3/SSE	
C-418-20570-P	1	Unknown	-1.0	-1.0	0	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20570-P	3	Unknown	-0.9	-1.0	0	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20609-P	0.5	Unknown	-0.9	-0.8	0.1	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20609-P	4	Unknown	-0.7	0.0	0.7	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20781-P	1	Unknown	-1.0	-0.6	0.4	A	R	03/07/18	C-4	1993	53	3/SSE	
C-418-20781-P	2	Unknown	-0.1	-0.1	0	A	R	03/07/18	C-4	1993	53	3/SSE	
C-419-20123-P	7	Unknown	0.7	1.1	0.4	A	R	03/07/18	C-2	2612	53	3/SSE	
C-419-20123-P	5	Unknown	1.0	1.0	0	A	R	03/07/18	C-2	2612	53	3/SSE	
C-419-20139-P	2	Unknown	-0.8	-0.9	0	A	R	03/07/18	C-4	1993	53	3/SSE	
C-419-20139-P	5	Unknown	-0.8	0.0	0.8	A	R	03/07/18	C-4	1993	53	3/SSE	
C-419-20315-P	2	Unknown	1.0	2.6	1.6	A	R	03/07/18	C-4	2314	53	3/SSE	
C-419-20315-P	1	Unknown	1.2	1.4	0.2	A	R	03/07/18	C-4	1993	53	3/SSE	
C-419-20316-P	2	Unknown	1.1	4.4	3.3	A	R	03/07/18	C-4	2314	53	3/SSE	
C-419-20316-P	5	Unknown	-1.0	2.1	3.1	A	R	03/07/18	C-4	1993	53	3/SSE	
C-419-20344-P	7	Unknown	0.2	0.2	0	A	R	03/07/18	C-2	2612	53	3/SSE	
C-419-20344-P	6	Unknown	0.2	2.0	1.8	A	R	03/07/18	C-2	2612	66	6/S	
C-419-20345-P	2	Unknown	0.0	0.9	0.9	A	R	03/07/18	C-2	2612	53	3/SSE	
C-419-20345-P	4	Unknown	0.0	0.2	0.2	A	R	03/07/18	C-2	2612	53	3/SSE	
C-420-1	1	25.5	0.9	1.2	0.3	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-10	1	Unknown	0.9	1.2	0.3	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-2	1	25.5	0.9	1.2	0.3	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-20001-P	3	Unknown	3.3	0.0	0	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20001-P	3	Unknown	0.0	0.0	0	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20001-P	0.5	Unknown	1.0	1.8	0.8	A	R	02/27/18	C-1	2612	Blank	11/WNW	*Duplicate?*
C-420-20002.1	3	7.2	0.5	0.6	0.1	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20002-P	2	Unknown	-2.1	0.0	2.1	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20002-P	6	Unknown	-3.5	0.0	3.5	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20002-P	0.5	Unknown	1.0	2.2	1.2	A	R	02/27/18	C-1	2612	Blank	11/WNW	*Duplicate?*
C-420-20004.2	0.5	19.1	1.0	1.0	0	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20004-V	0.5	19.1	0.0	0.0	0	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20005.2	0.5	12.7	1.0	1.0	0	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20005-V	0.5	12.7	1.0	1.0	0	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20006.1	0.5	12.7	0.9	1.0	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20006.2	2	50.9	1.0	1.4	0.4	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20006-V	0.5	12.7	0.9	1.0	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20007.1	0.5	12.7	0.9	1.0	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20007.2	1	25.5	1.1	1.2	0.1	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20007-V	0.5	12.7	0.9	1.0	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20008.2	0.5	12.7	0.9	1.0	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20008-V	0.5	12.7	0.9	1.0	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20009.3	2	9.6	1.0	0.9	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20009-V	5	23.9	2.0	6.1	4.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20010.2	2	19.1	0.9	0.9	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20010-V	4	38.2	-1.9	9.9	11.8	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20010-V	3	28.7	1.2	1.3	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20011.2	2	50.9	1.2	1.3	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20011.3	1	25.5	1.5	1.6	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20011.9	3	76.4	1.1	1.2	0.1	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20011-V	3	76.4	1.5	1.6	0.1	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20012-V	2	50.9	1.5	5.1	3.6	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20013.2	1	25.5	1.6	2.2	0.6	A	R	02/27/18	C-1	2612	Blank	4/NW	
C-420-20013-V	3	76.4	1.6	3.4	1.8	A	R	02/27/18	C-1	2612	Blank	4/NW	
C-420-20014-V	3	76.4	1.9	7.3	5.4	A	R	02/27/18	C-1	2612	Blank	4/NW	
C-420-20015-V	3	76.4	2.0	4.1	2.1	A	R	02/27/18	C-1	2612	Blank	4/NW	
C-420-20016-V	2	12.7	1.6	1.6	0	A	R	02/27/18	C-1	2612	Blank	4/NW	
C-420-20017.3	2	12.7	1.1	1.3	0.2	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20017-V	3	19.1	1.6	1.6	0	A	R	02/27/18	C-1	2612	Blank	4/NW	
C-420-20018.2	2	19.1	0.7	0.7	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20018-V	4	38.2	0.8	2.4	1.6	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20019.2	4	7.6	1.1	1.3	0.2	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20019.3	3	5.7	0.8	1.0	0.2	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20019-V	4	7.6	0.8	1.0	0.2	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20020-V	3	28.7	0.4	0.6	0.2	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20021.2	1	25.5	0.4	0.4	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20021-V	2	50.9	0.4	0.6	0.2	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20022-V	3	28.7	0.6	1.4	0.8	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20023.2	3	28.7	0.7	0.8	0.1	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20023-V	3	28.7	0.6	1.2	0.6	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20024.2	1	25.5	0.5	0.8	0.3	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20024-V	3	76.4	0.7	0.8	0.1	A	R	02/28/18	C-1	2994	43	7/SSW	

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C-420-20025.2	1	25.5	0.5	0.5	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20025-V	2	50.9	0.7	0.7	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20030.2	2	6.4	0.6	0.9	0.3	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20036-P	6	28.7	0.6	1.1	0.5	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20036-P	2	Unknown	-3.0	0.0	3	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20036-P	4	Unknown	-3.6	0.0	3.6	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20037-P	6	14.3	0.8	6.6	5.8	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20037-P	2	Unknown	0.0	0.0	0	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20037-P	3	Unknown	0.0	0.0	0	A	R	03/06/18	C-1	2635	47	9/ENE	
C-420-20003-V	0.5	19.1	1.0	1.0	0	A	R	02/27/18	C-1	2612	Blank	11/WNW	
C-420-20066-V	2	50.9	2.4	1.8	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20067.1	0.5	4.8	1.2	1.3	0.1	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20067-V	3	28.7	1.5	1.6	0.1	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20068.2	2	19.1	1.1	1.1	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20068-V	2	19.1	1.1	1.1	0	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20069-V	2	50.9	1.1	1.2	0.1	A	R	02/28/18	C-1	2612	43	7/SSW	
C-420-20070.2	1	25.5	0.9	1.0	0.1	A	R	02/28/18	C-1	2612	43	7/SSW	
C-420-20070-V	3	76.4	0.9	1.1	0.2	A	R	02/28/18	C-1	2612	43	7/SSW	
C-420-20071-V	3	76.4	0.9	0.9	0	A	R	02/28/18	C-1	2612	43	7/SSW	
C-420-20072.1	3	114.6	1.7	1.7	0	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20072.3	2	76.4	1.7	1.7	0	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20072-V	6	229.2	1.8	1.7	0	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20073.2	2	50.9	1.7	1.6	0	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20073.4	1	25.5	1.6	1.6	0	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20106.3	5	9.6	1.5	1.9	0.4	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20106-V	4	101.9	1.5	2.1	0.6	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20108.3	6	19.1	1.4	2.4	1	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20108-V	3	76.4	1.3	2.4	1.1	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20109.2	2	50.9	1.5	1.9	0.4	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20109-V	2	50.9	1.5	2.1	0.6	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20110.3	4	7.6	1.5	1.8	0.3	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20110-V	2	50.9	1.5	1.9	0.4	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20116.3	2	50.9	1.3	1.9	0.6	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20116-V	2	50.9	1.4	1.7	0.3	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20117.3	2	9.6	1.4	2.1	0.7	A	R	02/28/18	C-1	2954	52	7/SW	
C-420-20117-V	2	50.9	1.4	2.0	0.6	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20118.2	1	25.5	1.4	1.8	0.4	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20118.3	2	9.6	1.4	2.3	0.9	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20118-V	3	76.4	1.4	1.8	0.4	A	R	02/28/18	C-1	2994	43	7/SSW	
C-420-20119.3	3	5.7	1.2	1.3	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	Shell Side Inlet From C-1330
C-420-20119-V	3	76.4	1.2	1.3	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	Shell Side Inlet From C-1330
C-420-20121-V	2	50.9	1.5	1.9	0.4	A	R	03/14/18	C-2	2314	50	4/WSW	Diesel Flush System
C-420-20122-V	1	25.5	1.3	1.6	0.3	A	R	03/14/18	C-2	2314	50	4/WSW	Diesel Flush System
C-420-20123.2	1	25.5	1.2	1.8	0.6	A	R	03/14/18	C-2	2314	50	4/WSW	Diesel Flush System
C-420-20123.3	1	25.5	1.3	1.4	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	Diesel Flush System
C-420-20123-V	2	50.9	1.2	1.4	0.2	A	R	03/14/18	C-2	2314	50	4/WSW	Diesel Flush System
C-420-20124.2	1	25.5	1.2	1.2	0	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fan Inlet E-1747
C-420-20124-V	2	50.9	1.2	1.2	0	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fan Inlet
C-420-20125.2	1	25.5	1.1	1.1	0	A	R	03/14/18	C-2	2314	50	4/WSW	Blind (Figure 8)
C-420-20125-V	2	50.9	1.1	1.5	0.4	A	R	03/14/18	C-2	2314	50	4/WSW	Blinded From System
C-420-20126.2	1	25.5	1.1	1.1	0	A	R	03/14/18	C-2	2314	50	4/WSW	Upstream of NC BLK
C-420-20126-V	2	50.9	1.1	1.4	0.3	A	R	03/14/18	C-2	2314	50	4/WSW	Upstream of NC BLK
C-420-20127-V	2	50.9	1.1	1.1	0	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fan Inlet System
C-420-20128.2	1	25.5	1.1	1.2	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fin HPB
C-420-20128.3	2	12.7	0.9	1.1	0.2	A	R	03/14/18	C-2	2314	50	4/WSW	Inlet FLG Fin Fan
C-420-20128-V	2	50.9	1.1	1.4	0.3	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fin HPB
C-420-20129.3	2	12.7	1.0	1.9	0.9	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fan Outlet
C-420-20129.6	2	50.9	1.0	1.1	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fan Outlet
C-420-20129-V	2	50.9	0.9	1.1	0.2	A	R	03/14/18	C-2	2314	50	4/WSW	Fin Fan Outlet
C-420-20130-V	3	76.4	0.9	0.9	0	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20131.2	1	25.5	0.9	1.0	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20131.3	1	6.4	0.9	1.0	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20131-V	1	25.5	0.8	1.0	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20132.2	1	25.5	0.9	1.1	0.2	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20132-V	2	50.9	1.0	1.1	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20133.3	1	38.2	0.4	0.6	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20133.4	1	25.5	0.5	0.9	0.4	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20133-V	2	50.9	0.6	0.9	0.3	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20134-V	1	25.5	0.7	0.8	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20135-V	2	50.9	0.5	0.7	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20136.2	1	25.5	0.3	0.7	0.4	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20136.5	0.5	12.7	0.4	0.6	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20136-V	1	25.5	0.6	0.8	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20137-V	1	25.5	0.2	0.6	0.4	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20138.3	1	25.5	0.4	0.6	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	

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C-420-20138-V	2	19.1	0.4	0.4	0	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20139.2	1	9.6	0.3	0.5	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20139-V	1	9.6	0.5	0.7	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20140.2	1	9.6	0.2	0.5	0.3	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20140-V	1	25.5	0.4	0.5	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20141.2	1	38.2	0.4	0.6	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20141.5	1	38.2	0.4	0.5	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20141.8	0.5	19.1	0.4	0.4	0	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20141-V	0.5	19.1	0.4	0.6	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20142.3	1	38.2	0.4	0.5	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20142-V	1	38.2	0.5	0.6	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20143-V	1	25.5	0.4	0.6	0.2	A	R	02/28/18	C-2	2314	43	7/SSW	
C-420-20144.3	1	6.4	0.2	0.3	0.1	A	R	02/28/18	C-2	2314	43	7/SSW	
C-420-20144-V	2	12.7	0.2	0.4	0.2	A	R	02/28/18	C-2	2314	43	7/SSW	
C-420-20145.1	1	6.4	0.4	0.5	0.1	A	R	02/28/18	C-2	2314	43	7/SSW	
C-420-20145-V	1	6.4	0.8	1.0	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20146.2	0.5	12.7	0.9	1.1	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20146-V	0.5	12.7	0.8	1.1	0.3	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20147.2	1	25.5	0.9	1.0	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20147.5	1	38.2	1.1	1.5	0.4	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20147-V	1	25.5	0.9	1.7	0.8	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20148-V	1	25.5	1.1	1.5	0.4	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20149.3	0.5	12.7	0.9	1.2	0.3	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20149-V	1	25.5	0.9	1.4	0.5	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20150.2	2	9.6	0.9	1.0	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20150-V	5	23.9	0.9	1.1	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20151.3	5	127.3	0.8	1.1	0.3	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20151-V	2	6.4	0.8	1.0	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20152.2	1	19.1	0.8	1.0	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20152-V	1	25.5	0.9	1.1	0.2	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20153.2	0.5	19.1	0.9	0.9	0	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20153-V	1	38.2	0.9	1.2	0.3	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20154-V	2	38.2	0.8	0.9	0.1	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20155-V	2	38.2	0.2	0.5	0.3	A	R	02/28/18	C-2	2161	43	7/SSW	
C-420-20156-P	3	Unknown	1.2	1.7	0.5	A	R	03/07/18	C-2	2612	66	6/S	
C-420-20156-P	8	Unknown	1.1	2.9	1.8	A	R	03/07/18	C-2	2612	66	6/S	
C-420-20156-P	6	Unknown	0.6	0.9	0.3	A	R	02/28/18	C-2	2314	52	7/SW	*Duplicate?*
C-420-20158-V	1	38.2	0.2	0.3	0.1	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20159.3	1	19.1	0.3	0.4	0.1	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20159.4	1	19.1	0.4	0.5	0.1	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20159.5	1	25.5	0.4	0.7	0.3	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20159-V	1	25.5	0.2	0.5	0.3	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20160-V	3	76.4	0.5	0.7	0.2	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20161-V	2	50.9	0.5	2.4	1.9	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20162.2	1	25.5	0.3	1.2	0.9	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20162-V	1	25.5	0.2	0.8	0.6	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20163-V	1	25.5	0.2	0.4	0.2	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20164.2	1	38.2	0.3	0.4	0.1	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20164-V	1	25.5	0.3	0.4	0.1	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20165.2	1	25.5	0.3	0.5	0.2	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20165-V	1	25.5	0.3	0.5	0.2	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20166.3	1	9.6	0.3	0.9	0.6	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20166-V	1	9.6	0.2	0.8	0.6	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20167.2	1	9.6	0.4	0.5	0.1	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20170-V	1	19.1	0.4	0.4	0	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20182.2	1	38.2	0.2	0.4	0.2	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20182-V	1	38.2	0.3	0.8	0.5	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20183-V	1	19.1	0.3	0.6	0.3	A	R	02/28/18	C-2	2314	52	7/SW	
C-420-20184-P	19	Unknown	1.2	7.2	6	A	R	03/07/18	C-4	2314	53	3/SSE	
C-420-20184-P	4	Unknown	1.0	1.8	0.8	A	R	03/07/18	C-4	2314	66	6/S	
C-420-20184-P	5	Unknown	0.3	7.4	7.1	A	R	02/28/18	C-2	2314	52	7/SW	*Duplicate?*
C-420-20187.2	2	50.9	0.9	1.0	0.1	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20187.3	1	25.5	0.9	1.1	0.2	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20187.5	2	50.9	0.8	0.8	0	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20187-V	2	50.9	0.8	0.8	0	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20188-V	2	50.9	0.8	1.0	0.2	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20189-V	2	50.9	0.8	0.8	0	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20190.3	2	76.4	0.6	0.9	0.3	A	R	03/14/18	C-2	2314	50	4/WSW	
C-420-20190-V	2	50.9	0.7	1.1	0.4	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20193-V	2	76.4	0.7	0.8	0.1	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20205.2	2	76.4	0.8	0.8	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20205-V	3	114.6	0.8	0.8	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20206-V	2	38.2	0.7	0.7	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20213.2	2	76.4	0.8	0.7	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20213.3	3	9.6	0.7	0.7	0	A	R	03/14/18	C-2	1993	50	4/WSW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-420-20213-V	2	50.9	0.7	0.7	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20214.2	1	3.2	0.7	0.9	0.2	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20214-V	2	50.9	1.2	1.3	0.1	A	R	03/12/18	C-2	2161	70	7/SSW	TVA #2635
C-420-20214-V	2	50.9	0.7	0.8	0.1	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20215-V	2	50.9	0.7	0.7	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20216.2	2	50.9	0.7	0.7	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20216-V	2	50.9	0.7	0.7	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20232-V	2	38.2	0.6	0.6	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20236-P	2	Unknown	0.8	1.2	0.4	A	R	03/07/18	C-4	2314	66	6/S	
C-420-20236-P	2	Unknown	0.8	1.2	0.4	A	R	03/07/18	C-4	2314	66	6/S	
C-420-20246-V	2	38.2	0.5	0.7	0.2	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20247.2	2	76.4	0.5	0.7	0.2	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20247-V	2	76.4	0.5	0.9	0.4	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20248.2	1	25.5	0.5	0.8	0.3	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20262-V	2	50.9	0.5	0.8	0.3	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20263.1	1	38.2	0.6	0.6	0	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20263-V	1	38.2	0.5	0.6	0.1	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20264.3	2	12.7	0.9	1.0	0.1	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20264-V	4	25.5	0.6	1.5	0.9	A	R	03/14/18	C-2	1993	50	4/WSW	
C-420-20265	4	19.1	0.5	0.5	0	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20266-V	2	50.9	0.5	0.5	0	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20267.2	1	25.5	0.5	0.0	0	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20267-V	1	25.5	0.3	0.5	0.2	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20268.2	2	12.7	0.5	0.7	0.2	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20268-V	2	12.7	0.3	0.5	0.2	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20269.2	1	25.5	0.5	1.1	0.6	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20269-V	2	50.9	0.5	2.3	1.8	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20270.3	2	25.5	0.9	4.1	3.2	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20270-V	3	38.2	0.3	7.5	7.2	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20271.2	3	19.1	0.5	3.2	2.7	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20307.2	2	19.1	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/NA	
C-420-20360	3	7.2	2.7	2.9	0.2	A	R	03/14/18	C-4	2612	50	4/WSW	Filter
C-420-20374	2	4.8	2.5	3.3	0.8	A	R	03/14/18	C-4	2612	50	4/WSW	Filter
C-420-20375-V	1	25.5	3.4	3.5	0.1	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20338	3	5.7	0.2	2.5	2.3	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20342-V	2	76.4	0.9	0.8	0	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20343.2	2	9.6	0.8	0.9	0.1	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20343-V	3	14.3	0.7	1.8	1.1	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20344-V	4	19.1	0.7	1.3	0.6	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20345.2	1	12.7	0.7	0.9	0.2	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20345.2	2	25.5	0.9	1.0	0.1	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20346-V	4	19.1	0.7	7.0	6.3	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20346-V	4	19.1	0.9	2.1	1.2	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20347.2	5	127.3	0.7	10.9	10.2	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20347.2	1	25.5	1.0	1.0	0	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20347-V	2	50.9	2.5	3.1	0.6	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20347-V	2	50.9	1.0	1.0	0	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20348-V	1	25.5	2.5	2.6	0.1	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20348-V	2	50.9	1.0	0.9	0	A	R	03/14/18	C-2	2314	51	7/WSW	
C-420-20349.2	1	3.2	2.2	2.3	0.1	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20349.2	3	9.6	0.5	1.0	0.5	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20349-V	6	19.1	2.5	12.3	9.8	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20349-V	3	9.6	0.5	1.4	0.9	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20350	1	2.4	2.4	2.8	0.4	A	R	03/14/18	C-4	2612	50	4/WSW	Filter Size 8
C-420-20350	3	5.7	0.9	1.1	0.2	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20360	3	5.7	0.7	1.2	0.5	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20374	2	3.8	0.8	1.4	0.6	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20375-V	2	50.9	0.7	1.1	0.4	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20376.2	2	6.4	2.7	3.7	1	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20376.2	2	6.4	1.0	1.0	0	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20376-V	7	22.3	3.8	20.4	16.6	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20376-V	2	6.4	1.0	1.7	0.7	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20379-V	2	38.2	4.9	5.0	0.1	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20379-V	2	38.2	0.8	1.4	0.6	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20307-V	3	28.7	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20380.2	1	19.1	4.2	4.2	0	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20380.2	1	19.1	1.0	1.4	0.4	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20380-V	2	38.2	3.7	3.7	0	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20380-V	3	57.3	0.9	1.5	0.6	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20381-V	2	38.2	3.1	3.1	0	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20381-V	2	38.2	1.0	1.4	0.4	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20382-V	2	38.2	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20383.2	2	38.2	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20383.3	2	38.2	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20383-V	3	57.3	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	

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C-420-20384-V	2	38.2	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20385.2	3	57.3	3.1	2.5	0	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20385.2	1	19.1	1.3	1.5	0.2	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20385-V	1	19.1	5.1	5.1	0	A	R	03/14/18	C-4	2612	50	4/WSW	
C-420-20385-V	2	38.2	1.2	1.4	0.2	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20386.2	1	4.8	0.8	1.3	0.5	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20386.2	2	9.6	1.5	1.7	0.2	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20386-V	3	14.3	0.8	1.3	0.5	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20386-V	3	14.3	1.3	1.6	0.3	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20387-V	1	25.5	0.8	0.9	0.1	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20387-V	2	50.9	1.6	1.8	0.2	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20388.2	3	28.7	0.8	2.1	1.3	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20388.2	2	19.1	1.5	1.7	0.2	A	R	03/14/18	C-2	1993	51	7/WSW	
C-420-20388-V	1	9.6	1.7	1.8	0.1	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20389.2	9	43.0	0.1	1.5	1.4	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20389-V	6	28.7	0.1	1.4	1.3	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20390.2	1	25.5	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20390-V	1	25.5	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20391.3	1	9.6	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20391-V	1	9.6	0.1	1.4	1.3	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20392-V	2	50.9	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20393.2	1	4.8	1.0	1.8	0.8	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20393-V	2	9.6	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20394-V	1	9.6	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20395.3	1	25.5	0.9	1.0	0.1	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20395-V	1	25.5	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20396.2	3	14.3	0.9	3.6	2.7	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20396-V	1	4.8	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20397.3	1	12.7	1.0	1.1	0.1	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20397-V	2	25.5	0.1	0.1	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20398-V	2	50.9	2.0	2.0	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20399.2	3	14.3	2.9	4.1	1.2	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20399-V	1	4.8	1.6	4.1	2.5	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20400-V	1	4.8	1.5	1.5	0	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20401.2	1	25.5	1.0	1.1	0.1	A	R	03/14/18	C-4	2954	50	4/WSW	
C-420-20401-V	1	25.5	2.5	2.9	0.4	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20402.2	5	23.9	1.2	14.7	13.5	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20402-V	1	4.8	1.9	2.4	0.5	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20403.2	2	50.9	1.8	1.9	0.1	A	R	02/27/18	C-2	2314	55	11/WNW	
C-420-20403-V	1	25.5	1.5	2.1	0.6	A	R	02/27/18	C-2	2314	58	4/NW	
C-420-20404.2	2	6.4	1.4	3.3	1.9	A	R	02/27/18	C-2	2314	58	4/NW	
C-420-20406	1	9.6	1.5	2.0	0.5	A	R	02/27/18	C-2	2314	58	4/NW	
C-420-20407	1	9.6	1.5	2.1	0.6	A	R	02/27/18	C-2	2314	58	4/NW	
C-420-20408.2	1	25.5	1.0	1.2	0.2	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20408-V	2	50.9	1.0	1.1	0.1	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20409-V	2	50.9	1.1	1.2	0.1	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20410-V	1	25.5	1.0	1.1	0.1	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20411.2	2	50.9	1.0	1.3	0.3	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20411.3	2	19.1	1.0	1.1	0.1	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20411-V	3	28.7	1.0	1.4	0.4	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20412.2	2	19.1	1.0	1.4	0.4	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20412-V	2	19.1	1.0	1.4	0.4	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20413.2	1	19.1	1.2	1.2	0	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20413-V	2	38.2	1.2	1.4	0.2	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20415.2	2	19.1	1.0	1.0	0	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20415-V	2	19.1	1.0	1.1	0.1	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20416.3	2	50.9	0.9	0.9	0	P	R	03/12/18	C-2	2161	70	7/SSW	Partially Insulated
C-420-20416.4	3	28.7	0.9	0.8	0	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20416-V	2	50.9	0.8	0.9	0.1	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20417.2	1	9.6	0.8	0.8	0	P	R	03/12/18	C-2	2161	70	7/SSW	Partially Insulated
C-420-20417-V	2	19.1	0.8	0.9	0.1	P	R	03/12/18	C-2	2161	70	7/SSW	Partially Insulated
C-420-20418-V	2	50.9	0.8	1.1	0.3	P	R	03/12/18	C-2	2161	70	7/SSW	Partially Insulated
C-420-20419.2	1	25.5	0.8	0.8	0	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20419-V	2	50.9	0.8	1.1	0.3	P	R	03/12/18	C-2	2161	70	7/SSW	Partially Insulated
C-420-20420.2	0.5	19.1	0.0	0.1	0.1	P	R	03/12/18	C-2	2635	70	7/SSW	Partially Insulated
C-420-20420-V	2	50.9	0.1	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	TVA #2635
C-420-20421-V	3	76.4	0.8	2.6	1.8	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20422.2	2	50.9	0.8	1.1	0.3	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20422-V	1	25.5	0.8	1.0	0.2	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20423.3	1	25.5	0.8	1.1	0.3	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20423-V	2	50.9	0.8	1.4	0.6	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20424-V	2	50.9	0.8	1.3	0.5	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20425.2	1	25.5	0.8	0.8	0	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20425-V	1	25.5	0.9	0.8	0	A	R	03/12/18	C-2	2161	70	7/SSW	
C-420-20426-V	4	101.9	0.2	0.2	0	A	R	03/12/18	C-2	2635	70	7/SSW	TVA #2635

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-420-20427.2	3	28.7	0.1	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20427-V	2	19.1	0.1	0.1	0	P	R	03/12/18	C-2	2635	70	7/SSW	Partially Insulated
C-420-20428.3	Unknown	Unknown	0.1	0.0	0	P	R	03/12/18	C-2	2635	70	7/SSW	Partially Insulated
C-420-20428-V	3	28.7	0.1	0.1	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20429.1	2	50.9	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20429-V	2	50.9	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20430	5	5.3	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20431.3	1	38.2	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20431-V	4	152.8	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20434.2	2	19.1	0.0	0.1	0.1	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20434-V	3	28.7	0.0	0.1	0.1	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20435.2	1	38.2	0.7	0.7	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20435-V	1	38.2	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20436-V	1	38.2	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20437.1	1	38.2	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20437.6	1	38.2	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20437-V	1	38.2	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20438-V	1	25.5	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20439.2	0.5	4.8	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20439-V	2	19.1	0.5	0.5	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20440.2	2	19.1	0.4	0.5	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20440-V	2	19.1	0.4	0.4	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20441.2	1	9.6	0.3	0.4	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20441-V	2	19.1	0.4	0.4	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20442.2	1	25.5	0.3	0.4	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20442-V	1	25.5	0.3	0.5	0.2	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20443-V	1	25.5	0.3	0.4	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20444.2	1	25.5	0.5	0.6	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20444-V	1	25.5	0.3	0.6	0.3	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20445-V	1	25.5	0.3	0.4	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20446.4	1	25.5	0.2	0.3	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20446-V	1	25.5	0.2	0.3	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20447.3	0.5	12.7	0.4	0.5	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20447-V	2	50.9	0.7	0.9	0.2	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20448.3	1	9.6	0.4	0.5	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20448-V	1	9.6	0.3	0.4	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20449.2	1	Unknown	0.2	0.3	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20449-V	1	Unknown	0.2	0.3	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20450.2	1	Unknown	0.4	0.4	0	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20450.5	1	Unknown	0.3	0.4	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20450-V	1	Unknown	0.4	0.4	0	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20451.3	3	28.7	0.6	3.1	2.5	A	R	03/19/18	C-4	2314	43	4/NE	
C-420-20451.4	1	Unknown	0.7	0.8	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20451-V	1	Unknown	0.7	0.8	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20452-V	1	Unknown	0.6	0.7	0.1	P	R	03/12/18	C-4	2314	50	2/E	Insulated bonnet
C-420-20453-V	1	Unknown	0.6	0.8	0.2	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20454.2	1	Unknown	0.7	0.7	0	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20454.4	1	Unknown	0.5	0.6	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20454-V	1	Unknown	0.5	0.6	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20455.3	0.5	Unknown	0.6	0.6	0	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20455-V	1	Unknown	0.5	0.6	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20456.2	1	Unknown	0.4	0.5	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20456-V	2	Unknown	0.6	0.7	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20457.1	1	Unknown	0.5	0.7	0.2	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20457.2	1	Unknown	0.6	0.7	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20457.4	1	Unknown	0.4	0.5	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20457-V	1	Unknown	0.5	0.6	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20458.2	0.5	Unknown	0.6	1.4	0.8	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20458.4	1	Unknown	1.0	1.3	0.3	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20458-V	1	Unknown	0.3	0.4	0.1	A	R	03/12/18	C-4	2314	50	2/E	
C-420-20459-V	1	38.2	1.4	1.8	0.4	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20460-V	1	38.2	0.4	0.4	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20461.2	0.5	19.1	0.2	0.3	0.1	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20461-V	0.5	19.1	0.6	0.6	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20462.2	0.5	19.1	0.8	0.8	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20462-V	0.5	19.1	0.8	0.8	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20463-V	1	38.2	0.8	1.0	0.2	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20464-V	0.5	19.1	0.9	0.9	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20465.2	3	28.7	0.7	6.0	5.3	A	R	03/19/18	C-4	2314	43	4/NE	
C-420-20465.4	1	9.6	0.8	1.1	0.3	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20465-V	1	25.5	1.0	1.3	0.3	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20466-V	2	50.9	0.3	0.3	0	A	R	03/12/18	C-4	1993	50	2/E	
C-420-20467.4	2	19.1	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20467-V	3	28.7	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20468.2	1	25.5	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-420-20468-V	2	50.9	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20469.2	1	25.5	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20469-V	3	76.4	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20470.2	1	25.5	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20470-V	2	50.9	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20472.1	1	9.6	0.0	0.0	0	A	R	03/12/18	C-2	2635	70	7/SSW	
C-420-20478.1	1	38.2	1.2	1.3	0.1	A	R	03/14/18	C-4	2161	50	4/WSW	
C-420-20478.3	0.5	19.1	1.4	1.4	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-420-20478.6	1	38.2	1.3	1.3	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-420-20478.9	0.5	19.1	1.2	1.3	0.1	A	R	03/14/18	C-4	2161	51	9/SSW	
C-420-20478-V	1	38.2	1.3	1.3	0	A	R	03/14/18	C-4	2161	51	9/SSW	
C-420-20479.2	1	38.2	1.9	6.0	4.1	A	R	03/14/18	C-4	2161	51	9/SSW	Background
C-420-20479-V	1	38.2	2.5	4.1	1.6	A	R	03/14/18	C-4	2161	51	9/SSW	
C-420-20480-V	1	38.2	1.8	2.5	0.7	A	R	03/14/18	C-4	2161	51	9/SSW	
C-420-20514.2	1	25.5	1.4	3.3	1.9	A	R	03/14/18	C-4	2954	51	9/SSW	Shell of Exchanger
C-420-20514-V	1	25.5	1.6	2.3	0.7	A	R	03/14/18	C-4	2954	51	9/SSW	
C-420-20515.2	1	25.5	0.9	0.9	0	A	R	03/14/18	C-4	2954	51	9/SSW	
C-420-20515-V	1	25.5	1.0	1.0	0	A	R	03/14/18	C-4	2954	51	9/SSW	
C-420-20517-V	1	38.2	0.8	0.9	0.1	A	R	03/14/18	C-4	2954	51	9/SSW	
C-420-20518-V	1	19.1	0.8	0.9	0.1	A	R	03/14/18	C-4	2954	51	9/SSW	
C-420-3	1	25.5	1.1	1.2	0.1	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-4	1	25.5	1.1	1.2	0.1	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-5	1	25.5	1.1	1.0	0	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-6	1	25.5	1.1	1.0	0	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-7	1	25.5	0.8	0.9	0.1	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-8	1	25.5	0.8	1.0	0.2	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-420-9	1	Unknown	1.0	1.8	0.8	A	R	02/28/18	C-2	2314	43	7/SSW	Fin Fan Plug
C-422-20037-P	5	Unknown	0.1	1.4	1.3	A	R	03/07/18	C-2	2612	53	3/SSE	Casing N/A
C-429-20084-P	4	Unknown	1.1	3.0	1.9	A	R	03/08/18	C-2	2314	54	4/SE	
C-429-20084-P	13	Unknown	1.5	3.3	1.8	A	R	03/08/18	C-2	2314	54	4/SE	
C-429-20096-P	2	Unknown	0.6	0.0	0	A	R	03/07/18	C-4	2314	66	6/S	
C-429-20096-P	4	Unknown	-0.1	1.5	1.6	A	R	03/07/18	C-4	2314	66	6/S	
C-429-20238-P	6	Unknown	0.4	0.6	0.2	A	R	03/07/18	C-4	2314	66	6/S	
C-429-20238-P	2	Unknown	0.6	0.6	0	A	R	03/07/18	C-4	2314	66	6/S	
C-429-20246-P	4	Unknown	1.4	3.3	1.9	A	R	03/08/18	C-2	2314	54	4/SE	
C-429-20246-P	4	Unknown	1.5	6.9	5.4	A	R	03/08/18	C-2	2314	54	4/SE	
C-953-20026-P	4	Unknown	0.5	5.7	5.2	A	R	03/08/18	C-4	1993	61	4/WSW	
C-953-20026-P	2	Unknown	-0.1	0.0	0.1	A	R	03/08/18	C-4	2954	54	4/SSE	
C-953-20045-P	3	Unknown	1.9	2.5	0.6	A	R	03/08/18	C-2	2314	54	4/SE	
C-953-20045-P	3	Unknown	1.9	2.8	0.9	A	R	03/08/18	C-2	2314	54	4/SE	
C-955-20096-P	FLAG	Unknown	Blank	Blank	NA	U	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20096-P	2	Unknown	0.4	0.6	0.2	A	R	03/08/18	C-4	2954	61	4/WSW	
C-955-20112-P	4	Unknown	1.0	2.1	1.1	A	R	03/08/18	C-2	2635	62	4/SE	
C-955-20112-P	3	Unknown	1.5	1.6	0.1	A	R	03/08/18	C-2	2635	62	7/W	
C-955-20145-P	4	Unknown	0.8	36.5	35.7	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20145-P	2	Unknown	0.9	1.1	0.2	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20395-P	3	Unknown	1.0	1.4	0.4	A	R	03/08/18	C-2	2635	62	4/SE	
C-955-20395-P	3	Unknown	1.0	1.5	0.5	A	R	03/08/18	C-2	2635	62	7/W	
C-955-20410-P	3	Unknown	4.3	4.4	0.1	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20410-P	3	Unknown	1.1	4.6	3.5	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20431-P	2	Unknown	1.2	1.5	0.3	A	R	03/08/18	C-2	2635	62	4/SE	
C-955-20431-P	3	Unknown	1.1	1.7	0.6	A	R	03/08/18	C-2	2635	62	7/W	
C-955-20540-P	2	Unknown	0.8	2.5	1.7	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20540-P	5	Unknown	3.0	3.1	0.1	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20557-P	3	Unknown	1.3	1.3	0	A	R	03/08/18	C-2	2635	62	4/SE	
C-955-20557-P	3	Unknown	0.9	1.5	0.6	A	R	03/08/18	C-2	2635	62	7/W	
C-955-20578-P	2	Unknown	1.8	18.0	16.2	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20578-P	5	Unknown	2.3	25.0	22.7	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20596-P	2	Unknown	1.0	0.9	0	A	R	03/08/18	C-2	2635	62	4/SE	
C-955-20596-P	2	Unknown	1.0	0.9	0	A	R	03/08/18	C-2	2635	62	7/W	
C-955-20875-P	1	Unknown	0.8	0.8	0	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20875-P	3	Unknown	0.5	0.8	0.3	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20893-P	2	Unknown	0.6	1.1	0.5	A	R	03/08/18	C-2	2635	62	4/SE	
C-955-20893-P	3	Unknown	0.5	0.7	0.2	A	R	03/08/18	C-2	2635	62	7/W	
C-955-20917-P	2	Unknown	0.6	4.0	3.4	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20917-P	4	Unknown	0.8	0.9	0.1	A	R	03/08/18	C-4	1993	61	4/WSW	
C-955-20936-P	7	Unknown	0.4	1.5	1.1	A	R	03/08/18	C-2	2635	62	4/SE	
C-955-20936-P	10	Unknown	0.5	3.1	2.6	A	R	03/08/18	C-2	2161	62	7/W	
C-955-20965-P	6	Unknown	0.8	74.7	73.9	A	R	03/08/18	C-4	1993	61	4/WSW	
C-956-20001-P	1	Unknown	0.0	0.5	0.5	A	R	03/26/18	C-4	2314	44	7/NNW	
C-956-20001-P	1	Unknown	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-963-20001-P	1	Unknown	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-963-20001-P	3	Unknown	0.0	0.0	0	A	R	03/26/18	C-4	2314	44	7/NNW	
C-120-20375-P	2	6.4	1.6	1.6	0	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20373-P	2	6.4	1.6	1.6	0	A	R	05/21/18	C-4	202017011959	62.0	11/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-120-20408	1	25.5	1.6	1.6	0	P	R	05/21/18	C-4	202017011959	62.0	11/NE	Partially Insulated
C-120-20414-V	1	19.1	1.5	1.9	0.4	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20276-V	1	25.5	1.5	1.5	0	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20284.2	1	25.5	1.4	1.5	0.1	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20313-V	2	6.4	1.5	2	0.5	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20313.2	1	3.2	1.4	1.5	0.1	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20310-V	1	19.1	1.4	1.5	0.1	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20311.2	1	25.5	1.4	1.5	0.1	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20283-V	1	3.2	1.4	1.5	0.1	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20283.2	2	6.4	1.4	1.6	0.2	P	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20291-V	1	19.1	1.4	1.4	0	A	R	05/21/18	C-4	202017011959	62.0	11/NE	
C-120-20227-V	1	3.2	1.4	1.4	0	A	R	05/21/18	C-4	202017011959	62.0	11/NE	Partially Insulated
C-120-20261-V	2	50.9	1.3	1.4	0.1	A	R	05/21/18	C-4	202017011959	62.0	11/NE	Mixer
C-120-20265-V	2	50.9	1.4	1.4	0	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20260	1	2.4	1.3	2.1	0.8	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20260.1	1	2.4	1.3	1.8	0.5	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20219.2	1	25.5	1.3	1.3	0	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20815.6	1	25.5	1.2	1.3	0.1	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20217-V	1	25.5	1.2	1.3	0.1	P	R	05/21/18	C-4	202017011959	62	11/NE	Particle Insulation
C-120-20225-V	2	6.4	1.2	1.4	0.2	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20236	3	2.4	1.3	1.5	0.2	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20257.3	1	2.4	1.2	1.3	0.1	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20283-P	2	38.2	1.1	1.2	0.1	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20359-V	2	3.2	1.1	1.2	0.1	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-10762-V	1	25.5	1.2	1.3	0.1	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20760.02	1	1.6	1.2	1.2	0	A	R	05/21/18	C-4	202017011959	62	11/NE	
C-120-20643-P	2	4.8	1.2	1.2	0	A	R	05/21/18	C-4	202017011959	62	11/NE	Mixer
C-120-20664-P	2	4.8	1.2	1.9	0.7	A	R	05/21/18	C-4	202017011959	62	11/NE	Mixer
C-120-20017-P	1	3.2	1.6	1.8	0.2	A	R	05/21/18	C-4	202017011959	52	4/SE	Mixer
C-120-20014.01	1	25.5	1.6	1.7	0.1	A	R	05/21/18	C-4	202017011959	52	4/SE	
C-120-20012.02	1	25.5	1.6	1.7	0.1	A	R	05/21/18	C-4	202017011959	52	4/SE	
C-120-20094-P	3	2.9	1.0	1.0	0	A	R	05/21/18	C-4	202017011959	52	4/SE	Mixer
C-120-20092-P	4	3.8	0.1	0.9	0.8	A	R	05/21/18	C-4	202017011959	52	4/SE	Mixer
C-120-20140-P	2	1.9	1.9	1.9	0	A	R	05/21/18	C-4	202017011959	52	4/SE	Mixer
C-120-20110.06	2	50.9	1.8	1.8	0	A	R	05/21/18	C-4	202017011959	52	4/SE	
C-120-20129.1-V	1	25.5	1.7	1.8	0.1	A	R	05/21/18	C-4	202017011959	52	4/SE	
C-120-20127.1-V	2	3.2	1.7	2.8	1.1	A	R	05/21/18	C-4	202017011959	52	4/SE	
C-120-20807.03	1	3.2	1.7	1.8	0.1	A	R	05/21/18	C-4	202017011959	52	4/SE	
C-120-20103-V	1	19.1	1.6	1.6	0	P	R	05/21/18	C-4	202017011959	52	4/SE	Particle Insulation
C-1620-20543-P	1	4.8	1.3	1.3	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20446-P	3	14.3	1.2	1.3	0.1	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20473.2	1	25.5	1.2	1.2	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20403-V	1	19.1	1.2	1.2	0	P	R	05/22/18	C-4	202016121926	54	9/SW	Bonnet Insulated
C-1620-20468.3	1	9.5	1.0	1.2	0.2	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20453-V	1	25.5	1.1	1.1	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20003-P	1	3.2	1.0	1.0	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20026	1	25.5	1.0	1.0	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20029	1	25.5	1.0	1.0	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20039	1	25.5	3.4	3.7	0.3	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20041-V	1	25.5	2.9	2.9	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20018-V	1	76.4	1.9	1.9	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20077.2	1	76.4	1.6	1.6	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20004	2	1.3	1.5	2.2	0.7	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20084-P	1	3.2	1.0	1.1	0.1	A	R	05/22/18	C-4	202016121926	54	9/SW	Mixer
C-1620-20110	1	25.5	1.0	2.2	1.2	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20112	1	25.5	1.0	2.0	1	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20088-V	1	25.5	1.0	1.1	0.1	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20030.3	1	2.4	1.0	1.2	0.2	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20121-V	3	4.8	0.9	1.1	0.2	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-21021.2	1	1.6	0.9	1.1	0.2	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20178-P	3	7.2	0.8	35.0	34.2	A	R	05/22/18	C-4	202016121926	54	9/SW	Mixer
C-1620-20160-V	1	38.2	1.7	1.7	0	A	R	05/22/18	C-4	202016121926	54	9/SW	No Bonnet
C-1620-20209-V	2	6.4	1.4	1.4	0	A	R	05/22/18	C-4	202016121926	54	9/SW	Mixer
C-1620-20252-V	1	19.1	1.2	1.4	0.2	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20362-V	1	19.1	1.7	2.4	0.7	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20399.1	1	38.2	1.1	1.1	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20398-V	4	4.8	1.1	3.0	1.9	A	R	05/22/18	C-4	202016121926	54	9/SW	MOV 332
C-1620-20323-V	1	6.4	1.1	1.1	0	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20323.4	1	6.4	0.9	1.1	0.2	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1620-20333-V	1	25.5	1.0	1.1	0.1	A	R	05/22/18	C-4	202016121926	54	9/SW	
C-1626-20450-P	2	6.4	1.0	1.1	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1626-20355-P	1	3.2	1.1	1.1	0	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1626-20453.3	1	2.4	1.0	1.1	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1626-20175-P	1	3.2	0.9	1.0	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1626-20250-V	1	19.1	0.8	0.9	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
C-1626-20218-P	2	6.4	0.8	0.9	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1626-20003-P	1	3.2	0.8	0.9	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1626-20024-V	1	3.2	0.7	0.8	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1626-20204-P	1	3.2	0.8	0.9	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1626-20556.1	1	2.4	0.7	0.7	0	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1626-20558.8	1	38.2	0.7	0.8	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1626-20558-V	1	38.2	0.7	0.8	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1626-20042-P	1	3.2	0.6	0.8	0.2	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1626-20109-P	2	6.4	0.6	0.8	0.2	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1626-20341-P	2	6.4	0.7	0.8	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1621-20079-P	2	6.4	0.6	0.8	0.2	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1621-20077-P	1	3.2	0.5	1.8	1.3	A	R	05/22/18	C-4	202016121926	57	11/SW	MIXER
C-1621-20135-V	1	25.5	0.5	0.6	0.1	P	R	05/22/18	C-4	202016121926	57	11/SW	Bonnet Part. Insulated
C-1621-20087.2	1	38.2	0.5	0.6	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1621-20001-P	2	6.4	0.6	0.7	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	Mixer
C-1621-20005-P	1	1.9	0.6	0.6	0	A	R	05/22/18	C-4	202016121926	57	11/SW	Sample Pump
C-1627-20203-V	2	12.7	0.5	0.5	0	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1627-20218-V	1	25.5	0.4	0.5	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1627-20217-V	1	25.5	0.5	0.5	0	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1627-20160-V	1	25.5	0.4	0.6	0.2	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1627-20117-V	2	6.4	0.4	0.5	0.1	A	R	05/22/18	C-4	202016121926	57	11/SW	
C-1627-20001-P	2	6.4	1.2	1.2	0	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20305.1	1	25.5	1.1	1.3	0.2	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20305.5	2	50.9	1.1	104	102.9	A	R	05/23/18	C-4	202016121926	55	9/SW	-
C-1627-20305.6	2	50.9	1.6	7.6	6	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20305.7	1	3.2	1.8	3.5	1.7	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20306-V	1	76.4	1.8	2.9	1.1	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20306.3	2	152.8	1.9	149	147.1	A	R	05/23/18	C-4	202016121926	55	9/SW	-
C-1627-20303-V	1	25.5	3.1	34	30.9	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20303.2	1	76.4	3.2	3.2	0	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20309.3	1	25.5	2.9	3.0	0.1	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20298-V	1	25.5	2.3	2.8	0.5	A	R	05/23/18	C-4	202016121926	55	9/SW	Replaced 20318 to high
C-1627-20138.2	2	3.2	2.2	2.6	0.4	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20015-V	2	6.4	1.5	1.6	0.1	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20019-V	1	38.2	1.3	1.3	0	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20021-1	1	25.5	1.3	1.3	0	A	R	05/23/18	C-4	202016121926	55	9/SW	PRD
C-1627-20233.3	1	25.5	1.3	1.3	0	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20359-V	1	38.2	1.2	1.2	0	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20359.4	1	38.2	1.1	1.2	0.1	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20359.5	1	38.2	1.2	1.2	0	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-1627-20359.8	1	38.2	1.1	1.5	0.4	P	R	05/23/18	C-4	202016121926	55	9/SW	Part. Insulate.
C-1627-20186	2	3.2	1.0	1.3	0.3	A	R	05/23/18	C-4	202016121926	55	9/SW	Was 1627-20361 to high to reach same line
C-1627-20002.5	1	76.4	1.0	1.2	0.2	A	R	05/23/18	C-4	202016121926	55	9/SW	
C-422-20054-P	1	Unknown	1.0	1.1	0.1	A	R	03/07/18	C-4	2314	66	6/S	
C-420-20003-P	2	2	1.0	1.0	0	A	R	02/27/18	C-1	2612	Ambient	11/WNW	
C-1627-20001-P	4	Unknown	0.6	0.8	0.2	A	R	03/09/18	C-3	1993	60	7/SW	
C-1627-20001-P	4	Unknown	0.3	0.4	0.1	A	R	03/09/18	C-2	2314	60	7/SW	
C-1627-20241-P	2	Unknown	0.4	1.1	0.7	A	R	03/09/18	C-3	1993	60	7/SW	
C-402-20019-P	1	Unknown	1.1	2.4	1.3	A	R	3/7/2018	C-4	2314	66.0	6/S	
D-1	5	23.9	1	2	1	A	R	02/27/18	D-1	372	51	5.5/NW	S.E. Corner of Unit @ Pipeway Edge
D-3	15	71.6	3	103	100	A	R	02/27/18	D-1	372	51	5.5/NW	S.E. Corner of Unit @ Pipeway Edge FV-110 HCS Leak Tag#2854
D-5	3	14.3	1	2	1	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner out unit @ Edge of Pway Above GT
D-7	2	9.5	1	1	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ Edge of Pway E at FV - 110
D-9	2	50.9	1	1	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway E of FV 110
D-11	2	50.9	1	1	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway W of FV 110
D-13	3	14.3	1	1	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway W of FV 110
D-15	4	19.1	1	1	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway W of FV 110
D-17	4	19.1	1	2	1	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway E of PV-569
D-19	2	9.5	1	1	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway E of PV-569
D-21	3	76.4	1	2	1	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway E of PV-569
D-23	2	50.9	1	1	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway E of PV-569
D-25	4	152.8	1	219	218	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. Corner of unit @ the Edge of Pway E of PV-569 (HLS Leak Tag # 2855)
D-27	7	178.3	1	708	707	A	R	02/27/18	D-1	372	51	5.5/NW	S.E. Corner of unit @ P-way edge on PT-569 (HLS leak tag #2899)
D-29	1	38.2	2	6	4	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. corner of unit @ P-way edge on PT-569
D-31	1	38.2	2	3	1	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. corner of unit @ P-way edge on PT-569
D-33	1	38.2	2	2	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. corner of unit @ P-way edge on PT-569
D-35	4	19.1	2	2	0	A	R	02/27/18	D-1	367	51	5.5/NW	S.E. corner of unit @ P-way edge on PV-569
D-37	2	9.5	2	2	0	A	R	02/27/18	D-1	289	51	5.5/NW	S.E. corner of unit @ P-way edge E of PV-569
D-39	2	50.9	2	2	0	A	R	02/27/18	D-1	289	51	5.5/NW	S.E. corner of unit @ P-way edge W of PV-569
D-41	5	23.9	2	5	3	A	R	02/27/18	D-1	289	51	5.5/NW	S.E. corner of unit @ P-way edge E of PV-569
D-43	2	50.9	2	3	1	A	R	02/27/18	D-1	289	51	5.5/NW	S.E. corner of unit @ P-way edge E of PV-569
D-45	1	25.5	2	2	0	A	R	02/27/18	D-1	289	51	5.5/NW	S.E. corner of unit @ P-way edge E of PV-569
D-47	1	38.2	2	2	0	A	R	02/27/18	D-1	289	51	5.5/NW	S.E corner of unit @ P-way edge FT 1067
D-49	1	38.2	2	3	1	A	R	02/27/18	D-1	289	51	5.5/NW	S.E corner of unit @ P-way edge FT 1067
D-51	1	38.2	3	4	1	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1067

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-53	1	38.2	2	2	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1067
D-55	1	38.2	3	3	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1067
D-57	1	38.2	2	2	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1067
D-59	1	38.2	2	2	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1061
D-61	1	38.2	2	2	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1061
D-63	1	38.2	2	2	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1062
D-65	2	76.4	2	22	20	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1062
D-67	1	38.2	5	5	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1062
D-69	1	38.2	4	6	2	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1062
D-71	1	38.2	4	4	0	A	R	02/27/18	D-2	289	51	5.5/NW	SE corner of unit @Pway edge FT1062
D-2	3	9.5	5	7	2	A	R	02/28/18	D-3	553	55	5.5/SW	GT inside of pump on discharge line
D-4	2	50.9	3	461	458	A	R	02/28/18	D-3	553	55	5.5/SW	PL BTM of 3/4" GT NW side pump Leak HLS # 2896
D-6	1	25.5	3	4	1	A	R	02/28/18	D-3	2005	55	5.5/SW	GT NW side of pump on discharge LN
D-8	2	6.4	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	FL on discharge line W. side of pump
D-10	2	12.7	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	FL on Min flow line W. side of pump
D-12	1	19.1	2	3	1	A	R	02/28/18	D-3	2005	55	5.5/SW	GT W. side of pump
D-14	2	38.2	2	4	2	A	R	02/28/18	D-3	2005	55	5.5/SW	FL W. Side of pump
D-16	1	19.1	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	GT W. side of pump
D-18	1	19.1	2	3	1	A	R	02/28/18	D-3	2005	55	5.5/SW	FL W. Side of pump
D-20	0.5	19.1	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	BL SW. side of pump
D-22	0.5	19.1	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	TF SW. side of pump
D-24	1	38.2	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	N SW. side of pump
D-26	0.5	19.1	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	TF SW. side of pump
D-28	0.5	19.1	2	3	1	A	R	02/28/18	D-3	2005	55	5.5/SW	N SW. side of pump
D-30	0.5	19.1	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	FL SW side of pump
D-32	1	38.2	2	3	1	A	R	02/28/18	D-3	2005	55	5.5/SW	N SW. side of pump
D-34	1	38.2	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	FL SW side of pump
D-36	1	38.2	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	BL SW. side of pump @ sample station
D-38	1	38.2	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	FL SW. side of pump @ sample station
D-40	1	76.4	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	BL SW. side of pump @ sample station
D-42	1	76.4	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	TF SW side of pump @ sample station
D-44	1	25.5	2	25	23	A	R	02/28/18	D-3	2005	55	5.5/SW	N on discharge line SW side of pump HLS Leak #2897
D-46	1	6.4	3	4	1	A	R	02/28/18	D-3	2005	55	5.5/SW	F W side of pump on discharge line
D-48	1	38.2	2	570	568	A	R	02/28/18	D-3	2005	55	5.5/SW	N SW. side of pump HLS Leak #2898
D-50	2	6.4	3	5	2	A	R	02/28/18	D-3	2005	55	5.5/SW	GT SE. side of pump on suction line
D-52	2	6.4	3	4	1	A	R	02/28/18	D-3	2005	55	5.5/SW	F SE. side of pump on suction line
D-54	1	25.5	2	2	0	A	R	02/28/18	D-3	2005	55	5.5/SW	GT SE. side of pump on suction line
D-56	1	3.2	2	7	5	A	R	02/28/18	D-3	2005	55	5.5/SW	F SE. side of pump on suction line
D-58	0.5	12.7	3	3	0	A	R	02/28/18	D-3	2005	55	5.5/SW	GT SE. side of pump on suction line
D-60	4	101.9	2	38	36	A	R	02/28/18	D-3	2005	55	5.5/SW	EL SE. Side of pump on suction Line
D-62	1	25.5	4	4	0	A	R	02/28/18	D-3	2005	55	5.5/SW	GT SE.side of pump on suction line
D-64	1	25.5	4	7	3	A	R	02/28/18	D-3	2005	55	5.5/SW	TEE SE.side of suction line
D-66	1	38.2	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	GT SE.SIDE OF PUMP ON FAST LOOP LINE
D-68	1	38.2	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	TF SE.SIDE of pump on fast loop line
D-70	1	38.2	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	GT SE.SIDE OF PUMP ON FAST LOOP LINE
D-72	0.5	19.1	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	BP SE.SIDE OF PUMP ON FAST LOOP LINE
D-73	5	127.3	2	33	31	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 3ft S. of Synjet Manifold (HLS tag # 2891)
D-74	1	4.8	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	GT on JT manifold NW of P.16189
D-75	3	76.4	2	24	22	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 3ft S. of Synjet Manifold
D-76	0.5	12.7	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	BP on JT manifold NW of P.16189
D-78	1	25.5	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	GT on JT manifold NW of P.16189
D-79	1	25.5	4	4	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 3ft S. of Synjet Manifold
D-80	1	4.8	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	CV # FV.0581 NW Side ofP.16189
D-81	1	25.5	3	3	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 3ft S. of Synjet Manifold
D-82	1	25.5	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	F NW.Side of P16189
D-83	1	25.5	3	3	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway S. 3ft of SynJet manifold
D-84	1	25.5	2	19	17	A	R	02/28/18	D-3	553	55	5.5/SW	GT NW.Side of P16189
D-85	2	12.7	2	3	1	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway S of synjet manifold 5ft
D-86	1	25.5	2	4	2	A	R	02/28/18	D-3	553	55	5.5/SW	BP NW.Side of P16189
D-87	1	38.2	2	3	1	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 5ft S. of synjet manifold
D-88	1	4.8	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	GT on jet a line W.side of P16189
D-89	1	38.2	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 5ft S. of synjet manifold
D-90	1	4.8	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	F on JT a line W.Side P16189
D-91	2	50.9	2	98	96	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 5ft S. of synjet manifold (HLS tag #2892)
D-92	1	25.5	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	GT on JT a line W.Side P16189
D-93	1	38.2	4	6	2	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 5ft S. of synjet manifold
D-94	1	4.8	2	51	49	A	R	02/28/18	D-3	553	55	5.5/SW	F on JT a line W.Side P16189 HLS Leak #2889
D-95	2	12.7	3	3	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 8ft S of Synjet Manifold
D-96	1	6.4	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	CV # FV-0582 W.Side of P16189
D-97	5	31.8	3	3671	3668	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 7ft SW of synjet manifold (HLS tag #2893)
D-98	1	38.2	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	F W.Side of P16189
D-99	2	9.5	4	4	0	A	R	02/28/18	D-1	2089	55	5.5/SW	In Pway 10ft SW of Synjet Manifold
D-100	1	25.5	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	GT W.Side of P16189
D-101	4	19.1	3	114	111	A	R	02/28/18	D-1	2089	55	5.5/SW	In Pway 10ft SW of synjet manifold HLS Tag # 2899
D-102	1	38.2	2	18	16	A	R	02/28/18	D-3	553	55	5.5/SW	C W.Side of P16189

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-103	1	38.2	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 15ft SW of synjet manifold
D-104	1	38.2	4	16	12	A	R	02/28/18	D-3	553	55	5.5/SW	BL W.Side of P16189
D-105	1	38.2	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 15ft sw of synjet manifold
D-106	0.5	19.1	4	4	0	A	R	02/28/18	D-3	553	55	5.5/SW	TF W.Side of P16189
D-107	1	38.2	2	3	1	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 15ft SW of synjet manifold
D-108	1	38.2	3	3	0	A	R	02/28/18	D-3	553	55	5.5/SW	BL W.Side of P16189
D-109	4	152.8	3	98	95	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 15ft SW of synjet manifold #2895
D-110	1	38.2	3	3	0	A	R	02/28/18	D-3	553	55	5.5/SW	TF W.Side of P16189
D-111	2	76.4	2	2	0	A	R	02/28/18	D-1	2089	55	5.5/SW	In Pway 15ft SW of synjet manifold
D-112	1	38.2	3	3	0	A	R	02/28/18	D-3	553	55	5.5/SW	N W.Side of P16189
D-113	2	9.5	2	5	3	A	R	02/28/18	D-1	2089	55	5.5/SW	In Pway 15ft SW of synjet manifold
D-114	0.5	19.1	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	C W.Side of P16189
D-115	2	12.7	2	9	7	A	R	02/28/18	D-1	2089	55	5.5/SW	In Pway 10ft SW of synjet manifold
D-116	1	38.2	2	2	0	A	R	02/28/18	D-3	553	55	5.5/SW	N W.Side of P16189
D-117	1	6.4	3	3	0	A	R	02/28/18	D-1	2089	55	5.5/SW	In Pway 10ft SW of synjet manifold
D-118	1	38.2	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	CW. Side pf P.16189
D-119	3	19.1	2	1079	1077	A	R	02/28/18	D-1	2089	55	5.5/SW	In Pway 10ft SW of synjet manifold
D-120	1	19.1	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	GT W. side of P.16189
D-121	2	12.7	2	9	7	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of synjet manifold
D-122	2	9.5	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	F W. side of P.16189
D-123	2	12.7	4	114	110	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of synjet manifold
D-124	2	9.5	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	CV #PV-111 W. Side of P.16189
D-125	2	12.7	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of Synjet manifold FV-476
D-126	1	3.2	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	F W. side of P.16189
D-127	2	50.9	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of Synjet manifold
D-128	1	19.1	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	GT W. side of P.16189
D-129	1	25.5	2	3	1	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of Synjet manifold
D-130	1	25.5	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	PG W. side of P.16189
D-131	1	25.5	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of Synjet manifold
D-132	0.5	12.7	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	GT W. side of P.16189
D-133	0.5	12.7	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of Synjet manifold
D-134	1	25.5	2	45	43	A	R	02/28/18	D-3	553	Blank	Blank	C W.Side of P16189 above CV#PV-111 HLS Leak #2865 on Synjet Line
D-135	2	12.7	2	5	3	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 10ft SW of Synjet manifold
D-136	1	3.2	2	3	1	A	R	02/28/18	D-3	553	Blank	Blank	GT W. side of P.16189
D-137	4	25.5	2	123	121	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 12ft SW of Synjet manifold
D-138	0.5	19.1	2	3	1	A	R	02/28/18	D-3	553	Blank	Blank	C W. Side of P.16189
D-139	2	12.7	3	3	0	A	R	02/28/18	D-1	2037	55	5.5/SW	In Pway 12ft SW of Synjet manifold
D-140	2	50.9	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	GT W. Side of P.16189
D-141	2	50.9	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	LGO Sample Pway 15ft SW SynJet Manifold
D-142	1	38.2	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	BP W. Side of P.16189
D-143	1	25.5	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	LGO Sample Pway 15ft SW SynJet Manifold
D-144	1	38.2	2	4	2	A	R	02/28/18	D-3	553	Blank	Blank	N W. Side of P.16189
D-145	1	25.5	2	2	0	A	R	02/28/18	D-1	2037	55	5.5/SW	LGO Sample Pway 15ft SW SynJet Manifold
D-146	1	38.2	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	
D-148	2	76.4	2	2	0	A	R	02/28/18	D-3	553	Blank	Blank	N W. Side of P.16189
D-147	1	25.5	1	2	1	A	R	03/05/18	D-2	553	61	4.8/NW	15' W of SunJet Manifold @ LGO Sample
D-149	1	38.2	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	15' W of SunJet Manifold @ LGO Sample
D-151	1	38.2	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	15' W of SunJet Manifold @ LGO Sample
D-153	1	38.2	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	15' W of SunJet Manifold @ LGO Sample
D-155	1	38.2	1	2	1	A	R	03/05/18	D-2	553	61	4.8/NW	15' W of SunJet Manifold @ LGO Sample
D-157	1	25.5	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-159	1	25.5	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-161	1	25.5	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-163	1	25.5	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-165	1	38.2	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-167	1	38.2	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-169	1	38.2	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-171	1	38.2	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-173	1	25.5	1	2	1	A	R	03/05/18	D-2	553	61	4.8/NW	10 W of SunJet Manifold @ 310/390 Sample
D-150	1	3.2	0	2	1.9	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751 East end of platform
D-152	0.5	12.7	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-154	0.5	12.7	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-156	0.5	12.7	1	1	0	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-158	2	9.5	1	3	2	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-160	1	9.5	1	1	0	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-162	1	25.5	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-164	0.5	19.1	1	1	0	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-166	1	3.2	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-168	1	38.2	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-170	0.5	19.1	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-172	0.5	19.1	1	1	0	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-174	1	38.2	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-175	1	25.5	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W. of SYNJET MANIE. of PS-17
D-176	1	4.8	1	1	0	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751
D-177	1	38.2	1	3	2	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-178	2	9.5	1	154	153	A	R	03/05/18	D-4	289	61	4.8/NW	Top of V-751 middle of platform (HLS tag #2878)
D-179	1	38.2	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-180	1	25.5	1	2	1	A	R	03/05/18	D-4	2037	61	4.8/NW	Top of V-751
D-181	1	25.5	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-182	1	25.5	1	2	1	A	R	03/05/18	D-4	2037	61	4.8/NW	Top of V-751
D-183	1	38.2	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-184	0.5	12.7	1	2	1	A	R	03/05/18	D-4	2037	61	4.8/NW	Top of V-751
D-185	1	6.4	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-186	1	3.2	1	2	1	A	R	03/05/18	D-4	2037	61	4.8/NW	Top of V-751
D-187	2	12.7	1	2	1	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-188	1	25.5	1	3	2	A	R	03/05/18	D-4	2037	61	4.8/NW	Top of V-751
D-189	1	6.4	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-190	1	4.8	1	1	0	A	R	03/05/18	D-4	2037	61	4.8/NW	Top of V-751
D-191	1	25.5	1	2	1	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-192	1	3.2	1	47	46	A	R	03/05/18	D-4	2037	61	4.8/NW	Top of V-751 #2879
D-193	1	38.2	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-194	1	25.5	1.7	3.5	1.8	A	R	03/05/18	D-4	33	61	4.8/NW	First platform from top of vessel at sight glass
D-195	1	25.5	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-196	1	25.5	1.7	6.9	5.2	A	R	03/05/18	D-4	33	61	4.8/NW	First platform from top of vessel at sight glass
D-197	1	9.5	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-198	1	25.5	1.8	2.0	0.2	A	R	03/05/18	D-4	33	61	4.8/NW	First platform from top of vessel at sight glass
D-199	1	9.5	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-200	1	25.5	2.1	179.0	176.9	A	R	03/05/18	D-4	33	61	4.8/NW	First platform from top of vessel at sight glass (HLS tag #2880)
D-201	1	9.5	1	1	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17 PV-0567
D-202	1	25.5	1	2	1	A	R	03/05/18	D-4	289	61	4.8/NW	First platform from top of vessel at sight glass
D-203	1	9.5	0	0	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-204	0.5	12.7	1	39	38	A	R	03/05/18	D-4	289	61	4.8/NW	First platform from top of vessel at sight glass (HLS tag #2864)
D-205	1	6.4	0	0	0	A	R	03/05/18	D-2	553	61	4.8/NW	10' W of SunJet MAN1E of PS-17
D-206	0.5	12.7	1	2	1	A	R	03/05/18	D-4	2021	61	4.8/NW	First platform from top of vessel
D-208	2	19.1	1	74	73	A	R	03/05/18	D-4	2021	61	4.8/NW	First platform from top of vessel (HLS tag#2863)
D-210	2	50.9	1	2	1	A	R	03/05/18	D-4	2037	61	4.8/NW	First platform from top of vessel
D-212	1	25.5	1	18	17	A	R	03/05/18	D-4	2037	61	4.8/NW	First platform from top of vessel
D-214	1	25.5	1	4	3	A	R	03/05/18	D-4	2037	61	4.8/NW	First platform top of vessel
D-216	0.5	12.7	1	2	1	A	R	03/05/18	D-4	2037	61	4.8/NW	First platform top of vessel
D-218	1	25.5	1	4	3	A	R	03/05/18	D-4	2037	61	4.8/NW	First platform top of vessel
D-220	1	25.5	1	281	280	A	R	03/05/18	D-4	2037	61	4.8/NW	First platform top of vessel (HLS tag#2888)
D-222	0.5	9.5	1	1.4	0.4	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-224	1	19.1	1	1.5	0.5	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-226	1	19.1	1	1.8	0.8	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-228	1	19.1	1	15.8	14.8	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-230	1	19.1	1	2.1	1.1	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-232	0.5	9.5	1	1.6	0.6	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-234	0.5	9.5	1	1.4	0.4	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-207	1	25.5	2	2	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-209	0.5	12.7	2	2	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-211	1	25.5	1	1	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-213	1	38.2	1	1	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-215	1	38.2	1	2	1	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-217	0.5	19.1	1	1	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-219	0.5	19.1	2	2	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-221	2	50.9	1	18	17	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-223	1	4.8	3	3	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-225	4	19.1	3	72	69	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-227	3	14.3	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-229	2	9.5	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-231	1	25.5	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-233	1	25.5	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-235	1	38.2	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-236	0.5	9.5	1	1.4	0.4	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-237	1	25.5	3	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-238	1	19.1	1	1.8	0.8	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-239	1	38.2	2	2	0	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-240	1	19.1	1	1.5	0.5	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-241	5	23.9	2	68	66	A	R	03/05/18	D-2	553	61	4.8/NW	SE of PS-17 IN WOODEN DECK (HLS Tag #2887)
D-242	0.5	9.5	1	1.7	0.7	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-243	1	4.8	1.5	1.5	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-244	0.5	9.5	1	1.5	0.5	A	R	03/05/18	D-4	140	61	4.8/NW	Top South platform of E-933B
D-245	1	25.5	1.5	1.5	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-247	1	25.5	1.5	1.6	0.1	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-249	1	38.2	1.5	1.5	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-251	0.5	19.1	1.5	1.5	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-253	0.5	19.1	1.4	1.4	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-255	1	38.2	1.5	1.5	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-257	0.5	19.1	1.7	2.0	0.3	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-259	0.5	19.1	1.6	1.6	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-261	1	38.2	1.4	1.5	0.1	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 IN WOODEN DECK
D-263	1	38.2	1.3	1.3	0	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 on wooden deck
D-265	2	76.4	1.3	33.7	32.4	A	R	03/05/18	D-2	2005	61	4.8/NW	SE of PS-17 on wooden deck (HLS tag #2886)
D-267	1	25.5	0.0	0.1	0.1	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck
D-269	2	12.7	0.0	5.4	5.4	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck
D-271	1	6.4	0.3	0.4	0.1	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck
D-273	3	19.1	0.2	20.4	20.2	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck (CV 475)
D-275	1	25.5	0.7	0.7	0	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck
D-277	1	9.5	0.4	0.6	0.2	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck
D-279	1	9.5	0.2	0.2	0	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck
D-281	2	12.7	0.1	84.0	83.9	A	R	03/05/18	D-2	85	61	4.8/NW	SE of PS-17 on wooden deck (HLS tag #2885)
D-246	0.5	19.1	2	2	0	A	R	03/06/18	D-3	229	61	10.4/E	1st P on V-751 W. side
D-248	0.5	19.1	2	2	0	A	R	03/06/18	D-3	229	61	10.4/E	1st P on V-751 W. side
D-250	0.5	19.1	2	2	0	A	R	03/06/18	D-3	229	61	10.4/E	1st P on V-751 W. side
D-252	0.5	Unknown	2	2	0	A	R	03/06/18	D-3	229	61	10.4/E	1st P on V-751 W. side
D-254	3	28.6	2	131	129	A	R	03/06/18	D-3	229	61	10.4/E	1st P on V-751 E. side HLS Leak #2870
D-256	2	12.7	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	1st P on V-751 E. side
D-258	1	38.2	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side of V-751
D-260	0.5	19.1	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side of V-751
D-262	2	76.4	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side of V-751
D-264	0.5	19.1	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side of V-751
D-266	0.5	19.1	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side
D-268	1	38.2	2	3	1	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side of V-751
D-270	0.5	19.1	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side of V-751
D-272	0.5	19.1	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G W. side of V-751
D-274	2	50.9	4	4	0	A	R	03/06/18	D-3	2021	61	10.4/E	G E. Side of V.751
D-276	1	3.2	4	6	2	A	R	03/06/18	D-3	2021	61	10.4/E	G E. Side of C.751
D-278	1	3.2	2	3	1	A	R	03/06/18	D-3	2021	61	10.4/E	G E. Side of V.751
D-280	1	3.2	2	3	1	A	R	03/06/18	D-3	2021	61	10.4/E	G E. Side of V.751
D-282	1	3.2	2	2	0	A	R	03/06/18	D-3	2021	61	10.4/E	G E. Side of V.751
D-283	0.5	19.1	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-284	2	6.4	2	164	162	A	R	03/06/18	D-3	2021	61	10.4/E	G E. Side of V.751 on manifold
D-285	1	38.2	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-286	1	76.4	1.3	1.4	0.1	A	R	03/06/18	D-3	140	61	10.4/E	G SW. Side of V.751
D-287	0.5	19.1	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-288	0.5	38.2	1.3	1.3	0	A	R	03/06/18	D-3	140	61	10.4/E	G SW. Side of V.751
D-289	0.5	19.1	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-291	1	38.2	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-293	1	38.2	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-295	1	25.5	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-297	1	25.5	2	2	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-299	3	14.3	2	16	14	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-301	1	4.8	5	5	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-303	3	14.3	4	13	9	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-305	3	28.6	5	9	4	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-307	1	9.5	5	5	0	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway
D-309	2	19.1	5	34	29	A	R	03/06/18	D-1	2005	61	10.4/E	W. side Wood Deck S of PS-17 in S Pway FV-459 (HLS tag #2884)
D-311	0.5	12.7	2	2	0	A	R	03/06/18	D-1	553	61	10.4/E	W. Side Wood Deck S of P517 in S Pway
D-313	1	4.8	2	2	0	A	R	03/06/18	D-1	553	61	10.4/E	W. Side Wood Deck S of P517 in S Pway
D-315	2	9.5	2	15	13	A	R	03/06/18	D-1	553	61	10.4/E	W. Side Wood Deck S of P517 in S Pway
D-317	1	25.5	5	5	0	A	R	03/06/18	D-1	553	61	10.4/E	W. Side Wood Deck S of P517 in S Pway
D-319	1	4.8	5	5	0	A	R	03/06/18	D-1	553	61	10.4/E	W. Side Wood Deck S of P517 in S Pway
D-321	0.5	2.4	4	5	1	A	R	03/06/18	D-1	553	61	10.4/E	W. Side Wood Deck S of P517 in S Pway
D-323	4	19.1	4	39	35	A	R	03/06/18	D-1	553	61	10.4/E	W. Side Wood Deck S of P517 in S Pway (HLS tag #2882)
D-325	1	25.5	0	0	0	A	R	03/06/18	D-1	2037	61	10.4/E	E of PS16 on deck in S P way
D-327	1	25.5	0	0	0	A	R	03/06/18	D-1	2037	61	10.4/E	E of PS16 on deck in S P way
D-329	0.5	19.1	0	0	0	A	R	03/06/18	D-1	2037	61	10.4/E	E of PS16 on deck in S P way
D-331	0.5	19.1	0	0	0	A	R	03/06/18	D-1	2037	61	10.4/E	E of PS16 on deck in S P way
D-333	1	4.8	0	0	0	A	R	03/06/18	D-1	2037	61	10.4/E	E of PS16 on deck in S P way
D-335	2	9.5	2	5	3	A	R	03/06/18	D-1	2037	61	10.4/E	E of PS16 on deck in S P way
D-337	3	19.1	1	52	51	A	R	03/06/18	D-1	2037	61	10.4/E	E of PS16 on deck in S P way PIC-465 (HLS tag #2877)
D-339	2	50.9	1.7	8.4	6.7	A	R	03/06/18	D-1	33	61	10.4/E	E of PS16 on deck in S Pway
D-341	1	4.8	3.9	3.9	0	A	R	03/06/18	D-1	33	61	10.4/E	E of PS16 on deck in S Pway
D-343	2	9.5	2.8	4.0	1.2	A	R	03/06/18	D-1	33	61	10.4/E	E of PS16 on deck in S Pway
D-345	1	38.2	4.9	5.3	0.4	A	R	03/06/18	D-1	33	61	10.4/E	E of PS16 on deck in S Pway
D-347	0.5	19.1	3.0	3.0	0	A	R	03/06/18	D-1	33	61	10.4/E	E of PS16 on deck in S Pway
D-349	4	19.1	2.7	181.0	178.3	A	R	03/06/18	D-1	33	61	10.4/E	E of PS16 on deck in S Pway (HLS #2883)
D-351	1	4.8	1.8	1.9	0.1	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-353	0.5	19.1	1.7	2.0	0.3	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-355	1	38.2	1.7	2.0	0.3	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-357	1	9.5	1.7	1.8	0.1	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-359	1	4.8	1.7	1.8	0.1	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-361	2	9.5	1.7	1.8	0.1	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-363	1	9.5	1.6	1.8	0.2	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway FV 461
D-365	1	38.2	1.8	1.8	0	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-367	2	76.4	1.6	16.5	14.9	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-369	1	4.8	2.8	3.5	0.7	A	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway
D-371	3	14.3	2.5	43.0	40.5	P	R	03/06/18	D-1	85	61	10.4/E	E of PS16 on deck in S Pway Covered Bonnet
D-440	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-15250B
D-442	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-15250B
D-444	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-15250B
D-456	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-15250B
D-458	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-460	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-462	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-464	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-466	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-468	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-470	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-472	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-474	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-476	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-478	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform southside of E-16195
D-410	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-412	1	19.1	1	8	7	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-414	2	38.2	1	78	77	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-416	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-418	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-420	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-422	2	38.2	1	22	21	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-424	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-426	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-428	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-430	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-432	1	19.1	1	5	4	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-933B
D-434	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Southside of E-15250A
D-436	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Southside of E-15250A
D-438	1	19.1	1	1	0	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Southside of E-15250A
D-350	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-352	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-354	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-356	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-358	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-360	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-362	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-364	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932A
D-366	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-368	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-370	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-372	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-374	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-376	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-378	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-380	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-382	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-384	1	19.1	1	3	2	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-932B
D-386	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-388	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-390	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-392	4	76.4	1	31	30	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A HLS # 3027
D-394	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-396	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-398	1	19.1	1	2	1	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-400	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-402	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-404	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-406	1	19.1	1	3	2	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-408	1	19.1	1	1	0	A	R	03/08/18	D-4	2021	55	1.7/NW	Top platform Northside of E-933A
D-538	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-540	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-542	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-544	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-546	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-548	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-550	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-552	1	19.1	1	3	2	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-554	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-556	1	25.5	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-558	2	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-560	1	25.5	1	3	2	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-562	2	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-564	2	50.9	1	3	2	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-566	2	12.7	1	4	3	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform Northside of E-16195
D-568	2	19.1	1	3	2	A	R	03/08/18	D-4	2005	55	1.7/NW	Southwest of E-15106
D-570	2	50.9	1	8	7	A	R	03/08/18	D-4	2005	55	1.7/NW	Southwest of E-15106
D-572	2	50.9	1	4	3	A	R	03/08/18	D-4	2005	55	1.7/NW	Southwest of E-15106
D-574	4	12.7	1	3	2	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-576	4	12.7	1	22	21	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-578	2	50.9	1	4	3	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-580	2	76.4	1	12	11	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-582	1	38.2	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-584	1	38.2	1	3	2	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-586	4	12.7	1	3	2	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-588	8	25.5	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-590	2	9.5	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	North of PS-11 below fin fan deck
D-592	3	9.5	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	North of PS-11 below fin fan deck
D-594	2	50.9	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	North of fin fan North of PS-11
D-480	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-482	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-484	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-486	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-488	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-490	1	19.1	1	2	1	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-492	1	19.1	1	2	1	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-494	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-496	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-498	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform Southside of E-16195
D-500	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-502	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-504	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-506	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-508	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-510	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-512	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-514	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-516	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-518	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-520	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-522	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-524	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-526	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-528	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-530	1	19.1	1	1	0	A	R	03/08/18	D-4	85	55	1.7/NW	Top platform northside of E-16195
D-532	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform northside of E-16195
D-534	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform northside of E-16195
D-536	1	19.1	1	2	1	A	R	03/08/18	D-4	2005	55	1.7/NW	Top platform northside of E-16195
D-489	1	38.2	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758
D-491	3	19.1	2	37	35	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758 HLS Tag # 3004
D-493	2	19.1	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758
D-495	1	19.1	2	3	1	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758
D-497	0.5	Unknown	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758
D-499	3	76.4	3	11385	11382	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758 HLS Tag # 3006
D-501	1	38.2	2	2	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-503	0.5	19.1	2	2	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-505	0.5	19.1	2	2	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-507	1	38.2	2	2	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-509	0.5	19.1	2	2	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-511	1	6.4	1	2	1	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-513	1	6.4	1	2	1	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-515	0.5	12.7	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-517	1	6.4	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-519	0.5	38.2	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-521	1	76.4	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-523	1	76.4	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-525	0.5	19.1	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-527	0.5	19.1	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-529	1	6.4	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-531	2	9.5	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-533	1	25.5	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-535	2	6.4	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-537	1	3.2	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-539	3	19.1	1	1	0	A	R	03/08/18	D-2	2021	55	1.7/NW	Top platform V-758
D-403	1	25.5	3	3	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-405	2	76.4	3	6	3	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-407	1	38.2	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-409	1	38.2	2	3	1	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-411	1	38.2	3	3	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-413	1	19.1	3	3	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-415	1	38.2	2	3	1	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-417	2	12.7	3	3	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-419	1	25.5	1	1	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-421	1	6.4	1	1	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-423	3	19.1	1	9	8	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 (21-FU-617) S DSU Pway
D-425	0.5	12.7	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-427	1	6.4	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-429	2	12.7	1	1	0	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-431	1	9.5	1	2	1	A	R	03/08/18	D-2	2037	55	1.7/NW	5' E of PS16 S DSU Pway
D-373	7	22.3	1	261	260	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck HLS Tag #3048
D-375	2	9.5	4	4	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-377	1	4.8	4	4	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-379	1	25.5	3	3	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-381	5	23.9	3	217	214	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck HLS Tag # 3049
D-383	1	4.8	5	5	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-385	5	23.9	4	152	148	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck HLS Tag # 3050
D-387	1	25.5	4	4	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-389	2	12.7	3	8	5	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-391	1	25.5	3	3	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-393	1	38.2	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-395	1	9.5	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-397	1	25.5	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-399	2	9.5	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-401	3	14.3	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	DSU Pway SE of PS-16 on wooden deck
D-596	6	152.8	1	3237	3236	A	R	03/08/18	D-4	553	55	1.7/NW	North of PS-11 below fin fan deck
D-433	1	25.5	3	3	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-435	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-437	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-439	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-441	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-443	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-445	1	25.5	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-447	1	25.5	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-449	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-451	1	38.2	2	3	1	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-453	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-455	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-15
D-457	2	19.1	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-14
D-459	1	9.5	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-14
D-461	1	25.5	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway W of PS-14
D-463	1	25.5	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway E of PS-14
D-465	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway E of PS-14
D-467	1	25.5	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway E of PS-14
D-469	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway E of PS-14
D-471	1	38.2	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway E of PS-14
D-473	0.5	19.1	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway E of PS-14
D-475	1	25.5	2	2	0	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU Pway E of PS-14
D-477	1	38.2	2	3	1	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU @ P-2944
D-479	1	38.2	2	5	3	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU @ P-2944
D-481	5	15.9	2	1704	1702	A	R	03/08/18	D-2	289	55	1.7/NW	S DSU @ P-2944
D-483	1	9.5	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758
D-485	2	19.1	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758 (CV-187)

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-487	1	19.1	2	2	0	A	R	03/08/18	D-2	2037	55	1.7/NW	Top platform V-758
D-320	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-322	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-324	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-326	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-328	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-330	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-332	1	19.1	1	1	0	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-334	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-336	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-338	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-340	3	57.3	1	19	18	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-342	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-344	2	38.2	1	8	7	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-346	1	19.1	1	5	4	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B
D-348	6	114.6	1	801	800	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-932B HLS # 3026
D-290	1	19.1	1	1	0	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-292	1	19.1	1	7	6	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-294	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-296	1	19.1	1	1	0	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-298	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-300	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-302	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-304	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-306	1	19.1	1	3	2	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-308	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-310	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-312	1	19.1	1	4	3	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-314	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-316	1	19.1	1	2	1	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-318	1	19.1	1	1	0	A	R	03/08/18	D-4	553	55	1.7/NW	Top platform Southside of E-933B
D-541	2	6.4	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-543	2	152.8	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	Tube Fitting
D-545	1	76.4	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	Tube Fitting
D-547	2	Unknown	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-549	1	76.4	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	Bushing
D-551	2	19.1	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-553	1	25.5	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-555	1	9.5	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-557	2	19.1	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-559	2	19.1	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-561	1	38.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-563	1	38.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	Gauge
D-565	1	38.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-567	1	19.1	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	No Bonnet
D-569	3	7.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-571	1	9.5	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-573	1	25.5	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-575	1	25.5	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-577	1	38.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-579	1	9.5	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-581	1	9.5	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-583	1	38.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-585	4	152.8	2	112	110	A	R	03/09/18	D-1	2037	49	3.2/NW	1st platform from grade w side stem (HLS tag #3022)
D-587	1	38.2	3	3	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-589	3	114.6	2	104	102	A	R	03/09/18	D-1	2037	49	3.2/NW	1st platform from grade w side packing(HLS tag #2874)
D-591	1	38.2	3	3	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-593	1	38.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-595	3	114.6	2	106	104	A	R	03/09/18	D-1	2037	49	3.2/NW	1st platform from grade w side stem (HLS tag #3024)
D-597	1	38.2	2	2	0	A	R	03/09/18	D-1	2037	49	3.2/NW	
D-598	7	22.3	2	5	3	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-599	4	152.8	2	7254	7252	A	R	03/09/18	D-1	2037	49	3.2/NW	1st platform from grade w side packing(HLS tag #3023)
D-600	1	38.2	2	2	0	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-601	6	57.3	2	14789	14787	A	R	03/09/18	D-1	2005	49	3.2/NW	1st platform from grase w side stem (HLS tag #3025)
D-602	1	38.2	2	3	1	A	R	03/09/18	D-3	2021	49	3.2/NW	No Bonnet
D-603	2	19.1	2	13	11	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-604	1	38.2	2	2	0	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-605	2	19.1	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-606	4	152.8	2	30	28	A	R	03/09/18	D-3	2021	49	3.2/NW	at FV-284A No Bonnet (HLS Leak #3030)
D-607	1	9.5	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-608	1	38.2	2	5	3	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-609	2	12.7	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-610	1	38.2	3	2	0	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-611	1	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-612	4	152.8	2	336	334	A	R	03/09/18	D-3	2021	49	3.2/NW	at FV-284A Manifold(HLS Leak #3031)

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-613	1	38.2	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-614	1	38.2	2	3	1	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-615	1	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-616	1	38.2	2	2	0	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-617	2	12.7	2	5	3	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-618	5	15.9	2	18	16	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-619	2	12.7	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-620	1	38.2	3	3	0	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-621	1	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-622	1	38.2	3	3	0	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-623	2	38.2	2	16	14	A	R	03/09/18	D-1	2005	49	3.2/NW	No Bonnet
D-624	2	76.4	2	16	14	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-625	3	9.5	2	12	10	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-626	2	50.9	4	3	0	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-627	1	76.4	3	4	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-628	5	191	2	643	641	A	R	03/09/18	D-3	2021	49	3.2/NW	at CV-478 B Manifold(HLS LEAK # 3033)
D-629	1	76.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-630	2	76.4	3	3	0	A	R	03/09/18	D-3	289	49	3.2/NW	
D-631	1	76.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-632	2	76.4	3	6	3	A	R	03/09/18	D-3	289	49	3.2/NW	
D-633	1	38.2	2	3	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-634	2	9.5	3	4	1	A	R	03/09/18	D-3	289	49	3.2/NW	No Bonnet
D-635	1	38.2	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-636	2	6.4	3	4	1	A	R	03/09/18	D-3	289	49	3.2/NW	
D-637	1	38.2	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-638	2	12.7	3	3	0	A	R	03/09/18	D-3	289	49	3.2/NW	
D-639	1	38.2	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-640	2	12.7	3	4	1	A	R	03/09/18	D-3	289	49	3.2/NW	
D-641	1	38.2	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-642	1	25.5	3	4	1	A	R	03/09/18	D-3	289	49	3.2/NW	
D-643	1	38.2	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-644	2	12.7	2	4	2	A	R	03/09/18	D-3	289	49	3.2/NW	
D-646	2	12.7	3	3	0	A	R	03/09/18	D-3	289	49	3.2/NW	
D-647	2	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-648	2	12.7	2	3	1	A	R	03/09/18	D-3	289	49	3.2/NW	
D-649	1	25.5	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-650	3	38.2	2	150	148	A	R	03/09/18	D-3	289	49	3.2/NW	at CV-144 (FV-144)Manifold (HLS LEAK #3034)
D-651	1	25.5	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-652	2	12.7	1.8	2.0	0.2	A	R	03/09/18	D-3	140	49	3.2/NW	
D-653	2	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-654	2	12.7	1.9	3.2	1.3	A	R	03/09/18	D-3	140	49	3.2/NW	
D-655	3	76.4	2	54	52	A	R	03/09/18	D-1	2005	49	3.2/NW	E side of P2944 OVHD(HLS # 3007
D-656	2	12.7	1.9	3.3	1.4	A	R	03/09/18	D-3	140	49	3.2/NW	
D-657	2	6.4	3	4	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-658	2	12.7	2.1	2.5	0.4	A	R	03/09/18	D-3	140	49	3.2/NW	
D-659	5	15.9	2	628	626	A	R	03/09/18	D-1	2005	49	3.2/NW	E side of P2944 (HLS Tag #3008)
D-660	2	50.9	1.9	1.9	0	A	R	03/09/18	D-3	140	49	3.2/NW	
D-661	2	6.4	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-662	4	25.5	1.9	11.3	9.4	A	R	03/09/18	D-3	140	49	3.2/NW	
D-663	1	25.5	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-664	4	38.2	2.1	15.8	13.7	A	R	03/09/18	D-3	140	49	3.2/NW	
D-665	2	50.9	3	5	2	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-666	2	12.7	2.2	2.5	0.3	A	R	03/09/18	D-3	140	49	3.2/NW	
D-667	2	12.7	2	4	2	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-668	3	19.1	2.1	3.8	1.7	A	R	03/09/18	D-3	140	49	3.2/NW	
D-669	1	6.4	2	3	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-670	2	12.7	2.1	2.7	0.6	A	R	03/09/18	D-3	140	49	3.2/NW	
D-671A	3	38.2	2	145	143	A	R	03/09/18	D-1	2005	49	3.2/NW	W side of P-2944 NoBonnet (HLS tag #3009)
D-671B	1	38.2	2	3	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-672	4	101.9	1.9	268.0	266.1	A	R	03/09/18	D-3	140	49	3.2/NW	At CV-284 B Manifold (21LV284B) (HLS tag #3035)
D-673A	1	12.7	3	4	1	A	R	03/09/18	D-1	2005	49	3.2/NW	No Bonnet
D-673B	1	38.2	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-674	3	76.4	2.7	52.2	49.5	A	R	03/09/18	D-3	140	49	3.2/NW	At CV-284 B Manifold (21LV284B) (HLS tag #3036)
D-675A	1	12.7	4	4	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-675B	1	12.7	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-676	4	101.9	2	110	108	A	R	03/09/18	D-3	2021	49	3.2/NW	At CV-284 B Manifold (21LV284B) (HLS tag #3037)
D-677A	1	38.2	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-677B	0.5	12.7	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-678	2	50.9	2	4	2	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-679A	1	38.2	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-679B	6	152.8	2	252	250	A	R	03/09/18	D-1	2005	49	3.2/NW	W side of P2944(HLS tag #3010)
D-680	3	76.4	3	30	27	A	R	03/09/18	D-3	2021	49	3.2/NW	At CV-284 B Manifold (21LV284B) (HLS tag #3038)
D-681	1	25.5	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-682	2	50.9	2	4	2	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-683	1	6.4	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-684	1	38.2	2	3	1	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-685	1	38.2	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-686	2	50.9	2	3	1	A	R	03/09/18	D-3	2021	49	3.2/NW	
D-687	1	38.2	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-688	6	152.8	2	553	551	A	R	03/09/18	D-3	2021	49	3.2/NW	SE Side of V287 @ Stab. BTM sample station (HLS tag #3039)
D-689	1	38.2	3	3	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-690	5	127.3	3	678	675	A	R	03/09/18	D-3	2021	49	3.2/NW	SE side V287 @ sample station (HLS tag #3040)
D-691	1	38.2	2	3	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-692	7	267.4	2	28	26	A	R	03/09/18	D-3	2037	49	3.2/NW	SE side V287 @ sample station (HLS tag #3041)
D-693	1	38.2	2	3	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-694	4	152.8	3	14	11	A	R	03/09/18	D-3	2037	49	3.2/NW	
D-695	1	25.5	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-696	6	229.2	3	421	418	A	R	03/09/18	D-3	2037	49	3.2/NW	SE side V287 @ sample station (HLS tag #3042)
D-697	2	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-698	4	152.8	2	16	14	A	R	03/09/18	D-3	2037	49	3.2/NW	E. side V287 BTM of top sight glass
D-699	2	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-700	4	152.8	2	185	183	A	R	03/09/18	D-3	2037	49	3.2/NW	E. side V287 BTM of top sight glass (HLS tag #3043)
D-701	2	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-702	2	76.4	2	3	1	A	R	03/09/18	D-3	2037	49	3.2/NW	
D-703	1	25.5	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-704	3	114.6	2	9	7	A	R	03/09/18	D-3	2037	49	3.2/NW	
D-705	2	6.4	2	3	1	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-707	2	6.4	2	2	0	A	R	03/09/18	D-1	2005	49	3.2/NW	
D-709	5	15.9	2	302	300	A	R	03/09/18	D-1	2005	49	3.2/NW	S Side of P-2947(HLS Tag #3011)
D-706	3	76.4	2	18	16	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-708	2	50.9	2	7	5	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-710	2	50.9	1	10	9	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-711	4	12.7	3	2067	2064	A	R	03/12/18	D-2	289	48	1.1/SE	S. of P-2947 above valve
D-712	2	50.9	3	4	1	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-713	1	3.2	2	9432	9430	A	R	03/12/18	D-2	553	48	1.1/SE	S. of P-2947 valve racking
D-714	4	38.2	2	144	142	A	R	03/12/18	D-4	2021	48	1.1/SE	On manifold Eastside of V-287 (HLS tag #2701)
D-715	3	76.4	5	22	17	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-716	2	50.9	2	6	4	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-717	1	25.5	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-718	3	76.4	3	5	2	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-719	4	101.9	3	31	28	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-720	1	25.5	2	4	2	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-721	1	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-722	2	50.9	3	4	1	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-723	1	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-724	1	25.5	3	4	1	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-725	1	38.2	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-726	3	28.6	3	37	34	A	R	03/12/18	D-4	2021	48	1.1/SE	Under V-287 middle (HLS #2702)
D-726	3	28.6	3	37	34	A	R	03/12/18	D-4	2021	48	1.1/SE	Under V-287 middle of vessel (HLS tag #2702)
D-727	0.5	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-728	2	19.1	3	4	1	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-729	2	76.4	3	6	3	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-730	4	38.2	3	37	34	A	R	03/12/18	D-4	2021	48	1.1/SE	Under V-287 middle of vessel (HLS tag #2703)
D-731	1	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-732	3	76.4	3	94	91	A	R	03/12/18	D-4	2021	48	1.1/SE	South side V-287 Down low sewer above HUB (HLS # 2704)
D-732	3	76.4	3	94	91	A	R	03/12/18	D-4	2021	48	1.1/SE	HLS tag #2704
D-733	1	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-734	3	28.6	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	No bonnet
D-735	4	101.9	3	1409	1406	A	R	03/12/18	D-2	2037	48	1.1/SE	ABV P-2947 550
D-736	1	38.2	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-737	3	114.6	5	11	6	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-738	2	50.9	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	No bonnet
D-739	1	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-740	3	28.6	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-741	1	25.5	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-742	2	19.1	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-743	2	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-744	1	9.5	2	4	2	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-745	1	19.1	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-746	5	47.7	2	49	47	A	R	03/12/18	D-4	2005	48	1.1/SE	No bonnet, West Side of V-287 overhead (HLS tag #2705)
D-747	1	19.1	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-748	5	31.8	2	809	807	A	R	03/12/18	D-4	2005	48	1.1/SE	West Side of V-287 overhead (HLS tag #2701)
D-749	1	19.1	3	4	1	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-750	2	50.9	3	4	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-751	1	38.2	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-752	1	25.5	3	4	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-753	1	38.2	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-754	2	50.9	3	4	1	A	R	03/12/18	D-4	2005	48	1.1/SE	No bonnet
D-755	1	38.2	3	4	1	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-756	1	38.2	3	3	0	A	R	03/12/18	D-4	2005	48	1.1/SE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-757	1	25.5	3	4	1	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-758	3	9.5	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-759	1	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-760	6	19.1	3	65	62	A	R	03/12/18	D-4	2005	48	1.1/SE	On manifold SW. of E-935 (HLS #2707)
D-761	1	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-762	1	25.5	3	4	1	A	R	03/12/18	D-4	2005	48	1.1/SE	No bonnet
D-763	1	25.5	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-764	2	50.9	2	4	2	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-765	0.5	9.5	2	2	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-766	1	25.5	3	3	0	A	R	03/12/18	D-4	2005	48	1.1/SE	No bonnet
D-767	0.5	9.5	2	3	1	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-768	4	19.1	3	5	2	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-769	0.5	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-770	4	12.7	3	7	4	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-771	1	19.1	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-772	4	12.7	3	41	38	A	R	03/12/18	D-4	2005	48	1.1/SE	On manifold SW. of E-935 (HLS #2700)
D-773	1	19.1	3	4	1	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-774	1	25.5	3	3	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-775	1	38.2	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-776	1	25.5	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-777	1	19.1	2.9	3.1	0.2	A	R	03/12/18	D-2	142	48	1.1/SE	
D-778	1	38.2	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-779	1	25.5	3.1	3.1	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-780	1	38.2	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-781	2	9.5	3.1	3.2	0.1	A	R	03/12/18	D-2	142	48	1.1/SE	
D-782	1	38.2	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-783	0.5	19.1	3.3	3.3	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-784	1	38.2	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-785	0.5	Unknown	3.4	3.4	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-786	1	38.2	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-787	1	25.5	3.4	3.4	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-788	1	38.2	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-789	1	19.1	3.3	3.4	0.1	A	R	03/12/18	D-2	142	48	1.1/SE	
D-790	1	38.2	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-791	0.5	19.1	3.0	3.5	0.5	A	R	03/12/18	D-2	142	48	1.1/SE	
D-792	1	38.2	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-793	0.5	19.1	3.2	3.2	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-794	1	38.2	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-795	1	19.1	3.2	3.2	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-796	9	28.6	2	2265	2263	A	R	03/12/18	D-4	2005	48	1.1/SE	SW of J-171 on manifold , CU-168 (HLS tag #2709)
D-797	1	25.5	3.2	3.4	0.2	A	R	03/12/18	D-2	142	48	1.1/SE	
D-798	1	25.5	3	3	0	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-799	0.5	19.1	3.1	3.4	0.3	A	R	03/12/18	D-2	142	48	1.1/SE	
D-800	3	19.1	3	3	0	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-801	0.5	19.1	3.1	3.3	0.2	A	R	03/12/18	D-2	142	48	1.1/SE	
D-802	3	19.1	3	128	125	A	R	03/12/18	D-4	2021	48	1.1/SE	(HLS tag #2710)
D-803	2	76.4	3.3	23.0	19.7	A	R	03/12/18	D-2	142	48	1.1/SE	
D-804	4	7.6	3	5	2	A	R	03/12/18	D-4	2021	48	1.1/SE	
D-805	1	25.5	4.0	4.0	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-806	5	31.8	3	320	317	A	R	03/12/18	D-4	2021	48	1.1/SE	First platform form top of V-752 at manifold (HLS tag #2711)
D-807	1	19.1	3.5	3.5	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-808	3	114.6	4	178	174	A	R	03/12/18	D-4	2021	48	1.1/SE	First platform form top of V-752 at manifold (HLS tag #3017)
D-809	1	19.1	3.3	4.0	0.7	A	R	03/12/18	D-2	142	48	1.1/SE	
D-810	5	191	3	11985	11982	A	R	03/12/18	D-4	2021	48	1.1/SE	First platform form top of V-752 at manifold
D-811	1	25.5	3.6	3.7	0.1	A	R	03/12/18	D-2	142	48	1.1/SE	
D-812	2	50.9	3	4	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-813	1	25.5	3.2	3.5	0.3	A	R	03/12/18	D-2	142	48	1.1/SE	
D-814	5	9.5	2	7	5	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-815	2	50.9	3.6	3.9	0.3	A	R	03/12/18	D-2	142	48	1.1/SE	
D-816	3	14.3	2	5	3	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-817	1	25.5	3.2	4.3	1.1	A	R	03/12/18	D-2	142	48	1.1/SE	
D-818	3	14.3	2	5	3	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-819	3	76.4	3.1	4.7	1.6	A	R	03/12/18	D-2	142	48	1.1/SE	
D-820	3	14.3	3	4	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-821	1	38.2	3.7	4.2	0.5	A	R	03/12/18	D-2	142	48	1.1/SE	
D-822	3	14.3	3	10	7	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-823	0.5	19.1	4.3	4.3	0	A	R	03/12/18	D-2	142	48	1.1/SE	
D-824	3	14.3	3	3	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-825	1	38.2	3.3	3.5	0.2	A	R	03/12/18	D-2	142	48	1.1/SE	
D-826	2	50.9	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-827	2	19.1	3.6	4.8	1.2	A	R	03/12/18	D-2	142	48	1.1/SE	
D-828	2	9.5	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-829	3	28.6	3.5	16.0	12.5	A	R	03/12/18	D-2	142	48	1.1/SE	
D-830	1	25.5	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-831	3	76.4	4.0	38.7	34.7	A	R	03/12/18	D-2	142	48	1.1/SE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-832	5	23.9	2	12	10	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-833	3	28.6	3	10	7	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-834	4	19.1	2	64	62	A	R	03/12/18	D-4	2005	48	1.1/SE	Southside of E-16193 (HLS tag #2876)
D-835	1	25.5	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	Welded Bonnet
D-836	1	25.5	2	2	0	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-837	1	25.5	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-838	5	23.9	2	46	44	A	R	03/12/18	D-4	2005	48	1.1/SE	Southside of E-16193 (HLS tag #2876)
D-839	1	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	FV-0714
D-840	4	12.7	2	52	50	A	R	03/12/18	D-4	2005	48	1.1/SE	Southside of E-16193 (HLS tag #2866)
D-841	1	25.5	2	2	0	P	R	03/12/18	D-2	2037	48	1.1/SE	Bonnet Flange under insulation
D-842	1	25.5	2	3	1	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-843	3	76.4	2	24	22	P	R	03/12/18	D-2	2037	48	1.1/SE	Bonnet Flange under insulation
D-844	2	50.9	2	4	2	A	R	03/12/18	D-4	2005	48	1.1/SE	
D-845	1	25.5	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-847	2	50.9	3	8	5	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-849	1	25.5	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-851	1	25.5	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-853	3	76.4	2	2	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-855	2	6.4	3	11	8	P	R	03/12/18	D-2	2037	48	1.1/SE	21XV207 Bonnet insulated
D-857	1	25.5	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-859	3	9.5	3	173	170	A	R	03/12/18	D-2	2037	48	1.1/SE	N. side V-754 (HLS tag #3007)
D-861	2	50.9	4	6	2	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-863	1	25.5	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-865	1	3.2	3	4	1	A	R	03/12/18	D-2	2037	48	1.1/SE	LV-172
D-867	1	25.5	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-869	4	7.6	3	153	150	A	R	03/12/18	D-2	2037	48	1.1/SE	N. side V-754 (HLS tag #3015)
D-871	3	76.4	4	354	350	A	R	03/12/18	D-2	2037	48	1.1/SE	N. side V-754 (HLS tag #3005)
D-873	3	19.1	4	368	365	P	R	03/12/18	D-2	2037	48	1.1/SE	Bonnet Insulated N. side V-754 (HLS tag #3019)
D-875	0.5	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-877	1	38.2	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-879	1	76.4	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-881	1	76.4	4	4	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-883	1	38.2	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-885	0.5	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-887	0.5	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-889	0.5	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-891	0.5	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-893	0.5	19.1	3	3	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-895	1	25.5	2	2	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-897	2	3.2	2	2	0	A	R	03/12/18	D-2	2037	48	1.1/SE	
D-899	5	31.8	2	1392	1390	A	R	03/12/18	D-2	2037	48	1.1/SE	SW side of F-30 (HLS tag 3020)
D-846	1	25.5	2	2	0	A	R	03/14/18	D-3	2037	47	2.8/S	
D-848	2	9.5	2	4	2	A	R	03/14/18	D-3	2037	47	2.8/S	
D-850	4	19.1	2	6	4	A	R	03/14/18	D-3	2037	47	2.8/S	
D-852	3	14.3	2	2	0	A	R	03/14/18	D-3	2037	47	2.8/S	
D-854	2	9.5	2	2	0	A	R	03/14/18	D-3	2037	47	2.8/S	
D-856	4	38.2	2	2728	2726	A	R	03/14/18	D-3	2037	47	2.8/S	SW side of E-16194 (HLS leak #3045)
D-858	2	9.5	2	2	0	A	R	03/14/18	D-3	2021	47	2.8/S	
D-860	2	50.9	2	5	3	A	R	03/14/18	D-3	2021	47	2.8/S	
D-862	3	76.4	3	535	532	A	R	03/14/18	D-3	2021	47	2.8/S	SW side of E-16194 (HLS leak #3046)
D-864	4	101.9	3	29	26	A	R	03/14/18	D-3	2021	47	2.8/S	1st deck NW side of V-752 (HLS leak #3047)
D-866	3	28.6	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	1st deck NW side of V-752
D-868	4	38.2	3	1752	1749	A	R	03/14/18	D-3	2021	47	2.8/S	(HLS leak #2871)1st deck NW side of V-752 SE side
D-870	3	28.6	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-872	5	47.7	3	3375	3372	A	R	03/14/18	D-3	2021	47	2.8/S	1st deck NW side of V-752 (HLS leak #2872)
D-874	3	114.6	3	7	4	A	R	03/14/18	D-3	2021	47	2.8/S	
D-876	4	101.9	3	163	160	A	R	03/14/18	D-3	2021	47	2.8/S	1st deck of V-752 NE side (HLS tag #2740)
D-878	3	76.4	3	308	305	A	R	03/14/18	D-3	2021	47	2.8/S	1st deck of V-752 NE side (HLS tag #2873)
D-880	3	76.4	3	573	570	A	R	03/14/18	D-3	2021	47	2.8/S	1st deck of V-752 N side (HLS tag #2741)
D-882	2	152.8	3	3	0	A	R	03/14/18	D-3	2021	47	2.8/S	
D-884	1	76.4	3	3	0	A	R	03/14/18	D-3	2021	47	2.8/S	
D-886	1	76.4	3	3	0	A	R	03/14/18	D-3	2021	47	2.8/S	
D-888	1	76.4	3	3	0	A	R	03/14/18	D-3	2021	47	2.8/S	
D-890	2	76.4	3	7	4	A	R	03/14/18	D-3	2021	47	2.8/S	
D-892	4	152.8	3	75	72	A	R	03/14/18	D-3	2021	47	2.8/S	N side of pump on discharge line (HLS tag #2742)
D-894	3	114.6	3	176	173	A	R	03/14/18	D-3	2021	47	2.8/S	N side of pump on discharge line (HLS tag #2743)
D-896	2	76.4	3	10	7	A	R	03/14/18	D-3	2021	47	2.8/S	
D-898	3	114.6	3	32	29	A	R	03/14/18	D-3	2021	47	2.8/S	N side of pump on discharge line (HLS tag #2892)
D-900	4	12.7	3	3	0	A	R	03/14/18	D-3	2021	47	2.8/S	
D-901	1	6.4	2	2	0	A	R	03/14/18	D-1	553	47	2.8/S	
D-902	2	6.4	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-903	3	19.1	2	239	237	A	R	03/14/18	D-1	553	47	2.8/S	W. side of F-30 (HLS tag #2868)
D-904	1	25.5	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-905	5	31.8	3	563	560	A	R	03/14/18	D-1	553	47	2.8/S	W. side of F-30 (HLS tag #3044)
D-906	1	25.5	2	4	2	A	R	03/14/18	D-3	2021	47	2.8/S	

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D-907	1	6.4	2	2	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-908	3	9.5	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-909	7	44.6	2	1681	1679	A	R	03/14/18	D-1	289	47	2.8/S	W. side of F-30 (HLS tag #2723)
D-910	2	50.9	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-911	2	76.4	1	2	1	A	R	03/14/18	D-1	2005	47	2.8/S	
D-912	2	19.1	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-913	1	38.2	1	2	1	A	R	03/14/18	D-1	2005	47	2.8/S	
D-914	1	9.5	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	SW side P2946 on discharge line
D-915	6	57.3	1	61	60	A	R	03/14/18	D-1	2005	47	2.8/S	Top of bushing on PRD (HLS tag #2724)
D-916	2	76.4	2	1166	1164	A	R	03/14/18	D-3	2021	47	2.8/S	SW side P2946 on discharge line (HLS tag #2748)
D-917	1	9.5	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-918	1	38.2	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-919	1	9.5	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-920	0.5	19.1	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-921	1	9.5	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	No bonnet
D-922	0.5	19.1	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-923	1	9.5	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	No bonnet
D-924	1	38.2	2	10	8	A	R	03/14/18	D-3	2021	47	2.8/S	
D-925	2	3.2	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-926	1	38.2	2	5	3	A	R	03/14/18	D-3	2021	47	2.8/S	
D-927-1	1	25.5	3	3	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-927-2	1	19.1	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-928	1	38.2	2	4	2	A	R	03/14/18	D-3	2021	47	2.8/S	
D-929	3	114.6	2	15	13	A	R	03/14/18	D-1	2005	47	2.8/S	
D-930	0.5	19.1	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-931	1	38.2	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-932	1	38.2	2	7	5	A	R	03/14/18	D-3	2021	47	2.8/S	
D-933	1	38.2	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-934	1	38.2	2	4	2	A	R	03/14/18	D-3	2021	47	2.8/S	
D-935	0.5	19.1	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-936	1	25.5	2	5	3	A	R	03/14/18	D-3	2021	47	2.8/S	
D-937	0.5	19.1	1	1	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-938	1	25.5	2	3	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-939	0.5	19.1	1	1	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-940	3	9.5	2	93	91	A	R	03/14/18	D-3	2021	47	2.8/S	S. Side of Pump pn suction line (HLS tag #2722)
D-941	3	114.6	2	31	29	A	R	03/14/18	D-1	2005	47	2.8/S	S. side of P-2945 bonnet flange (HLS tag #2728)
D-942	3	9.5	2	10	8	A	R	03/14/18	D-3	2021	47	2.8/S	
D-943	1	38.2	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-944	1	25.5	2	8	6	A	R	03/14/18	D-3	2021	47	2.8/S	No bonnet
D-945	0.5	19.1	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-946	1	25.5	3	6	3	A	R	03/14/18	D-3	2021	47	2.8/S	
D-947	0.5	19.1	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-948	2	50.9	3	64	61	A	R	03/14/18	D-3	2021	47	2.8/S	SE side of pump on suction line (HLS tag #2750)
D-949	1	38.2	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-950	4	12.7	3	76	73	A	R	03/14/18	D-3	2021	47	2.8/S	S side of pump on suction line (HLS tag #2749)
D-951	1	38.2	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-952	4	101.9	3	3288	3285	A	R	03/14/18	D-3	2021	47	2.8/S	S side of discharge line (HLS tag #2720)
D-953	1	38.2	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-954	1	38.2	2	7	5	A	R	03/14/18	D-3	2005	47	2.8/S	
D-956	2	50.9	2	1989	1987	A	R	03/14/18	D-3	2005	47	2.8/S	SW side of pump on discharge line (HLS leak #2719)
D-957	1	25.5	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-958	3	9.5	3	6	3	A	R	03/14/18	D-3	2005	47	2.8/S	
D-959	0.5	12.7	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-960	4	12.7	3	1385	1382	A	R	03/14/18	D-3	2005	47	2.8/S	W side of pump on discharge line (HLS leak #2718)
D-961	1	25.5	2	2	0	A	R	03/14/18	D-1	2005	47	2.8/S	
D-962	2	9.5	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-963	4	101.9	2	196	194	A	R	03/14/18	D-1	2005	47	2.8/S	Above P2945 (HLS tag #2728)
D-964	2	9.5	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-965	3	76.4	3	58	55	A	R	03/14/18	D-1	2005	47	2.8/S	Above P2945 (HLS tag #2726)
D-967	2	9.5	2	2	0	A	R	03/14/18	D-1	553	47	2.8/S	
D-968	1	25.5	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	No Bonnet
D-969	7	33.4	2	2830	2828	A	R	03/14/18	D-1	553	47	2.8/S	W. above P2945 (HLS tag #2727)
D-970	1	25.5	3	3	0	A	R	03/14/18	D-3	2021	47	2.8/S	
D-971	1	4.8	2	2	0	A	R	03/14/18	D-1	2037	47	2.8/S	
D-972	2	50.9	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-973	2	9.5	2	2	0	A	R	03/14/18	D-1	2037	47	2.8/S	
D-974	1	25.5	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-975	3	9.5	2	12	10	A	R	03/14/18	D-1	2037	47	2.8/S	
D-976	1	76.4	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-977	8	25.5	3	1014	1011	A	R	03/14/18	D-1	2037	47	2.8/S	S. above P2945 (HLS tag #2729)
D-978	1	76.4	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-979	8	25.5	3	7680	7677	A	R	03/14/18	D-1	2037	47	2.8/S	S. above P2945 (HLS tag #2730)
D-980	1	76.4	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-981	2	6.4	3	3	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-982	1	38.2	3	5	2	A	R	03/14/18	D-3	2021	47	2.8/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-983	3	76.4	3	21	18	A	R	03/14/18	D-1	289	47	2.8/S	
D-984	1	38.2	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-985	1	25.5	4	4	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-986	1	38.2	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-987	1	25.5	4	4	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-988	1	38.2	3	5	2	A	R	03/14/18	D-3	2021	47	2.8/S	
D-989	4	101.9	3	70	67	A	R	03/14/18	D-1	289	47	2.8/S	S of P2945 (HLS tag #2731)
D-990	2	76.4	3	7	4	A	R	03/14/18	D-3	2021	47	2.8/S	
D-991	1	25.5	4	4	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-992	2	6.4	3	5	2	A	R	03/14/18	D-3	2021	47	2.8/S	
D-993	1	25.5	4	4	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-994	2	9.5	3	5	2	A	R	03/14/18	D-3	2021	47	2.8/S	
D-995	1	9.5	4	4	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-996	2	38.2	3	4	1	A	R	03/14/18	D-3	2021	47	2.8/S	
D-997	2	19.1	3	4	1	A	R	03/14/18	D-1	289	47	2.8/S	
D-998	3	28.6	3	5	2	A	R	03/14/18	D-3	2021	47	2.8/S	
D-999	1	9.5	3	3	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-1000	3	9.5	3	5	2	A	R	03/14/18	D-3	2021	47	2.8/S	
D-1001	1	9.5	3	3	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-1003	1	9.5	2	3	1	A	R	03/14/18	D-1	289	47	2.8/S	
D-1005	1	9.5	3	3	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-1007	1	25.5	2	3	1	A	R	03/14/18	D-1	289	47	2.8/S	
D-1009	1	25.5	3	3	0	A	R	03/14/18	D-1	289	47	2.8/S	
D-1011	5	31.8	2	54	52	A	R	03/19/18	D-1	553	37	2.2/SW	Inboard Seal covered by Metal Plate HCS Tag#2732
D-1013	4	25.5	3	101	98	A	R	03/19/18	D-1	553	37	2.2/SW	Outboard seal covered by metal plate HCS Tag#2733
D-1015	7	3.3	3	4	1	A	R	03/19/18	D-1	553	37	2.2/SW	Housing
D-1017	4	50.9	4	1518	1514	A	R	03/19/18	D-1	553	37	2.2/SW	Pump Seal HCS Tag#2734
D-1019	2	3.2	2	3	1	A	R	03/19/18	D-1	289	37	2.2/SW	Housing
D-1021	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	553	37	2.2/SW	Pump Seal Steam - Unable to monitor
D-1023	2	2.1	2	3	1	A	R	03/19/18	D-1	289	37	2.2/SW	Housing
D-1025	2	25.5	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	
D-1027	2	3.2	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	Housing
D-1029	1	12.7	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	
D-1031	2	3.2	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	Housing
D-1033	1	9.5	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	
D-1035	2	3.2	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	Housing
D-1037	1	9.5	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	
D-1039	2	3.2	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	Housing
D-1041	1	6.4	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	
D-1043	1	3.2	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	Housing
D-1045	2	12.7	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	
D-1047	NA	NA	Blank	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Housing Insulated - Unable to Monitor
D-1049	3	19.1	2	2	0	A	R	03/19/18	D-1	289	37	2.2/SW	
D-1051	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Housing Insulated - Unable to Monitor
D-1053	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1055	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated/Steam - Unable to monitor
D-1057	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1059	5	8	2	72	70	A	R	03/19/18	D-1	289	37	2.2/SW	Pump Housing HCS Tag#2735
D-1061	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1063	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1065	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1067	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1069	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1071	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1073	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1075	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1077	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1079	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1081	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1083	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1085	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1087	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1089	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Steam - Unable to monitor
D-1091	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	289	37	2.2/SW	Insulated - Unable to monitor
D-1093	2	25.5	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	
D-1095	2	3.8	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	Housing
D-1097	2	25.5	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	
D-1099	2	3.8	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	Housing
D-1101	2	25.5	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	
D-1103	3	5.7	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	Housing
D-1105	1	9.5	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	
D-1107	2	3.8	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	Housing
D-1109	1	12.7	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	
D-1111	2	3.8	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	Housing
D-1113	2	25.5	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1115	2	3.8	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	Housing
D-1117	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	2021	37	2.2/SW	Steam - Unable to monitor
D-1119	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	2021	37	2.2/SW	Insulated - Unable to monitor
D-1121	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	2021	37	2.2/SW	Steam - Unable to monitor
D-1123	NA	NA	2	Blank	NA	U	R	03/19/18	D-1	2021	37	2.2/SW	Insulated - Unable to monitor
D-1125	1	12.7	2	2	0	A	R	03/19/18	D-1	2021	37	2.2/SW	
D-1127	NA	NA	Blank	Blank	NA	U	R	03/19/18	D-1	2021	37	2.2/SW	Insulated - Unable to monitor
D-1129	NA	NA	Blank	Blank	NA	U	R	03/19/18	D-1	2021	37	2.2/SW	Steam - Unable to monitor
D-1131	NA	NA	Blank	Blank	NA	U	R	03/19/18	D-1	2021	37	2.2/SW	Insulated - Unable to monitor
D-1002	3	19.1	2.5	15	12.5	A	R	03/19/18	D-3	140	65	2.2/SW	Inboard seal
D-1004	4	1.9	2.5	68	65.5	A	R	03/19/18	D-3	140	65	2.2/SW	Outboard seal S side of pump HLS Leak #2761
D-1006	11	70	2.0	3	1	A	R	03/19/18	D-3	140	65	2.2/SW	
D-1008	6	38.2	2.6	478	475.4	A	R	03/19/18	D-3	140	65	2.2/SW	Pump seal HLS Leak #2762
D-1010	7	13.4	3.1	5	1.9	A	R	03/19/18	D-3	140	65	2.2/SW	Pump housing
D-1012	1	6.4	3.5	Blank	NA	U	R	03/19/18	D-3	140	65	2.2/SW	Steam - Unable to monitor
D-1014	1	1.9	3.4	Blank	NA	U	R	03/19/18	D-3	140	65	2.2/SW	Steam - Unable to monitor
D-1016	5	47.7	3.2	2873	2869.8	A	R	03/19/18	D-3	140	65	2.2/SW	Pump seal HLS Leak #2763
D-1018	7	7.4	2	7	5	A	R	03/19/18	D-3	2005	65	2.2/SW	Pump housing
D-1020	3	19.1	2	4	2	A	R	03/19/18	D-3	2005	65	2.2/SW	Inboard seal
D-1022	4	3.8	2	4	2	A	R	03/19/18	D-3	2005	65	2.2/SW	Inboard pump housing
D-1024	6	5.7	3	188	185	A	R	03/19/18	D-3	2005	65	2.2/SW	N side of pump on outboard pump housing HLS Leak #2721
D-1026	2	12.7	3	3	0	A	R	03/19/18	D-3	2005	65	2.2/SW	Outboard pump seal
D-1028	4	25.5	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1030	4	3.8	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1032	4	25.5	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1034	5	4.8	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1036	1	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1038	3	2.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1040	1	9.5	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1042	4	3.8	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1044	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1046	3	2.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1048	3	28.6	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1050	3	2.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1052	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1054	3	2.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1056	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1058	3	2.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	Insulated
D-1060	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1062	3	2.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	Insulated
D-1064	2	19.1	2	3	1	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1066	1	1	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1068	1	9.5	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1070	2	1.9	2	3	1	A	R	03/19/18	D-3	2005	65	2.2/SW	Inboard pump housing
D-1072	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1074	2	1.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1076	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1078	0.5	0.5	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1080	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1082	0.5	0.5	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1084	2	12.7	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1086	3	3.6	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1088	2	12.7	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1090	3	3.6	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1092	2	19.1	2	3	1	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1094	2	3.2	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1096	3	28.6	2	6	4	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1098	2	3.2	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1100	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Unable to reach seal
D-1102	2	1.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1104	1	9.5	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Unable to reach seal
D-1106	2	1.9	2	3	1	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1108	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1110	3	5.7	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1112	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1114	3	5.7	2	3	1	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1116	2	19.1	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1118	2	1.9	2	2	0	A	R	03/19/18	D-3	2005	65	2.2/SW	
D-1120	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1122	0.5	0.5	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1124	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1226-1	0.5	1	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Insulated - Unable to monitor
D-1128	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Unable to monitor Out of Service
D-1130	0.5	1	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Unable to monitor Out of Service
D-1132-1	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1132-2	0.5	1	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Insulated - Unable to monitor
D-1134	0.5	4.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Steam - Unable to monitor
D-1136	0.5	0.8	2	Blank	NA	U	R	03/19/18	D-3	2005	65	2.2/SW	Insulated - Unable to monitor
D-1133	1	12.7	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1135	2	2.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1137	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1138	2	19.1	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1139	2	4.8	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1140	3	5.7	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1141	4	76.4	2	13	11	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1142	2	19.1	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1143	2	4.8	3	3	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1144	4	3.8	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1145	1	12.7	3	3	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1146	2	19.1	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1147	2	3.2	3	3	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1148	4	3.8	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1149	5	63.7	2	32	30	A	R	03/21/18	D-2	553	53	6.3/NE	Pump Seal HLS#2774
D-1150	2	19.1	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1151	2	2.1	3	3	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1152	3	5.7	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1153	1	19.1	3	3	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1154	2	19.1	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1155	2	2.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1156	3	5.7	0	1	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1157	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1158	1	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1159	2	3.2	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1160	3	5.7	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1161	1	12.7	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1162	1	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1163	2	3.2	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	housing
D-1164	3	5.7	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1165	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1166	2	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1167	2	3.2	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	housing
D-1168	4	4.2	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1169	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1170	2	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1171	2	4.8	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	housing
D-1172	3	3.2	2	2	0	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1173	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1174	2	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1175	2	4.8	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	housing
D-1176	4	4.2	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1177	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1178	2	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1179	NA	NA	Blank	Blank	NA	U	R	03/21/18	D-2	553	53	6.3/NE	Housing Insulated unable to monitor
D-1180	4	4.2	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1181	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1182	1	19.1	0	2	2	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1183	NA	NA	Blank	Blank	NA	U	R	03/21/18	D-2	553	53	6.3/NE	Housing Insulated unable to monitor
D-1184	3	5.7	0	2	2	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1185	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1186	1	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1187	4	6.4	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1188	2	4.8	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1189	1	19.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1190	2	38.2	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1191	2	3.8	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1192	3	7.2	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1193-1	2	25.5	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1193-2	NA	NA	Blank	Blank	NA	U	R	03/21/18	D-2	553	53	6.3/NE	Housing insulated unable to monitor
D-1194	1	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1195	1	12.7	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1196	3	7.2	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1197	NA	NA	Blank	Blank	NA	U	R	03/21/18	D-2	553	53	6.3/NE	Housing insulated unable to monitor
D-1198	NA	NA	1	Blank	NA	U	R	03/21/18	D-4	2021	53	6.3/NE	can't reach seal
D-1199	1	9.5	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1200	3	2.9	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1201	2	2.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing
D-1202	1	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1203	1	9.5	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1204	2	4.8	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1205	2	2.1	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	Housing

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1206	2	19.1	1	3	2	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1207	2	25.5	2	2	0	A	R	03/21/18	D-2	553	53	6.3/NE	
D-1208	4	7.6	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1210	2	19.1	1	2	1	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1212	4	7.6	1	4	3	A	R	03/21/18	D-4	2021	53	6.3/NE	
D-1209	2	4.8	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1211	1	19.1	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1213	2	4.8	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1214	2	19.1	1	2	1	A	R	03/23/18	D-3	553	39	1.6/W	
D-1215	3	38.2	2	13	11	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1216	3	5.7	1	2	1	A	R	03/23/18	D-3	553	39	1.6/W	
D-1217	2	2.1	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1218	5	47.7	1	328	327	A	R	03/23/18	D-3	553	39	1.6/W	On P-14654 @ seal (HLS tag #2769)
D-1219	1	12.7	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1220	3	5.7	1	4	3	A	R	03/23/18	D-3	553	39	1.6/W	
D-1221	2	2.1	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1222	2	19.1	2	3	1	A	R	03/23/18	D-3	553	39	1.6/W	
D-1223	1	12.7	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1224	NA	NA	2	Blank	NA	U	R	03/23/18	D-3	553	39	1.6/W	Unable to monitor insulated
D-1226-2	2	19.1	2	3	1	A	R	03/23/18	D-3	553	39	1.6/W	
D-1227	2	3.8	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1228	NA	NA	2	Blank	NA	U	R	03/23/18	D-3	553	39	1.6/W	Unable to monitor insulated
D-1229	1	12.7	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1230	2	6.4	2	2	0	A	R	03/23/18	D-3	553	39	1.6/W	
D-1231	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	2005	39	1.6/W	Housing unable to monitor covered in H2O
D-1232	2	6.4	1	2	1	A	R	03/23/18	D-3	553	39	1.6/W	
D-1233	1	12.7	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1234	NA	NA	1	Blank	NA	U	R	03/23/18	D-3	553	39	1.6/W	Steam - Unable to monitor
D-1235	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	2005	39	1.6/W	Housing unable to monitor covered in H2O
D-1236	4	3.2	1	3	2	A	R	03/23/18	D-3	553	39	1.6/W	
D-1237	1	6.4	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Inboard seal
D-1238	5	47.7	2	2	0	A	R	03/23/18	D-3	553	39	1.6/W	
D-1239	1	6.4	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Outboard seal
D-1240	NA	NA	1	Blank	NA	U	R	03/23/18	D-3	553	39	1.6/W	Unable to monitor insulated
D-1241	3	2.9	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1242	3	28.6	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	Inboard seal
D-1243	1	6.4	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Inboard seal
D-1244	4	6.4	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1245	3	19.1	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	outboard seal
D-1246	2	19.1	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	Outboard seal
D-1247	3	2.9	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1248	2	19.1	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1249	1	12.7	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1250	4	6.4	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1251	2	4.8	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1252	2	19.1	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1253	1	12.7	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	
D-1254	3	4.8	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1255	2	4.8	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing
D-1256	2	19.1	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1257	1	6.4	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Inboard seal
D-1258	3	4.8	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1259	1	6.4	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Outboard seal
D-1260	NA	NA	0	Blank	NA	U	R	03/23/18	D-3	2037	39	1.6/W	Unable to monitor steam
D-1261	2	1.9	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing outboard
D-1262	3	4.8	0	0	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1263	2	1.9	1	1	0	A	R	03/23/18	D-1	2005	39	1.6/W	Housing inboard
D-1264	3	28.6	0	1	1	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1265	1	6.4	1	1	0	A	R	03/23/18	D-1	2005	39	1.6/W	Inboard seal
D-1266	3	4.8	0	1	1	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1267	2	1.9	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Inboard housing
D-1268	3	28.6	0	1	1	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1269	1	6.4	2	2	0	A	R	03/23/18	D-1	2005	39	1.6/W	Outboard seal
D-1270	3	4.8	1	1	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1271	1	12.7	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	
D-1272	2	19.1	1	1	0	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1273	2	3.2	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	Housing
D-1274	NA	NA	0	Blank	NA	U	R	03/23/18	D-3	2037	39	1.6/W	Pump out of service
D-1275	6	38.2	2	5	3	A	R	03/23/18	D-1	289	39	1.6/W	
D-1276	NA	NA	0	Blank	NA	U	R	03/23/18	D-3	2037	39	1.6/W	Pump out of service
D-1277	3	3.6	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	
D-1278	NA	NA	0	Blank	NA	U	R	03/23/18	D-3	2037	39	1.6/W	Pump out of service
D-1279	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Steam - Unable to monitor
D-1280	2	19.1	0	1	1	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1281	2	2.4	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	Housing

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1282	3	4.8	0	1	1	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1283	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Steam - Unable to monitor
D-1284	NA	NA	0	Blank	NA	U	R	03/23/18	D-3	2037	39	1.6/W	Unable to monitor steam
D-1285	3	28.6	2	40	38	A	R	03/23/18	D-1	289	39	1.6/W	Pump seal (HLS tag #2737)
D-1286	3	4.8	0	4	4	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1287	5	6.8	2	114	112	A	R	03/23/18	D-1	289	39	1.6/W	Housing (HLS tag #2738)
D-1288	0.5	4.8	0	Blank	NA	A	R	03/23/18	D-3	2037	39	1.6/W	Unable to monitor steam
D-1289	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Steam - Unable to monitor
D-1290	4	6.4	1	3	2	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1291	2	3.2	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	Housing
D-1292	2	19.1	1	3	2	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1293	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Steam - Unable to monitor
D-1294	4	4.8	1	3	2	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1295	3	2.9	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	Housing
D-1296	2	19.1	1	3	2	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1297	1	6.4	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	
D-1298	4	4.8	1	3	2	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1299	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Housing Insulated unable to monitor
D-1300	2	19.1	1	2	1	A	R	03/23/18	D-3	2037	39	1.6/W	
D-1301	2	9.5	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	
D-1302	4	4.8	2	2	0.3	A	R	03/23/18	D-3	140	39	1.6/W	
D-1303	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Insulate housing unable to monitor
D-1304	NA	NA	2	Blank	NA	U	R	03/23/18	D-3	140	39	1.6/W	Pump out of service
D-1305	6	3.8	3	184	181	A	R	03/23/18	D-1	2021	39	1.6/W	Housing
D-1306	7	66.8	2	158	156	A	R	03/23/18	D-3	140	39	1.6/W	pump seal N.side of P-2040
D-1307	1	6.4	2	2	0	A	R	03/23/18	D-1	289	39	1.6/W	
D-1308	2	19.1	2	2	0.5	A	R	03/23/18	D-3	140	39	1.6/W	
D-1309	3	3.6	2	5	3	A	R	03/23/18	D-1	289	39	1.6/W	Housing
D-1310	5	4	2	2	0.4	A	R	03/23/18	D-3	140	39	1.6/W	
D-1311	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Steam - Unable to monitor
D-1312	4	38.2	2	3	1.5	A	R	03/23/18	D-3	140	39	1.6/W	
D-1313	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Insulated - Unable to monitor
D-1314	4	5.5	2	3	1.2	A	R	03/23/18	D-3	140	39	1.6/W	
D-1315	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Steam - Unable to monitor
D-1316	NA	NA	2	Blank	NA	U	R	03/23/18	D-3	140	39	1.6/W	Unable to monitor steam
D-1317	4	3.8	2	7	5	A	R	03/23/18	D-1	289	39	1.6/W	
D-1318	4	4.8	2	3	1	A	R	03/23/18	D-3	140	39	1.6/W	
D-1319	NA	NA	2	Blank	NA	U	R	03/23/18	D-1	289	39	1.6/W	Housing Insulated unable to monitor
D-1320	NA	NA	2	Blank	NA	U	R	03/23/18	D-3	140	39	1.6/W	Unable to monitor steam
D-1322	NA	NA	2	Blank	NA	U	R	03/23/18	D-3	140	39	1.6/W	Unable to monitor Insulated
D-1323	5	6.8	1	1	0	A	R	03/23/18	D-1	2021	39	1.6/W	Housing
D-1324	8	76.4	2	87	85	A	R	03/23/18	D-3	140	39	1.6/W	Outboard seal N.side of pump (HLS tag #2771)
D-1325	1	4.8	1	1	0	A	R	03/23/18	D-1	2021	39	1.6/W	
D-1326	NA	NA	3	Blank	NA	U	R	03/23/18	D-3	140	39	1.6/W	Unable to monitor steam
D-1327	2	1.9	2	2	0	A	R	03/23/18	D-1	2021	39	1.6/W	Housing
D-1328	NA	NA	3	Blank	NA	U	R	03/23/18	D-3	140	39	1.6/W	Unable to monitor Insulated
D-1329	NA	NA	Blank	Blank	NA	U	R	03/23/18	D-1	2021	39	1.6/W	Steam - Unable to monitor
D-1330	7	66.8	3	101	98	A	R	03/23/18	D-3	140	39	1.6/W	Outboard seal N.side of pump (HLS tag #2713)
D-1331	1	6.4	2	2	0	A	R	03/23/18	D-1	2021	39	1.6/W	Seal inboard
D-1333	1	6.4	2	2	0	A	R	03/23/18	D-1	2021	39	1.6/W	Seal outboard
D-1335	2	1.9	2	2	0	A	R	03/23/18	D-1	2021	39	1.6/W	Housing
D-1337	3	14.3	2	19	17	A	R	03/23/18	D-1	2021	39	1.6/W	Inboard Seal
D-1339	3	14.3	3	22	19	A	R	03/23/18	D-1	2021	39	1.6/W	Outboard Seal
D-1341	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	553	45	9.0/W	Unable to monitor due to steam
D-1343	2	2.1	2	2	0	A	R	03/26/18	D-2	553	45	9.0/W	Housing
D-1345	1	12.7	4	4	0	A	R	03/26/18	D-2	553	45	9.0/W	
D-1347	2	2.1	4	4	0	A	R	03/26/18	D-2	553	45	9.0/W	Housing
D-1349	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	553	45	9.0/W	Outboard seal unable to monitor due to steam
D-1351	2	2.1	3	3	0	A	R	03/26/18	D-2	553	45	9.0/W	Housing
D-1353	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	553	45	9.0/W	Outboard seal unable to monitor due to steam
D-1355	2	2.1	2	3	1	A	R	03/26/18	D-2	553	45	9.0/W	Housing
D-1357	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	553	45	9.0/W	Unable to monitor due to steam outboard
D-1359	2	2.1	2	2	0	A	R	03/26/18	D-2	553	45	9.0/W	Housing
D-1361	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	553	45	9.0/W	Unable to monitor due to steam outboard
D-1363	2	2.1	3	3	0	A	R	03/26/18	D-2	553	45	9.0/W	Housing
D-1365	3	38.2	2	19	17	A	R	03/26/18	D-2	553	45	9.0/W	Light steam @ Seal
D-1367	4	4.2	2	649	647	A	R	03/26/18	D-2	553	45	9.0/W	Housing HLS # 2775
D-1369	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Unable to monitor due to steam
D-1371	2	2.1	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1373	1	12.7	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	Inboard seal
D-1375	1	12.7	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	Outboard seal
D-1377	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing insulated
D-1379	1	12.7	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	Inboard Seal
D-1381	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Outboard seal, unable to monitor due to steam
D-1383	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1385	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing insulated
D-1387	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Unable to monitor due to steam
D-1389	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing Insulated
D-1391	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Unable to monitor due to steam outboard
D-1393	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing Insulated
D-1395	1	12.7	1	1	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1397	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing insulated
D-1362	3	4.8	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1364	4	38.2	2	51	49	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1366	4	3.8	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1368	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (steam)
D-1370	6	5.7	2	281	279	A	R	03/26/18	D-4	2021	45	9.0/W	Pump housing In piperow
D-1372	2	38.2	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1374	4	6.4	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1376	2	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1378	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (Insulated)
D-1380	2	19.1	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1382	6	6.4	2	14	12	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1384	3	57.3	2	5	3	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1386	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (Insulated)
D-1388	2	38.2	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1390	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (Insulated)
D-1392	1	9.5	2	2	0	A	R	03/26/18	D-4	33	45	9.0/W	
D-1394	3	5.7	2	2.4	0.4	A	R	03/26/18	D-4	33	45	9.0/W	
D-1396	2	19.1	2.1	2.3	0.2	A	R	03/26/18	D-4	33	45	9.0/W	
D-1398	6	11.5	2	7.2	5.2	A	R	03/26/18	D-4	33	45	9.0/W	
D-1400	2	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1402	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (Insulated)
D-1404	2	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1406	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (Insulated)
D-1408	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (No seal on pump)
D-1410	6	11.5	2	6	4	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1412	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (No seal on pump)
D-1414	6	11.5	2	7	5	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1416	2	19.1	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1418	6	9.5	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1399	1	12.7	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1401	2	3.2	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1403	1	12.7	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1405	2	4.8	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1407	1	19.1	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1409	2	4.8	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1411	2	38.2	2	48	46	A	R	03/26/18	D-2	2005	45	9.0/W	HLS TAG #2776
D-1413	2	3.8	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1415	1	9.5	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1417	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing Insulated
D-1419	2	19.1	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1421	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing Insulated
D-1423	1	19.1	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1425	2	3.2	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1427	1	9.5	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	No seal on pump
D-1429	3	4.1	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1431	1	9.5	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1433	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing Insulated
D-1435	2	19.1	2	Blank	NA	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1437	NA	NA	Blank	Blank	NA	U	R	03/26/18	D-2	2005	45	9.0/W	Housing Insulated
D-1439	1	19.1	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1441	2	2.4	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1443	1	19.1	2	2	0	A	R	03/26/18	D-2	2005	45	9.0/W	
D-1445	3	4.8	3	3	0	A	R	03/26/18	D-2	2005	45	9.0/W	Housing
D-1332	3	28.6	2	8	6	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1334	6	4.8	2	48	46	A	R	03/26/18	D-4	2021	45	9.0/W	Pump housing southside of unit E of V-589
D-1336	2	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1338	5	4.8	2	8	6	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1340	2	19.1	2	6	4	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1342	6	5.7	2	8	6	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1344	1	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1346	3	4.8	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1348	1	19.1	2	5	3	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1350	3	4.8	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1352	2	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1354	NA	NA	2	Blank	NA	U	R	03/26/18	D-4	2021	45	9.0/W	Can't inspect (Insulated)
D-1356	1	19.1	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1358	3	4.8	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1360	1	19.1	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1420	2	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1422	3	7.2	2	3	1	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1424	2	19.1	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1426	4	9.5	2	4	2	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1428	1	9.5	2	2	0	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1430	4	6.4	2	2	0	A	R	03/26/18	D-4	2021	45	9.0/W	
D-1432	2	19.1	2	2	0	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1434	2	6.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1436	2	6.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1438	2	6.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1440	2	6.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1442	2	6.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1444	3	28.6	2	4	2	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1446	2	6.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1448	2	19.1	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1450	3	9.5	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1452	3	9.5	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1454	2	12.7	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1456	2	12.7	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1458	2	12.7	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1460	2	12.7	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1462	2	12.7	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1464	3	19.1	2	2	0	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1466	4	25.5	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1468	2	76.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1470	2	76.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1472	2	76.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1474	2	19.1	2	4	2	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1476	3	28.6	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1478	3	14.3	2	4	2	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1480	2	50.9	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1482	1	38.2	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1484	2	50.9	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1486	2	76.4	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1488	1	38.2	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1490	1	38.2	2	3	1	A	R	03/27/18	D-3	553	45	3.8/SW	
D-1447	2	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1449	2	9.5	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1451	1	38.2	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1453	2	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1455	2	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1457	2	9.5	2	3	1	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1459	2	19.1	3	3	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1461	2	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1463	2	9.5	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1465	1	38.2	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1467	1	9.5	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1469	2	9.5	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1471	3	4.8	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1473	1	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1475	2	12.7	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1477	1	38.2	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1479	1	38.2	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1481	2	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1483	1	9.5	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1485	1	9.5	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1487	1	9.5	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1489	1	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1491	1	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1493	1	76.4	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1495	1	76.4	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1497	2	152.8	2	4	2	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1499	1	76.4	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1501	1	76.4	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1503	1	76.4	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1505	1	19.1	2	2	0	A	R	03/27/18	D-1	289	45	3.8/SW	
D-1507	1	19.1	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1509	1	76.4	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1511	1	76.4	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1513	1	76.4	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1515	1	76.4	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1517	1	76.4	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1519	1	76.4	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1521	2	12.7	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1523	3	19.1	1	4	3	A	R	03/27/18	D-1	140	45	3.8/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1525	1	6.4	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1527	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1529	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1531	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1533	1	19.1	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1535	0.5	9.5	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1537	0.5	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1539	0.5	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1541	0.5	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1543	0.5	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1545	0.5	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1547	0.5	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1549	2	12.7	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1551	2	12.7	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1553	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1555	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1557	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1559	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1561	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1563	1	38.2	1	1	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1565	3	19.1	1	4	3	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1567	1	9.5	2	2	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1569	1	4.8	2	3	1	P	R	03/27/18	D-1	553	45	3.8/SW	Bonnet Insulated
D-1571	2	6.4	2	2	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1573	1	4.8	2	2	0	P	R	03/27/18	D-1	553	45	3.8/SW	Bonnet Insulated
D-1575	1	9.5	2	2	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1577	2	3.8	2	2	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1579	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1581	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1583	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1585	1	3.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1587	3	9.5	3	4	1	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1589	2	6.4	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1591	1	3.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1593	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1595	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1597	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1599	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1601	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1603	1	6.4	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1605	1	6.4	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1607	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1609	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1611	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1613	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1615	2	3.8	2	3	1	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1617	1	25.5	2	2	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1619	1	25.5	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1621	1	25.5	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1623	1	38.2	3	3	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1625	1	25.5	2	2	0	A	R	03/27/18	D-1	553	45	3.8/SW	
D-1627	1	25.5	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1629	1	25.5	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1631	1	76.4	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1633	1	76.4	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1635	1	1.9	2	2	0	P	R	03/27/18	D-1	140	45	3.8/SW	Bonnet Insulated
D-1637	1	1.9	2	3	1	P	R	03/27/18	D-1	140	45	3.8/SW	Bonnet Insulated
D-1639	1	25.5	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1641	1	25.5	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1643	1	25.5	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1645	1	25.5	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1647	2	3.8	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1649	2	3.8	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1651	4	7.6	2	11	9	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1653	1	38.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1655	1	38.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1657	2	6.4	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1659	3	9.5	2	4	2	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1661	2	6.4	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1663	2	6.4	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1665	1	19.1	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1667	1	19.1	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1669	3	5.7	2	12	10	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1671	1	38.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1673	1	38.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1675	1	38.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1677	2	3.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1679	1	38.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1681	1	76.4	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1683	1	38.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1685	2	3.2	2	2	0	A	R	03/27/18	D-1	140	45	3.8/SW	
D-1492	1	38.2	1.2	1.6	0.4	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1494	1	38.2	1.2	1.7	0.5	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1496	1	38.2	1.2	1.6	0.4	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1498	1	38.2	1.1	1.1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1500	2	50.9	1.1	2.0	0.9	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1502	1	38.2	1.1	2.0	0.9	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1504	2	50.9	1.1	2.0	0.9	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1506	2	76.4	1.1	1.6	0.5	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1508	1	38.2	1.1	1.8	0.7	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1510	1	38.2	1.1	1.9	0.8	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1512	1	38.2	1.1	1.5	0.4	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1514	1	38.2	1.0	1.0	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1516	1	38.2	1.0	1.0	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1518	1	38.2	1.0	2.0	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1520	2	19.1	1.0	2.0	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1522	2	19.1	1	2	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1524	2	50.9	1	2	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1526	1	38.2	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1528	2	76.4	1	2	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1530	2	76.4	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1532	1	38.2	1	2	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1534	1	25.5	1	2	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1536	3	28.6	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1538	2	19.1	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1540	3	14.3	1	2	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1542	2	50.9	1	2	1	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1544	1	38.2	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1546	2	50.9	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1548	1	38.2	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1550	1	38.2	1	1	0	A	R	03/27/18	D-3	33	45	3.8/SW	
D-1552	1	38.2	2	2	0	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1554	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1556	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1558	1	38.2	1	1	0	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1560	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1562	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1564	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1566	1	38.2	1	1	0	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1568	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1570	1	38.2	1	1	0	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1572	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1574	2	50.9	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1576	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1578	2	50.9	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1580	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1582	2	19.1	1	1	0	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1584	2	19.1	1	1	0	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1586	1	38.2	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1588	2	50.9	1	2	1	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1590	1	38.2	1	1	0	A	R	03/27/18	D-3	85	45	3.8/SW	
D-1592	2	19.1	2	2	0	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1594	2	9.5	2	2	0	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1596	2	19.1	2	2	0	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1598	3	4.8	2	3	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1600	2	19.1	2	3	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1602	4	9.5	2	2	0	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1604	2	19.1	2	2	0	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1606	2	76.4	2	2	0	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1608	1	38.2	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1610	3	7.2	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1612	3	7.2	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1614	1	25.5	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	No Bonnet
D-1616	2	4.8	1	2	1	P	R	03/27/18	D-3	289	45	3.8/SW	Insulated No bonnet
D-1618	2	4.8	1	2	1	P	R	03/27/18	D-3	289	45	3.8/SW	Insulated No bonnet
D-1620	2	50.9	2	2	0	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1622	2	50.9	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1624	1	25.5	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	No Bonnet
D-1626	1	76.4	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1628	1	38.2	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1630	2	6.4	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1632	2	4.8	1	2	1	P	R	03/27/18	D-3	289	45	3.8/SW	Bonnet Insulated
D-1634	2	6.4	1	3	2	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1636	2	6.4	1	3	2	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1638	1	25.5	1	3	2	A	R	03/27/18	D-3	289	45	3.8/SW	No Bonnet
D-1640	1	38.2	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1642	2	19.1	1	3	2	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1644	1	38.2	1	3	2	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1646	1	38.2	1	2	1	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1648	1	38.2	1	3	2	A	R	03/27/18	D-3	289	45	3.8/SW	
D-1650	2	4.8	1	3	2	P	R	03/27/18	D-3	289	45	3.8/SW	Bonnet Insulated
D-1652	1	25.5	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1654	1	25.5	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1656	2	4.8	2	3	1	P	R	03/27/18	D-3	2037	45	3.8/SW	Bonnet Insulated
D-1658	2	50.9	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1700	2	50.9	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1702	2	4.8	2	3	1	P	R	03/27/18	D-3	2037	45	3.8/SW	Bonnet Insulated
D-1704	3	9.5	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1706	2	19.1	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1708	2	50.9	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1710	2	50.9	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1712	2	19.1	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1714	2	19.1	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1716	2	12.7	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1718	2	12.7	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1720	1	25.5	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1722	2	50.9	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1724	2	6.4	2	2	0	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1726	3	9.5	2	3	1	A	R	03/27/18	D-3	2037	45	3.8/SW	
D-1687	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	No Bonnet Flange
D-1689	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1691	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1693	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1695	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1697	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1699	1	19.1	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1701	1	19.1	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1703	1	19.1	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1705	1	25.5	2	3	1	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1707	1	25.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1709	1	38.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1711	1	38.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1713	0.5	19.1	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1715	1	38.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1717	1	38.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1719	1	38.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1721	1	38.2	2	3	1	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1723	1	38.2	2	3	1	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1725	1	38.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1727	1	38.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1729	1	38.2	2	5	3	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1731	1	38.2	3	3	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1733	1	38.2	3	3	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1735	1	38.2	3	3	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1737	1	38.2	2	3	1	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1739	1	25.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1741	1	25.5	2	3	1	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1743	2	50.9	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1745	1	25.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1747	3	76.4	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1749	4	6.4	2	3	1	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1751	2	3.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1753	1	38.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1755	1	38.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1757	4	7.6	2	60	58	A	R	03/28/18	D-2	2037	56	4.0/NW	S of P-2488 HLS TAG#2777
D-1759	6	11.5	3	30	27	A	R	03/28/18	D-2	2037	56	4.0/NW	S of P-2488 HLS TAG#2778
D-1761	1	6.4	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1763	2	12.7	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1765	1	9.5	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1767	1	9.5	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1769	1	9.5	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	Welded Bonnet
D-1771	1	9.5	3	4	1	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1773	1	9.5	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1775	6	9.5	4	143	139	A	R	03/28/18	D-2	2037	56	4.0/NW	S side P-4309 HLS TAG #2778
D-1777	4	6.4	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1779	1	25.5	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	Welded bonnet flange
D-1781	1	25.5	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1783	1	25.5	5	5	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1785	1	25.5	5	5	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1787	2	9.5	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1789	1	25.5	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1791	1	25.5	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1793	1	38.2	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1795	2	76.4	4	4	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1797	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1799	1	38.2	3	4	1	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1801	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1803(1)	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1805(1)	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1807(1)	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1809(1)	1	25.5	3	4	1	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1811(1)	3	5.7	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1803(2)	1	9.5	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1805(2)	1	9.5	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1807(2)	2	19.1	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1809(2)	1	9.5	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1811(2)	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1813	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1815(1)	1	38.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1817(1)	1	38.2	3	3	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1819(1)	1	38.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1821(1)	1	38.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1823(1)	1	38.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1815(2)	1	38.2	2	2	0	A	R	03/28/18	D-2	2037	56	4.0/NW	
D-1817(2)	1	38.2	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1819(2)	1	38.2	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1821(2)	1	38.2	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1823(2)	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1825	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1827	2	19.1	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1829	2	19.1	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1831	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1833	1	9.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1835	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1837	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1839	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1841	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1843	1	38.2	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1845	1	38.2	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1847	1	19.1	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1849	1	38.2	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1851	1	38.2	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1853	1	19.1	2	2	0	P	R	03/28/18	D-2	33	56	4.0/NW	Bonnet Flange Insulated
D-1855	1	19.1	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1857	1	25.5	2	7	5	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1859	1	25.5	2	2	0	A	R	03/28/18	D-2	33	56	4.0/NW	
D-1861	1	9.5	3	3	0	A	R	03/28/18	D-2	289	56	4.0/NW	
D-1863	NA	NA	Blank	Blank	NA	U	R	03/28/18	D-2	289	56	4.0/NW	Housing Insulated
D-1865A	1	9.5	3	3	0	A	R	03/28/18	D-2	289	56	4.0/NW	
D-1865B	NA	NA	Blank	Blank	NA	U	R	03/28/18	D-2	289	56	4.0/NW	Housing Insulated
D-1867	1	9.5	2	2	0	A	R	03/28/18	D-2	289	56	4.0/NW	
D-1869	2	3.2	2	2	0	A	R	03/28/18	D-2	289	56	4.0/NW	Housing
D-1871	1	19.1	2	2	0	A	R	03/28/18	D-2	289	56	4.0/NW	
D-1873	3	7.2	2	2	0	A	R	03/28/18	D-2	289	56	4.0/NW	Housing
D-1875	1	19.1	4	4	0	A	R	03/28/18	D-2	289	56	4.0/NW	
D-1877	3	4.8	3	3	0	A	R	03/28/18	D-2	289	56	4.0/NW	Housing
D-1879	1	19.1	3	3	0	A	R	03/28/18	D-2	289	56	4.0/NW	
D-1881	2	3.2	3	3	0	A	R	03/28/18	D-2	289	56	4.0/NW	Housing
D-1883	4	76.4	2	276	274	A	R	03/28/18	D-2	289	56	4.0/NW	
D-1885	NA	NA	Blank	Blank	NA	U	R	03/28/18	D-2	289	56	4.0/NW	Housing unable to monitor
D-1887	1	19.1	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1889	NA	NA	Blank	Blank	NA	U	R	03/28/18	D-2	2005	56	4.0/NW	Housing Insulated
D-1891	1	Unknown	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1893	NA	NA	Blank	Blank	NA	U	R	03/28/18	D-2	2005	56	4.0/NW	Housing Insulated
D-1728	5	9.5	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1730	1	25.5	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1732	2	50.9	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1734	4	7.6	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1736	5	9.5	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1738	4	7.6	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1740	5	9.5	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1742	1	25.5	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1744	2	50.9	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1746	5	11.9	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1748	4	9.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1750	4	9.5	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1752	1	25.5	1	2	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1754	1	25.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1756	4	9.5	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1758	5	11.9	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1760	4	9.5	1	3	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1762	4	9.5	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1764	1	25.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1766	2	50.9	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1768	1	25.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1770	4	12.7	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1772	3	9.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1774	3	9.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1776	4	9.5	1	2	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1778	3	7.2	1	2	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1780	5	11.9	1	2	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1782	1	25.5	1	2	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1784	1	25.5	1	2	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1786	1	25.5	1	2	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1788	4	9.5	2	3	1	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1790	3	7.2	2	3	1	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1792	4	9.5	2	3	1	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1794	4	76.4	2	10	8	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1796	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1798	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1800	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1802	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1804	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1806	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1808	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1810	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1812	2	38.2	2	7	5	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1814	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1816	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1818	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1820	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1822	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1824	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1826	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1828	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1830	2	38.2	2	9	7	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1832	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1834	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1836	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1838	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1840	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1842	1	19.1	2	4	2	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1844	1	19.1	2	3	1	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1846	1	19.1	2	5	3	A	R	03/28/18	D-4	289	55	4.0/NW	
D-1848	3	9.5	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1850	3	9.5	2	4	2	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1852	4	12.7	2	4	2	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1854	3	9.5	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1856	1	19.1	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1858	1	19.1	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1860	1	19.1	2	4	2	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1862	1	19.1	2	4	2	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1864	1	19.1	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1866	1	19.1	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1868	1	19.1	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1870	1	19.1	2	4	2	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1872	1	19.1	2	4	2	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1874	1	19.1	2	3	1	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1876	3	9.5	2	4	2	A	R	03/28/18	D-4	553	55	4.0/NW	
D-1878	7	133.7	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1880	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1882	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1884	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1886	1	19.1	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1888	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1890	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1892	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1894	1	19.1	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1896	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1898	1	19.1	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1900	1	19.1	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1902	3	9.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1904	3	9.5	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1906	2	50.9	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1908	3	9.5	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1910-1	3	7.2	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1912	1	38.2	2	2	0	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1914	1	25.5	2	2	0	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1916	2	19.1	2	2	0	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1918	1	25.5	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1920	1	25.5	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1922	1	38.2	2	2	0	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1924	1	38.2	2	2	0	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1926	1	38.2	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1928	1	38.2	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1930	1	38.2	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1932	1	38.2	2	2	0	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1934	1	38.2	2	2	0	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1936	1	38.2	2	3	1	A	R	03/28/18	D-4	BLANK	55	4.0/NW	
D-1938	1	38.2	2	2	0	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1940	1	38.2	2	2	0	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1942	1	38.2	2	2	0	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1944	1	38.2	2	2	0	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1946	0.5	19.1	2	2	0	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1948	1	9.5	2	3	1	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1950	4	6.4	2	2	0	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1952	1	9.5	2	3	1	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1954	3	5.7	2	4	2	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1956	2	19.1	2	3	1	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1958	3	5.7	2	4	2	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1960	2	19.1	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1962	3	5.7	2	3	1	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1964	1	9.5	1	2	1	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1966	4	4.8	1	3	2	A	R	03/28/18	D-4	2037	55	4.0/NW	
D-1968	1	9.5	2	2	0	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1970	0.5	0.4	2	3	1	A	R	03/28/18	D-4	2021	55	4.0/NW	
D-1895	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1897	2	3.2	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	Housing
D-1899	1	9.5	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1901	3	4.8	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	Housing
D-1903	1	19.1	1	2	1	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1905	2	6.4	2	2	0	A	R	03/28/18	D-2	2005	56	4.0/NW	Housing
D-1907	1	19.1	1	1	0	A	R	03/28/18	D-2	2005	56	4.0/NW	
D-1909	2	6.4	1	2	1	A	R	03/28/18	D-2	2005	56	4.0/NW	Housing
D-1910-2	7	66.8	2	359	357	A	R	03/28/18	D-2	2005	56	4.0/NW	HLS#2779 Pump seal
D-1911	1	12.7	2	2	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1913	1	2.4	2	2	0	A	R	03/29/18	D-1	2037	55	4.1/SW	Housing
D-1915	3	28.6	2	46	44	A	R	03/29/18	D-1	2037	55	4.1/SW	Pump seal above recycle center
D-1917	1	2.4	3	3	0	A	R	03/29/18	D-1	2037	55	4.1/SW	Housing
D-1919	4	38.2	3	198	195	A	R	03/29/18	D-1	2037	55	4.1/SW	Pump seal above recycle center
D-1921	2	4.8	4	4	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1923	2	2.1	2	2	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1925	3	19.1	2	33	31	A	R	03/29/18	D-1	2037	55	4.1/SW	Pump seal Unleaded Gasoline Pump bench
D-1927	2	3.2	3	3	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1929	1	9.5	3	3	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1931	2	4.8	3	3	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1933	2	19.1	3	18	15	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1935	2	1.9	4	4	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1937	1	6.4	4	4	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1939	1	38.2	5	5	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1969	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1971	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1973	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1975	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1977	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1979	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1981	1	38.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1983	2	6.4	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1985	2	6.4	2	3	1	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1987	2	38.2	2	3	1	P	R	03/29/18	D-1	289	55	4.1/SW	Bonnet insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-1989	1	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1991	1	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1993	1	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1995	1	25.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1997	1	25.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1972	2	19.1	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	Inboard seal
D-1974	NA	NA	2	Blank	NA	U	R	03/29/18	D-3	2005	55	4.1/SW	Insulated not able to monitor
D-1976	NA	NA	2	Blank	NA	U	R	03/29/18	D-3	2005	55	4.1/SW	Insulated not able to monitor
D-1978	2	19.1	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	Outboard seal
D-1980	2	19.1	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	Inboard seal
D-1982	NA	NA	2	2	0	U	R	03/29/18	D-3	2005	55	4.1/SW	Insulated not able to monitor
D-1984	NA	NA	2	Blank	NA	U	R	03/29/18	D-3	2005	55	4.1/SW	Insulated not able to monitor
D-1986	2	19.1	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	Outboard seal
D-1988	2	19.1	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-1990	3	3.6	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-1992	1	25.5	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	No Bonnet
D-1994	1	25.5	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-1996	2	50.9	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-1998	2	50.9	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2000	2	50.9	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2002	2	76.4	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2004	1	38.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2006	2	50.9	1	4	3	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2008	2	50.9	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2010	3	9.5	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2012	3	9.5	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2014	2	76.4	1	1	0	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2016	1	38.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2018	2	50.9	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2020	4	101.9	1	13	12	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2022	1	25.5	1	2	1	P	R	03/29/18	D-3	2005	55	4.1/SW	Bonnet insulated not able to monitor
D-2024	2	50.9	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2026	2	50.9	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2028	2	50.9	2	2	0	P	R	03/29/18	D-3	2005	55	4.1/SW	Bonnet insulated not able to monitor
D-2030	3	7.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2152	2	50.9	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2154	1	25.5	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2156	2	50.9	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2158	1	25.5	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2160	2	50.9	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2162	2	50.9	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2164	0.5	12.7	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2166	2	50.9	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2168	2	50.9	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2170	2	19.1	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2172	1	38.2	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2174	1	38.2	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2176	1	38.2	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2178	1	38.2	2	2	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2180	1	38.2	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	No Bonnet
D-2182	1	38.2	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2184	1	38.2	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2186	1	38.2	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2188	1	25.5	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2190	1	25.5	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2192	2	19.1	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2194	1	9.5	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2196	1	25.5	3	3	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2198	1	25.5	3	3	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2200	2	25.5	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2202	2	25.5	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2204	3	9.5	3	3	0	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2206	3	9.5	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2208	1	25.5	3	3	0	A	R	03/29/18	D-5	2037	55	4.1/SW	No Bonnet
D-2210	1	25.5	2	3	1	A	R	03/29/18	D-5	2037	55	4.1/SW	
D-2092	1	38.2	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2094	2	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2096	1	25.5	1	2	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2098	1	25.5	1	2	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2100	2	50.9	1	2	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2102	2	50.9	1	2	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2104	2	19.1	1	2	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2106	2	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2108	2	19.1	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2110	1	9.5	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-2112	2	19.1	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2114	1	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2116	1	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2118	1	19.1	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2120	2	38.2	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2122	1	38.2	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2124	1	38.2	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2126	1	38.2	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2128	1	38.2	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2130	1	38.2	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2132	2	76.4	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2134	1	38.2	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2136	1	25.5	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	No Bonnet
D-2138	1	25.5	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2140	1	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	No Bonnet
D-2142	2	38.2	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2144	1	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	No Bonnet
D-2146	1	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2148	2	38.2	2	2	0	A	R	03/29/18	D-5	2005	55	4.1/SW	No Bonnet
D-2150	1	19.1	2	3	1	A	R	03/29/18	D-5	2005	55	4.1/SW	
D-2032	3	7.2	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2034	3	76.4	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2036	2	76.4	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2038	1	38.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2040	1	38.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2042	2	50.9	1	1	0	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2044	3	7.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2046	2	19.1	1	1	0	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2048	2	19.1	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2050	3	9.5	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2052	2	19.1	1	3	2	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2054	2	19.1	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2056	1	38.2	2	2	0	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2058	1	38.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2060	1	38.2	1	2	1	A	R	03/29/18	D-3	2005	55	4.1/SW	
D-2062	1	38.2	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2064	1	76.4	1	2	1	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2066	1	38.2	1	2	1	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2068	1	38.2	1	2	1	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2070	1	38.2	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2072	1	38.2	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2074	1	76.4	1	2	1	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2076	2	19.1	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2078	2	19.1	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2080	2	50.9	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2082	1	25.5	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2084	1	38.2	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2086	1	38.2	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2088	1	38.2	2	2	0	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-2090	1	38.2	1	2	1	A	R	03/29/18	D-3 / D-5	2021	55	4.1/SW	
D-1941	1	38.2	5	5	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1943	1	38.2	5	5	0	A	R	03/29/18	D-1	2037	55	4.1/SW	
D-1945	1	2.4	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1947	1	38.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1949	2	3.8	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1951	2	3.8	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1953	1	25.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1955	1	25.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1957	1	38.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1959	1	38.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1961	1	3.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1963	1	38.2	2	2	0	P	R	03/29/18	D-1	289	55	4.1/SW	Bonnet insulated
D-1965	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-1967	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2179	1	38.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2181	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2183	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2185	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2187	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2189	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2191	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2193	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2195	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2197	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2199	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-2201	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2203	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2205	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-1999	1	6.4	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2001	1	6.4	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2003	1	38.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	Bonnet welded
D-2005	1	6.4	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2007	1	6.4	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2009	0.5	19.1	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	Welded bonnet
D-2011	1	6.4	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2013	1	3.2	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2015	1	3.2	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2017	1	4.8	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2019	1	38.2	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2021	1	4.8	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2023	1	4.8	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2025	1	38.2	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2121	1	38.2	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2123	1	38.2	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2125	1	9.5	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2127	1	9.5	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2129	0.5	9.5	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2131	0.5	4.8	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2133	1	19.1	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2135	1	19.1	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2137	0.5	9.5	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2139	0.5	9.5	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2141	1	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2143	0.5	9.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2145	0.5	12.7	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2147	0.5	12.7	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2089	2	50.9	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2091	1	9.5	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2093	2	6.4	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2095	1	2.4	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2097	2	4.8	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2099	1	38.2	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2101	1	38.2	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2103	2	6.4	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2105	1	3.2	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2107	2	6.4	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2109	1	38.2	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2111	1	2.4	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2113	2	4.8	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2117	2	4.8	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2119	1	6.4	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2149	1	38.2	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2151	2	76.4	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2153	1	12.7	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2155	2	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2157	0.5	12.7	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2159	0.5	12.7	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2161	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2163	1	25.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2165	2	4.8	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2167	1	25.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2169	1	25.5	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2171	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2173	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2175	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2177	0.5	19.1	2	2	0	A	R	03/29/18	D-1	289	55	4.1/SW	
D-2027	1	4.8	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2029	2	9.5	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2031	1	4.8	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2033	0.5	2.4	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2035	0.5	19.1	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2037	1	4.8	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2039	2	9.5	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2041	1	6.4	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2043	1	6.4	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2045	1	38.2	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2047	2	12.7	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2049	1	6.4	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2051	1	38.2	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2053	1	19.1	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	Welded bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-2055	1	6.4	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2057	1	6.4	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	Welded bonnet
D-2059	1	6.4	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2061	1	19.1	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2063	0.5	9.5	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2065	1	6.4	1	1	0	P	R	03/29/18	D-1	553	55	4.1/SW	Insulated bonnet
D-2067	0.5	19.1	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2069	0.5	19.1	1	1	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2071	1	19.1	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2073	1	9.5	2	2	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2075	6	19.1	2	62	60	P	R	03/29/18	D-1	553	55	4.1/SW	Insulated bonnet Not Pipe Support D-4
D-2079	2	6.4	3	4	1	P	R	03/29/18	D-1	553	55	4.1/SW	Insulated bonnet
D-2081	1	9.5	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2083	2	19.1	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2085	2	9.5	3	3	0	P	R	03/29/18	D-1	553	55	4.1/SW	Insulated bonnet
D-2087	1	25.5	3	3	0	A	R	03/29/18	D-1	553	55	4.1/SW	
D-2207	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2209	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2211	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2213	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2215	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2217	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2219	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2221	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2223	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2225	1	38.2	2	2	0	A	R	03/29/18	D-1	2021	55	4.1/SW	
D-2212	3	19.1	1	2	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2214	2	12.7	1	2	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2216	3	19.1	1	2	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2218	2	12.7	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2220	2	19.1	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	No bonnet
D-2222	1	38.2	1	2	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2224	2	19.1	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	no bonnet
D-2226	4	3.8	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2228	3	5.7	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2230	4	12.7	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2232	1	19.1	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2234	1	19.1	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2236	2	19.1	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2238	2	19.1	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2240	1	38.2	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2242	1	38.2	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2244	1	38.2	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2246	1	38.2	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2248	1	25.5	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2250	1	19.1	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2252	1	25.5	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2254	1	25.5	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2256	1	25.5	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2258	1	25.5	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2260	1	19.1	2	4	2	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2262	1	25.5	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2264	1	25.5	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2266	1	25.5	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2268	1	25.5	2	3	1	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2270	1	19.1	2	2	0	A	R	03/30/18	D-4	2021	66	3.9/NE	
D-2272	1	25.5	2	2	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2274	1	25.5	2	3	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2276	1	25.5	2	2	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2278	8	3.1	1	4	3	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2280	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2282	1	19.1	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2284	1	25.5	2	2	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2286	1	25.5	2	2	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2288	1	25.5	2	3	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2290	1	25.5	2	2	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2292	1	19.1	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2294	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2296	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2298	1	25.5	1	3	2	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2300	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2302	1	19.1	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2304	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2306	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2308	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-2310	8	3.1	1	3	2	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2312	2	19.1	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2314	2	9.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2316	3	9.5	1	1	0	P	R	03/30/18	D-4	2005	66	3.9/NE	Bonnet Insulated
D-2318	2	6.4	1	2	1	P	R	03/30/18	D-4	2005	66	3.9/NE	Bonnet Insulated
D-2320	1	25.5	1	1	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2322	1	25.5	1	1	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2324	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2336-1	1	25.5	1	2	1	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2328	1	25.5	2	2	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2330	1	25.5	2	2	0	A	R	03/30/18	D-4	2005	66	3.9/NE	
D-2332	1	38.2	1	2	0.7	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2334	0.5	19.1	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2336-2	2	9.5	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2338	3	14.3	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2340	1	25.5	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2342	3	14.3	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2344	2	9.5	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2346	1	25.5	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2348	1	25.5	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2350	1	25.5	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2352	1	25.5	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2354	3	14.3	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2356	3	14.3	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2358	1	25.5	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2360	1	25.5	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2362	3	14.3	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2364	3	14.3	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2366	2	12.7	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2368	2	12.7	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2370	3	14.3	2	3	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2372	3	14.3	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2374	1	25.5	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2376	1	25.5	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2378	2	38.2	1	8	7	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2380	1	19.1	1	4	3	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2382	2	38.2	1	9	8	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2384	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2386	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2388	1	19.1	1	4	3	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2390	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2392	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2394	1	19.1	1	4	3	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2396	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2398	1	19.1	1	5	4	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2400	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2402	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2404	1	19.1	1	2	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2406	3	14.3	2	2	0	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2408	3	14.3	2	3	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2410	3	14.3	2	3	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2412	3	76.4	2	8	6	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2414	3	14.3	2	3	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2416	2	9.5	2	3	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2418	3	14.3	2	5	3	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2420	1	25.5	2	3	1	A	R	03/30/18	D-4	33	66	3.9/NE	
D-2257	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2259	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	Open end
D-2261	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2263	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2265	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2267	2	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2269	6	28.6	2	418	416	A	R	03/30/18	D-2	553	66	3.9/NE	4th platform from to HLS tag#2786
D-2271	1	9.5	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2273	1	38.2	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2275	1	38.2	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2277	0.5	19.1	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2279	1	38.2	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2281	1	38.2	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2283	0.5	19.1	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2285	0.5	19.1	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2317	3	19.1	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2319	2	12.7	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2321	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2323	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-2325	3	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2327	2	19.1	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2329	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2331	4	12.7	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2333	2	6.4	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2335	3	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2337	0.5	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	Welded bonnet
D-2339	1	38.2	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2341	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	Welded bonnet
D-2343	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2287	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2289	2	19.1	2	5	3	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2291	1	9.5	2	3	1	A	R	03/30/18	D-2	553	66	3.9/NE	Welded bonnet flange
D-2293	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2295	0.5	19.1	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2297	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2299	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2301	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2303	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2305	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2307	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2309	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2311	2	6.4	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2313	4	12.7	2	13	11	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2315	3	19.1	3	3	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2345	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2347	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2349	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2351	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2353	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2355	1	9.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2357	1	25.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2359	1	25.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2361	1	25.5	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2363	0.5	19.1	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2365	0.5	19.1	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2367	1	38.2	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2369	1	38.2	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2371	1	38.2	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2373	1	38.2	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2375	1	38.2	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2377	1	38.2	2	2	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2379	1	25.5	1	1	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2381	3	9.5	1	1	0	A	R	03/30/18	D-2	237	66	3.9/NE	Bonnet welded
D-2383	1	38.2	1	1	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2385	1	9.5	1	1	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2387	1	25.5	1	1	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2389	1	25.5	1	1	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2391	2	50.9	1	1	0	A	R	03/30/18	D-2	237	66	3.9/NE	
D-2393	1	38.2	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2395	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2397	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2399	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2401	1	38.2	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2403	1	19.1	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2405	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2407	2	19.1	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2409	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2411	2	12.7	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2413	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2415	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2417	3	14.3	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2419	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2421	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2423	1	25.5	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2425	1	38.2	2	2	0	A	R	03/30/18	D-2	2005	66	3.9/NE	
D-2227	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2229	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2231	0.5	19.1	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2233	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2235	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2237	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2239	2	19.1	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2241	4	7.6	2	4	2	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2243	3	5.7	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
D-2245	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2247	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2249	0.5	19.1	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2251	1	9.5	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2253	0.5	19.1	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
D-2255	1	38.2	2	2	0	A	R	03/30/18	D-2	553	66	3.9/NE	
E-1	1	25	1.1	1.1	0	A	R	04/04/18	E-1	636	68.6	3.8/E	No Bonnet
E-3	3	76	1.2	42.1	40.9	A	R	04/04/18	E-1	636	68.6	3.8/E	Packing east on pump
E-5	2	51	1.2	457	455.8	A	R	04/04/18	E-1	636	68.6	3.8/E	TC east of pump
E-7	7	13	4	3.2	0	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-9	5	10	3.1	1.6	0	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-11	7	33	2.1	78.6	76.5	A	R	04/04/18	E-1	636	68.6	3.8/E	Packing east on pump
E-13	2	51	4.6	4.3	0	A	R	04/04/18	E-1	636	68.6	3.8/E	No Bonnet
E-15	1	25	3.7	3.6	0	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-17	2	10	3.4	3.1	0	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-19	4	19	3.3	2.4	0	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-21	3	10	3	3.1	0.1	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-23	4	13	3.2	1.9	0	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-25	3	57	1.8	1.6	0	A	R	04/04/18	E-1	636	68.6	3.8/E	
E-27	2	38	2.4	2.4	0	A	R	04/04/18	E-1	636	68.6	3.8/E	TC = threaded connector
E-29	2	51	2.6	3.3	0.7	A	R	04/04/18	E-1	636	68.6	3.8/E	No Bonnet
E-31	1	25	2.6	2.3	0	A	R	04/04/18	E-1	636	74	14/E	
E-33	2	51	3.4	1338	1334.6	A	R	04/04/18	E-1	636	74	14/E	SSD OF P-504
E-35	1	25	1.5	1.1	0	A	R	04/04/18	E-1	638	74	14/E	
E-37	3	Unable to Compute	1.1	261	259.9	A	R	04/04/18	E-1	638	74	14/E	SEAL
E-39	4	Unable to Compute	2.4	5.5	3.1	A	R	04/04/18	E-1	638	74	14/E	
E-41	1	25	2.1	1.9	0	A	R	04/04/18	E-1	638	74	14/E	
E-43	1	25	2	1.6	0	A	R	04/04/18	E-1	638	74	14/E	
E-45	1	25	1.8	7.2	5.4	A	R	04/04/18	E-1	638	74	14/E	
E-47	3	76	2.5	35.1	32.6	A	R	04/04/18	E-1	638	74	14/E	North side of pump/ No bonnet
E-49	4	102	2.4	85.2	82.8	A	R	04/04/18	E-1	638	74	14/E	North side of pump/ No bonnet
E-51	3	76	2.7	57.6	54.9	A	R	04/04/18	E-1	638	74	14/E	North side of pump/ No bonnet
E-53	2	51	3	2.3	0	A	R	04/04/18	E-1	638	74	14/E	No Bonnet
E-55	2	51	2.8	112	109.2	A	R	04/04/18	E-1	638	74	14/E	north side of pump
E-57	4	102	3	101	98	A	R	04/04/18	E-1	638	74	14/E	North side of pump/ No bonnet
E-59	3	76	1.1	108	106.9	A	R	04/04/18	E-1	638	77	2.1/E	North side of pump/ No bonnet
E-61	5	12	3.2	59.1	55.9	A	R	04/04/18	E-1	638	77	2.1/E	north side of pump
E-63	4	10	2.9	359	33	A	R	04/04/18	E-1	638	77	2.1/E	North side of pump/ No bonnet
E-65	3	7	3	6.4	3.4	A	R	04/04/18	E-1	638	77	2.1/E	
E-67	5	12	3.2	29.5	26.3	A	R	04/04/18	E-1	638	77	2.1/E	north side of pump
E-69	2	51	3.5	472	468.5	A	R	04/04/18	E-1	638	77	2.1/E	North side of pump/ No bonnet
E-71	2	51	3.4	11.7	8.3	A	R	04/04/18	E-1	638	77	2.1/E	
E-73	2	38	3.3	68.9	65.6	A	R	04/04/18	E-1	638	77	2.1/E	North side of pump/ No bonnet
E-2	2	19	0.5	0.5	0	A	R	04/04/18	E-1	1881	61.4	10.2/E	
E-4	2	38	0.5	1.4	0.9	A	R	04/04/18	E-1	1881	61.4	10.2/E	No Bonnet
E-6	1	19	0.7	1.1	0.4	A	R	04/04/18	E-1	1881	61.4	10.2/E	
E-8	6	38	0.7	76	75.3	A	R	04/04/18	E-1	1881	61.4	10.2/E	Valve north of R-402A
E-10	1	25	2.7	2.1	0	A	R	04/04/18	E-1	1881	61.4	10.2/E	No Bonnet
E-12	2	13	2.1	178	175.9	A	R	04/04/18	E-1	1881	61.4	10.2/E	Valve north of R-402A/ No Bonnet
E-14	1	25	2.8	3.3	0.5	A	R	04/04/18	E-1	1881	61.4	10.2/E	
E-16	2	19	3.2	236	232.8	A	R	04/04/18	E-1	1881	61.4	10.2/E	Valve north of R-402A/ No Bonnet
E-18	1	19	3.2	3.3	0.1	A	R	04/04/18	E-1	1881	61.4	10.2/E	
E-20	1	19	3.2	3.3	0.1	A	R	04/04/18	E-1	1881	61.4	10.2/E	
E-22	2	38	3	201	198	A	R	04/04/18	E-1	1881	61.4	10.2/E	Bull Plug on Globe Valve North of R-402A
E-24	6	38	2.7	164	161.3	A	R	04/04/18	E-1	1881	61.4	10.2/E	Globe on Globe Valve North of R-402A
E-26	4	25	2.1	92	89.9	A	R	04/04/18	E-1	1881	61.4	10.2/E	Globe on Globe Valve North of R-402A
E-28	0.5	38	2.2	2.1	0	A	R	04/04/18	E-1	1881	61.4	10.2/E	No Bonnet
E-30	1	76	2.2	1.5	0	A	R	04/04/18	E-1	1881	61.4	10.2/E	No Bonnet
E-32	0.5	38	2.4	2.4	0	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-34	0.5	38	2.1	2	0	A	R	04/04/18	E-1	1881	71.1	5.0/E	
E-36	0.5	38	2.1	2.1	0	A	R	04/04/18	E-1	1881	71.1	5.0/E	
E-38	1	6	1.8	2.1	0.3	A	R	04/04/18	E-1	1881	71.1	5.0/E	
E-40	1	19	2.1	2.6	0.5	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-42	1	19	2.1	2.4	0.3	A	R	04/04/18	E-1	1881	71.1	5.0/E	
E-44	3	57	2.3	18	15.7	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-46	3	19	3.2	14	10.8	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-48	3	19	2.9	134	131.1	A	R	04/04/18	E-1	1881	71.1	5.0/E	Globe valve south of R402B/ No Bonnet
E-50	1	19	2.7	6.6	3.9	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-52	4	38	2.9	115	112.1	A	R	04/04/18	E-1	1881	71.1	5.0/E	Globe valve south of R402B/ No Bonnet
E-54	2	38	2.6	7.4	4.8	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-56	1	19	1.9	3.2	1.3	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-58	0.5	38	2.7	2.7	0	A	R	04/04/18	E-1	1881	71.1	5.0/E	
E-60	0.5	10	2.4	2.4	0	A	R	04/04/18	E-1	1881	71.1	5.0/E	No Bonnet
E-62	2	13	2.1	93	90.9	A	R	04/04/18	E-1	1881	68.2	5.2/E	Gate south of R-402B/ No Bonnet
E-64	2	13	1.8	2.2	0.4	A	R	04/04/18	E-1	1881	68.2	5.2/E	No Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-66	1	19	2.2	2.7	0.5	A	R	04/04/18	E-1	1881	68.2	5.2/E	No Bonnet
E-68	2	38	1.9	206	204.1	A	R	04/04/18	E-1	1881	68.2	5.2/E	Plug south on Gate south of R-402B
E-70	1	19	1.8	2.8	1	A	R	04/04/18	E-1	1881	68.2	5.2/E	No Bonnet
E-72	2	38	2.4	20	17.6	A	R	04/04/18	E-1	1881	68.2	5.2/E	No Bonnet
E-74	1	19	2.9	2.5	0	A	R	04/04/18	E-1	1881	68.2	5.2/E	
E-76	0.5	10	2.3	2.5	0.2	A	R	04/04/18	E-1	1881	68.2	5.2/E	
E-78	1	19	2.3	5.6	3.3	A	R	04/04/18	E-1	1881	68.2	5.2/E	No Bonnet
E-80	1	6	2.6	2.9	0.3	A	R	04/04/18	E-1	1881	68.2	5.2/E	
E-82	1	6	2.6	3.0	27.4	A	R	04/04/18	E-1	1881	68.2	5.2/E	
E-84	1	25	2.5	2.4	0	A	R	04/04/18	E-1	1881	68.2	5.2/E	
E-86	0.5	13	2.5	2.2	0	A	R	04/04/18	E-1	1881	68.2	5.2/E	No Bonnet
E-88	0.5	13	2.1	2.1	0	A	R	04/04/18	E-1	1881	68.2	5.2/E	No Bonnet
E-90	3	10	2	40	38	A	R	04/04/18	E-1	1881	68.2	5.2/E	Plug on Valve west of E-401
E-92	2	38	2.5	113	110.5	A	R	04/04/18	E-1	1881	79.8	5.0/E	Globe west of E401/ No Bonnet
E-94	1	19	2.2	2.2	0	A	R	04/04/18	E-1	1881	79.8	5.0/E	
E-96	3	10	2.1	71.5	69.4	A	R	04/04/18	E-1	1881	79.8	5.0/E	Control 4T07CXX-B west of E-401
E-98	0.5	38	2.4	2.8	0.4	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-100	0.5	38	2.9	3.2	0.3	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-102	1	76	2.7	2.6	0	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-104	1	76	2.8	2.9	0.1	A	R	04/04/18	E-1	1881	79.8	5.0/E	
E-106	1	76	2.8	2.8	0	A	R	04/04/18	E-1	1881	79.8	5.0/E	
E-108	0.5	38	2.4	2.3	0	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-110	0.5	38	2.4	2.5	0.1	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-112	0.5	38	2	2.3	0.3	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-114	2	153	2.1	7	4.9	A	R	04/04/18	E-1	1881	79.8	5.0/E	
E-116	0.5	38	2.3	2.2	0	A	R	04/04/18	E-1	1881	79.8	5.0/E	
E-118	0.5	38	2.2	2.6	0.4	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-120	0.5	38	2.3	2.6	0.3	A	R	04/04/18	E-1	1881	79.8	5.0/E	No Bonnet
E-122	1	76	2.1	2.5	0.4	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-124	1	76	2.1	2	0	A	R	04/04/18	E-1	1881	86	4.5/E	
E-126	1	76	2.1	2.3	0.2	A	R	04/04/18	E-1	1881	86	4.5/E	
E-128	1	19	2.1	3.4	1.3	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-130	1	19	2.4	11	8.6	A	R	04/04/18	E-1	1881	86	4.5/E	
E-132	3	10	1.8	2.4	0.6	A	R	04/04/18	E-1	1881	86	4.5/E	
E-134	4	13	2	8.9	6.9	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-136	1	3	2.2	2.7	0.5	A	R	04/04/18	E-1	1881	86	4.5/E	
E-138	2	6	2.5	2.7	0.2	A	R	04/04/18	E-1	1881	86	4.5/E	
E-140	1	19	2.3	2.7	0.4	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-142	1	19	2.6	2.8	0.2	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-144	2	6	2.4	2.5	0.1	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-146	1	19	2.2	2.2	0	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-148	2	38	2	6.5	4.5	A	R	04/04/18	E-1	1881	86	4.5/E	No Bonnet
E-150	2	6	2.5	3	0.5	A	R	04/04/18	E-1	1881	86	4.5/E	
E-152	0.5	38	2.1	2.8	0.7	A	R	04/04/18	E-1	1881	77	2.1/E	No Bonnet
E-154	0.5	38	2.3	2.5	0.2	A	R	04/04/18	E-1	1881	77	2.1/E	No Bonnet
E-156	0.5	38	2.3	2.3	0	A	R	04/04/18	E-1	1881	77	2.1/E	
E-158	1	13	1.8	2	0.2	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-160	1	13	1.7	1.7	0	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-162	1	13	1.5	1.6	0.1	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-164	1	76	1.5	5.1	3.6	A	R	04/04/18	E-1	640	77	2.1/E	
E-166	1	19	2.8	2.2	0	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-168	1	19	2.1	2.6	0.5	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-170	1	19	2.1	2.4	0.3	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-172	1	3	1.9	2	0.1	A	R	04/04/18	E-1	640	77	2.1/E	
E-174	1	19	1.9	1.8	0	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-176	1	19	1.4	1.4	0	A	R	04/04/18	E-1	640	77	2.1/E	No Bonnet
E-178	1	19	1.4	1.6	0.2	A	R	04/04/18	E-1	640	77	2.1/E	
E-180	1	19	1.1	3	1.9	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-182	1	19	1.7	2	0.3	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-184	1	19	1.7	1.8	0.1	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-186	1	76	1.7	1.9	0.2	A	R	04/04/18	E-1	640	78	3.5/E	
E-188	1	19	1.5	1.5	0	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-190	0.5	10	1.6	1.4	0	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-192	0.5	10	1.3	1.5	0.2	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-194	0.5	10	1.4	1.5	0.1	A	R	04/04/18	E-1	640	78	3.5/E	
E-196	2	6	1.4	1.5	0.1	A	R	04/04/18	E-1	640	78	3.5/E	
E-198	0.5	38	1	1.4	0.4	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-200	0.5	38	1.3	1.3	0	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-202	1	76	1.3	1.3	0	A	R	04/04/18	E-1	640	78	3.5/E	
E-204	0.5	10	1	1.3	0.3	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-206	1	19	0.9	1	0.1	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-208	1	3	0.9	1.1	0.2	A	R	04/04/18	E-1	640	78	3.5/E	No Bonnet
E-210	2	38	1	1.5	0.5	A	R	04/04/18	E-1	640	88	3.4/E	No Bonnet
E-212	0.5	10	1.2	1.3	0.1	A	R	04/04/18	E-1	640	88	3.4/E	No Bonnet
E-214	0.5	10	1	1.1	0.1	A	R	04/04/18	E-1	640	88	3.4/E	No Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-75	2	51	1.8	7.5	5.7	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-77	7	178	1.9	459	457.1	A	R	04/05/18	E-1	636	69	2.2/E	NWSD OF PUMP, No Bonnet
E-79	2	51	2.8	2.9	0.1	A	R	04/05/18	E-1	636	69	2.2/E	
E-81	7	13	2.6	134	131.4	A	R	04/05/18	E-1	636	69	2.2/E	
E-83	4	Unable to Compute	3.2	58.1	54.9	P	R	04/05/18	E-1	636	69	2.2/E	Casing in insulated
E-85	1	25	2.6	3	0.4	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-87	3	76	2.6	2.2	0	A	R	04/05/18	E-1	636	69	2.2/E	
E-89	1	25	2.5	3.1	0.6	A	R	04/05/18	E-1	636	69	2.2/E	
E-91	1	25	2.5	7.4	4.9	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-93	2	51	2.8	3.2	0.4	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-95	1	25	2.4	2.3	0	A	R	04/05/18	E-1	636	69	2.2/E	
E-97	1	25	2.7	2.6	0	A	R	04/05/18	E-1	636	69	2.2/E	
E-99	1	25	2.4	2.3	0	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-101	2	51	2.5	2.6	0.1	A	R	04/05/18	E-1	636	69	2.2/E	
E-103	1	25	1.9	1.5	0	A	R	04/05/18	E-1	636	69	2.2/E	
E-105	2	51	1.4	1.9	0.5	A	R	04/05/18	E-1	636	69	2.2/E	
E-107	1	25	1.2	2	0.8	A	R	04/05/18	E-1	636	69	2.2/E	
E-109	4	Unable to Compute	1.9	54.3	52.4	P	R	04/05/18	E-1	636	69	2.2/E	Housing is insulated
E-111	1	25	2.8	6.9	4.1	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-113	1	25	2.4	2.6	0.2	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-115	1	25	2.1	1.8	0	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-117	1	25	1.5	1.2	0	A	R	04/05/18	E-1	636	69	2.2/E	
E-119	2	51	1.4	1.8	0.4	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-121	2	51	1.5	2.6	1.1	A	R	04/05/18	E-1	636	69	2.2/E	No Bonnet
E-123	4	13	1.6	2	0.4	A	R	04/05/18	E-1	636	69	2.2/E	
E-125	6	19	2.1	58.7	56.6	A	R	04/05/18	E-1	636	69	2.2/E	southside of pump
E-127	4	13	2.1	70.4	68.3	A	R	04/05/18	E-1	636	69	2.2/E	No bonnet, southside of pump
E-129	2	51	2.5	72.1	69.6	A	R	04/05/18	E-1	636	69	2.2/E	No bonnet, southside of pump
E-131	1	25	3.2	6.4	3.2	A	R	04/05/18	E-1	636	69	2.2/E	
E-133	3	5	3.8	17.1	13.3	A	R	04/05/18	E-1	636	69	2.2/E	No bonnet
E-135	1	25	3.1	6.9	3.8	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-137	3	6	3.4	54.4	51	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-139	3	6	2.9	4.8	1.9	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-141	1	25	4.2	19.1	14.9	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-143	1	25	3.1	6	2.9	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-145	3	10	2.4	10.7	8.3	A	R	04/05/18	E-1	636	66	4.7/E	
E-147	2	51	3.4	9.1	5.7	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-149	1	25	3.2	7.7	4.5	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-151	1	25	3.1	7.9	4.8	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-153	1	25	3	3.7	0.7	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-155	2	51	3.2	5.4	2.2	A	R	04/05/18	E-1	636	66	4.7/E	
E-157	3	76	3.5	14	10.5	A	R	04/05/18	E-1	636	66	4.7/E	No bonnet
E-159	1	25	3.2	6.8	3.6	A	R	04/05/18	E-1	636	66	4.7/E	
E-161	1	76	2.9	5	2.1	A	R	04/05/18	E-1	636	66	4.7/E	
E-163	1	76	3.5	4.9	1.4	A	R	04/05/18	E-1	636	66	4.7/E	
E-165	1	38	2.9	3	0.1	A	R	04/05/18	E-1	636	70	5.7/E	
E-167	1	38	2.8	2.8	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-169	1	38	2.7	3	0.3	A	R	04/05/18	E-1	636	70	5.7/E	
E-171	1	25	2.8	10.8	8	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-173	2	38	2.2	10.9	8.7	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-175	2	19	2	2.4	0.4	A	R	04/05/18	E-1	636	70	5.7/E	
E-177	1	25	2.9	3.9	1	A	R	04/05/18	E-1	636	70	5.7/E	
E-179	4	Unable to Compute	2.9	4.4	1.5	P	R	04/05/18	E-1	636	70	5.7/E	Housing is insulated
E-181	2	51	2.6	2.6	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-183	2	51	2.7	2.7	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-185	2	51	2.7	2.7	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-187	1	25	2.8	2.8	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-189	2	51	2.8	2.8	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-191	2	51	2.9	2.9	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-193	2	51	2.8	2.8	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-195	1	25	3	2.9	0	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-197	6	29	2.1	84	81.9	A	R	04/05/18	E-1	636	70	5.7/E	East side of exchanger
E-199	5	24	2.6	2	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-201	1	25	3	5	2	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-203	1	25	3.1	3.1	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-205	3	14	3.1	4.2	1.1	A	R	04/05/18	E-1	636	70	5.7/E	
E-207	3	14	3.2	2.9	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-209	2	51	2.5	2.2	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-211	4	13	1.8	4.9	3.1	A	R	04/05/18	E-1	636	70	5.7/E	
E-213	1	19	2.3	7.1	4.8	A	R	04/05/18	E-1	636	70	5.7/E	
E-215	4	13	2	1.9	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-217	3	10	1.9	2.2	0.3	A	R	04/05/18	E-1	636	70	5.7/E	
E-219	1	25	2.2	1.9	0	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-221	3	76	2.2	51.6	49.4	A	R	04/05/18	E-1	636	70	5.7/E	Southeast of E-507
E-223	3	14	3	3.2	28.2	A	R	04/05/18	E-1	636	70	5.7/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-225	3	19	1.9	64.3	62.4	A	R	04/05/18	E-1	636	70	5.7/E	Westside of pump
E-227	2	51	3.2	4.4	1.2	A	R	04/05/18	E-1	636	70	5.7/E	
E-229	2	51	3.1	3.4	0.3	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-231	4	25	2.2	63.5	61.3	A	R	04/05/18	E-1	636	70	5.7/E	Westside of pump
E-233	2	153	2.8	2.5	0	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-235	1	76	2.4	2.2	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-237	1	76	2.2	2.1	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-239	1	76	1.9	1.8	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-241	1	38	1.8	1.8	0	A	R	04/05/18	E-1	636	70	5.7/E	
E-243	2	76	1.8	1.7	0	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-245	1	38	1.6	3.3	1.7	A	R	04/05/18	E-1	636	70	5.7/E	
E-247	2	76	2.4	2.1	0	A	R	04/05/18	E-1	636	70	5.7/E	No Bonnet
E-249	2	76	1.7	17	15.3	A	R	04/05/18	E-1	636	70	5.7/E	
E-251	3	29	1.8	6.2	4.4	A	R	04/05/18	E-1	636	70	5.7/E	
E-253	2	13	2.6	4.3	1.7	A	R	04/05/18	E-1	636	70	5.7/E	
E-216	2	6	1.1	1.3	0.2	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-218	6	19	1.2	25	23.8	A	R	04/05/18	E-1	1881	69	2.2/E	
E-220	1	3	3.1	3.2	0.1	A	R	04/05/18	E-1	1881	69	2.2/E	
E-222	1	3	3.1	3.2	0.1	A	R	04/05/18	E-1	1881	69	2.2/E	
E-224	2	38	2.7	2.5	0	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-226	7	535	2.5	20	17.5	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-228	1	76	3.1	3.1	0	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-230	1	76	3	3	0	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-232	1	76	2.7	2.7	0	A	R	04/05/18	E-1	1881	69	2.2/E	
E-234	1	76	2.7	2.6	0	A	R	04/05/18	E-1	1881	69	2.2/E	
E-236	1	76	2.4	2.3	0	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-238	1	76	2.3	2.4	0.1	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-240	1	76	2.3	2.7	0.4	A	R	04/05/18	E-1	1881	69	2.2/E	No Bonnet
E-242	1	76	2.3	2.5	0.2	A	R	04/05/18	E-1	1881	69	2.2/E	
E-244	0.5	38	2.3	2.3	0	A	R	04/05/18	E-1	1881	69	2.2/E	
E-246	1	25	2.8	2.5	0	A	R	04/05/18	E-1	1881	74	2.6/E	No Bonnet
E-248	1	25	1.7	1.7	0	A	R	04/05/18	E-1	1881	74	2.6/E	
E-250	1	25	2.8	2	0	A	R	04/05/18	E-1	1881	74	2.6/E	
E-252	1	25	1.6	2.2	0.6	A	R	04/05/18	E-1	1881	74	2.6/E	
E-254	1	25	1.7	1.8	0.1	A	R	04/05/18	E-1	1881	74	2.6/E	
E-256	1	10	1.5	1.7	0.2	A	R	04/05/18	E-1	1881	74	2.6/E	
E-258	2	13	1.4	2	0.6	A	R	04/05/18	E-1	1881	74	2.6/E	
E-260	1	6	1.5	1.8	0.3	A	R	04/05/18	E-1	1881	74	2.6/E	
E-262	1	10	2.2	1.7	0	A	R	04/05/18	E-1	1881	74	2.6/E	
E-264	1	10	1.7	1.7	0	A	R	04/05/18	E-1	1881	74	2.6/E	
E-266	1	10	1.3	1.5	0.2	A	R	04/05/18	E-1	1881	74	2.6/E	
E-268	1	10	1.3	1.7	0.4	A	R	04/05/18	E-1	1881	74	2.6/E	
E-270	1	25	1.3	1.3	0	A	R	04/05/18	E-1	1881	74	2.6/E	
E-272	1	25	1.3	1.5	0.2	A	R	04/05/18	E-1	1881	74	2.6/E	
E-274	1	13	1.7	1.2	0	A	R	04/05/18	E-1	1881	74	2.6/E	
E-276	1	10	1.1	1	0	A	R	04/05/18	E-1	638	70	1.4/E	
E-278	1	25	0.7	0.9	0.2	A	R	04/05/18	E-1	638	70	1.4/E	No Bonnet
E-280	1	25	0.7	1.1	0.4	A	R	04/05/18	E-1	638	70	1.4/E	
E-282	0.5	13	1.3	1.1	0	A	R	04/05/18	E-1	638	70	1.4/E	No Bonnet
E-284	0.5	13	0.8	1.7	0.9	A	R	04/05/18	E-1	638	70	1.4/E	
E-286	0.5	13	1.6	0.8	0	A	R	04/05/18	E-1	638	70	1.4/E	
E-288	0.5	13	0.7	0.9	0.2	A	R	04/05/18	E-1	638	70	1.4/E	
E-290	1	25	0.7	2.2	1.5	A	R	04/05/18	E-1	638	70	1.4/E	
E-292	1	25	0.7	0.6	0	A	R	04/05/18	E-1	638	70	1.4/E	
E-294	1	25	0.7	0.6	0	A	R	04/05/18	E-1	638	70	1.4/E	
E-296	1	13	0.5	0.6	0.1	A	R	04/05/18	E-1	638	70	1.4/E	
E-298	1	25	0.7	0.6	0	A	R	04/05/18	E-1	638	70	1.4/E	No Bonnet
E-300	0.5	13	0.6	0.6	0	A	R	04/05/18	E-1	638	70	1.4/E	
E-302	1	13	0.6	1.6	1	A	R	04/05/18	E-1	638	70	1.4/E	
E-304	2	13	0.8	1.3	0.5	A	R	04/05/18	E-1	638	70	1.4/E	
E-306	0.5	6	0.8	0.8	0	A	R	04/05/18	E-1	638	77	1.1/E	
E-308	0.5	6	0.7	2.9	2.2	A	R	04/05/18	E-1	638	77	1.1/E	
E-310	1	13	0.8	0.5	0	A	R	04/05/18	E-1	638	77	1.1/E	
E-312	1	25	0.5	0.9	0.4	A	R	04/05/18	E-1	638	77	1.1/E	No Bonnet
E-314	1	25	0.6	0.7	0.1	A	R	04/05/18	E-1	638	77	1.1/E	
E-316	6	19	1	5	4	A	R	04/05/18	E-1	638	77	1.1/E	
E-318	1	13	1.7	1.8	0.1	A	R	04/05/18	E-1	638	77	1.1/E	
E-320	1	13	1	1.7	0.7	A	R	04/05/18	E-1	638	77	1.1/E	
E-322	1	19	1.6	1.9	0.3	A	R	04/05/18	E-1	638	77	1.1/E	No Bonnet
E-324	4	13	0.7	1.5	0.8	A	R	04/05/18	E-1	638	77	1.1/E	
E-326	1	25	0.6	1.6	1	A	R	04/05/18	E-1	638	77	1.1/E	
E-328	1	25	0.6	0.9	0.3	A	R	04/05/18	E-1	638	77	1.1/E	
E-330	3	19	0.5	0.8	0.3	A	R	04/05/18	E-1	638	77	1.1/E	
E-332	1	25	0.4	0.4	0	A	R	04/05/18	E-1	638	77	1.1/E	No Bonnet
E-334	1	25	0.2	1.2	1	A	R	04/05/18	E-1	638	77	1.1/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-336	4	19	0.2	2.9	2.7	A	R	04/05/18	E-1	640	68	4.7/E	
E-338	2	19	0.1	7	6.9	A	R	04/05/18	E-1	640	68	4.7/E	
E-340	4	38	0	5.5	5.5	A	R	04/05/18	E-1	640	68	4.7/E	Pump seal P-505A
E-342	4	13	0	2.5	2.5	A	R	04/05/18	E-1	640	68	4.7/E	PUMP HOUSING P-505A
E-344	1	25	0	1.1	1.1	A	R	04/05/18	E-1	640	68	4.7/E	
E-346	1	25	0.8	0.7	0	A	R	04/05/18	E-1	640	68	4.7/E	
E-348	1	25	0	0.6	0.6	A	R	04/05/18	E-1	640	68	4.7/E	
E-350	0.5	13	0.5	1.5	1	A	R	04/05/18	E-1	640	68	4.7/E	
E-352	5	24	0	6	6	A	R	04/05/18	E-1	640	68	4.7/E	
E-354	2	10	0.6	3	2.4	A	R	04/05/18	E-1	640	68	4.7/E	
E-356	0.5	13	1	1.7	0.7	A	R	04/05/18	E-1	640	68	4.7/E	No Bonnet
E-358	1	25	0.8	2.1	1.3	A	R	04/05/18	E-1	640	68	4.7/E	
E-360	1	25	1.3	1.7	0.4	A	R	04/05/18	E-1	640	68	4.7/E	
E-362	1	25	0.8	3.7	2.9	A	R	04/05/18	E-1	640	68	4.7/E	
E-364	1	25	0.7	2	1.3	A	R	04/05/18	E-1	640	68	4.7/E	No bonnet
E-366	1	25	2.2	2.2	0	A	R	04/05/18	E-1	1881	70	5.7/E	
E-368	1	25	2.1	5.2	3.1	A	R	04/05/18	E-1	1881	70	5.7/E	
E-370	1	25	2.7	3.3	0.6	A	R	04/05/18	E-1	1881	70	5.7/E	
E-372	1	25	2.1	3.2	1.1	A	R	04/05/18	E-1	1881	70	5.7/E	
E-374	1	19	2.2	2.7	0.5	A	R	04/05/18	E-1	1881	70	5.7/E	
E-376	2	19	2.9	4.4	1.5	A	R	04/05/18	E-1	1881	70	5.7/E	Pump seal P-505B
E-378	2	6	2.4	4	1.6	A	R	04/05/18	E-1	1881	70	5.7/E	Pump housing P-505B
E-380	1	25	2.5	2.9	0.4	A	R	04/05/18	E-1	1881	70	5.7/E	No Bonnet
E-382	3	76	3.1	472	471.9	A	R	04/05/18	E-1	1881	70	5.7/E	Elbow on gate valve on P-505B
E-384	4	19	3.5	4.4	0.9	A	R	04/05/18	E-1	1881	70	5.7/E	
E-386	1	10	3.6	5.5	1.9	A	R	04/05/18	E-1	1881	70	5.7/E	
E-388	1	19	3.6	3.9	0.3	A	R	04/05/18	E-1	1881	70	5.7/E	
E-390	1	19	3.4	3.9	0.5	A	R	04/05/18	E-1	1881	70	5.7/E	
E-392	1	25	3.9	3.1	0	A	R	04/05/18	E-1	1881	70	5.7/E	No Bonnet
E-394	2	51	3	3.3	0.3	A	R	04/05/18	E-1	1881	70	5.7/E	
E-396	1	25	3.3	2.8	0	A	R	04/05/18	E-1	1881	74	2.1/E	
E-398	1	25	2.9	3.1	0.2	A	R	04/05/18	E-1	1881	74	2.1/E	
E-400	1	25	2.9	2.9	0	A	R	04/05/18	E-1	1881	74	2.1/E	
E-402	1	25	2.5	2.6	0.1	A	R	04/05/18	E-1	1881	74	2.1/E	
E-404	2	10	2.5	4	1.5	A	R	04/05/18	E-1	1881	74	2.1/E	
E-406	1	10	1.2	1.3	0.1	A	R	04/09/18	E-1	638	68	4.0/S	
E-408	2	13	1.1	1.5	0.4	A	R	04/09/18	E-1	638	68	4.0/S	
E-410	0.5	3	1.2	1.5	0.3	A	R	04/09/18	E-1	638	68	4.0/S	
E-412	1	25	1.2	1.6	0.4	A	R	04/09/18	E-1	638	68	4.0/S	No Bonnet
E-414	2	6	1.4	3	1.6	A	R	04/09/18	E-1	638	68	4.0/S	
E-416	1	25	1.4	1.5	0.1	A	R	04/09/18	E-1	638	68	4.0/S	
E-418	1	25	1.2	1.3	0.1	A	R	04/09/18	E-1	638	68	4.0/S	
E-420	0.5	38	1.2	1.2	0	A	R	04/09/18	E-1	638	68	4.0/S	
E-422	0.5	38	1.2	1.2	0	A	R	04/09/18	E-1	638	68	4.0/S	
E-424	0.5	38	1.1	1.3	0.2	A	R	04/09/18	E-1	638	68	4.0/S	No Bonnet
E-426	1	76	1.2	1.2	0	A	R	04/09/18	E-1	638	68	4.0/S	No Bonnet
E-428	1	76	1.1	1.2	0.1	A	R	04/09/18	E-1	638	68	4.0/S	
E-430	1	76	1.3	1.3	0	A	R	04/09/18	E-1	638	68	4.0/S	
E-432	1	25	1.1	1.5	0.4	A	R	04/09/18	E-1	638	68	4.0/S	No Bonnet
E-434	2	6	1.3	1.5	0.2	A	R	04/09/18	E-1	638	68	4.0/S	
E-436	2	6	1.2	1.7	0.5	A	R	04/09/18	E-1	638	69	1.2/S	
E-438	1	25	1.1	1.7	0.6	A	R	04/09/18	E-1	638	69	1.2/S	No Bonnet
E-440	3	10	1.3	3.7	2.4	A	R	04/09/18	E-1	638	69	1.2/S	
E-442	1	3	1.2	1.9	0.7	A	R	04/09/18	E-1	638	69	1.2/S	
E-444	5	48	0.8	73	72.2	A	R	04/09/18	E-1	638	69	1.2/S	Gate Valve east of E-406A
E-446	1	25	2.9	3	0.1	A	R	04/09/18	E-1	638	69	1.2/S	
E-448	2	51	2.7	2.7	0	A	R	04/09/18	E-1	638	69	1.2/S	
E-450	3	29	2.6	3.2	0.6	A	R	04/09/18	E-1	638	69	1.2/S	
E-452	1	10	2.4	5	2.6	A	R	04/09/18	E-1	638	69	1.2/S	
E-454	1	6	2.7	3.6	0.9	P	R	04/09/18	E-1	638	69	1.2/S	Only Bonnet, No packing no Stem
E-456	6	38	2.1	3.8	1.7	A	R	04/09/18	E-1	638	69	1.2/S	
E-458	4	38	2.8	3.4	0.6	A	R	04/09/18	E-1	638	69	1.2/S	
E-460	4	38	1.8	3	1.2	A	R	04/09/18	E-1	638	69	1.2/S	
E-462	2	51	2.6	2.9	0.3	A	R	04/09/18	E-1	638	69	1.2/S	
E-464	1	25	1.7	2.5	0.8	A	R	04/09/18	E-1	638	69	1.2/S	
E-468	4	38	0.7	2.7	2	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-490	2	19	0.7	1.7	1	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-492	4	38	1.2	3.2	2	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-494	5	16	1.4	3	1.6	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-496	3	10	0.4	1	0.6	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-498	2	51	0.4	2.5	2.1	A	R	04/09/18	E-1	638	78.5	1.6/S	No Bonnet
E-500	2	51	1.1	2.5	1.4	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-502	2	19	1.1	2.6	1.5	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-504	5	48	0.8	45	44.2	A	R	04/09/18	E-1	638	78.5	1.6/S	Gate Valve southeast of E-406A
E-506	6	57	2.2	3.7	1.5	A	R	04/09/18	E-1	638	78.5	1.6/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-508	3	29	1.9	3.6	1.7	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-510	8	19	2.8	5.1	2.3	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-512	2	5	2.5	3	0.5	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-514	6	29	1.7	271	269.3	A	R	04/09/18	E-1	638	78.5	1.6/S	Gate Valve southeast of E-406A
E-516	6	19	2.3	5.9	3.6	A	R	04/09/18	E-1	638	78.5	1.6/S	
E-518	2	19	2.6	3.7	1.1	A	R	04/09/18	E-1	638	78	3.5/SW	
E-520	4	38	2.5	5.2	2.7	A	R	04/09/18	E-1	638	78	3.5/SW	
E-522	7	67	2.3	20	17.7	A	R	04/09/18	E-1	638	78	3.5/SW	
E-524	2	51	2.6	2.5	0	A	R	04/09/18	E-1	638	78	3.5/SW	No Bonnet
E-526	2	80	2.4	3.7	1.3	A	R	04/09/18	E-1	638	78	3.5/SW	
E-528	3	29	2.8	3.6	0.8	A	R	04/09/18	E-1	638	78	3.5/SW	
E-530	2	19	2.7	3.2	0.5	A	R	04/09/18	E-1	638	78	3.5/SW	
E-532	1	10	2.4	2.5	0.1	A	R	04/09/18	E-1	638	78	3.5/SW	
E-534	1	25	2.3	4.3	2	A	R	04/09/18	E-1	638	78	3.5/SW	No Bonnet
E-536	4	38	2.4	290	287.6	A	R	04/09/18	E-1	638	78	3.5/SW	Gate Valve southwest of E-406A
E-538	2	51	2.5	4.6	2.1	A	R	04/09/18	E-1	638	78	3.5/SW	No Bonnet
E-540	1	25	2.2	2.6	0.4	A	R	04/09/18	E-1	638	78	3.5/SW	
E-542	12	29	2.4	5190	5187.6	A	R	04/09/18	E-1	638	78	3.5/SW	Control Valve MOV-633 east of E-406A
E-544	3	14	-2.2	-1	1.2	A	R	04/09/18	E-1	640	81	4.9/W	
E-546	2	10	-2.3	-1	1.3	A	R	04/09/18	E-1	640	81	4.9/W	
E-548	1	25	-2.5	-2.2	0.3	A	R	04/09/18	E-1	640	81	4.9/W	No Bonnet
E-550	0.5	13	1.4	1	0	A	R	04/09/18	E-1	640	81	4.9/W	
E-552	1	10	-1	-1	0	A	R	04/09/18	E-1	640	81	4.9/W	
E-554	1	25	-1.9	-1.9	0	A	R	04/09/18	E-1	640	81	4.9/W	No Bonnet
E-556	4	102	-1.9	56	57.9	A	R	04/09/18	E-1	640	81	4.9/W	Reducer south on Gate Valve e of E-406A
E-558	2	19	0.4	1.4	1	A	R	04/09/18	E-1	640	81	4.9/W	
E-560	1	25	-0.3	-1.5	0	A	R	04/09/18	E-1	640	81	4.9/W	No Bonnet
E-562	1	25	-1.6	-0.4	1.2	A	R	04/09/18	E-1	640	81	4.9/W	
E-564	2	19	-0.9	-0.4	0.5	A	R	04/09/18	E-1	640	81	4.9/W	
E-566	1	25	-2.4	-2.4	0	A	R	04/09/18	E-1	640	81	4.9/W	No Bonnet
E-568	5	12	-2.6	-2.5	0.1	A	R	04/09/18	E-1	640	81	4.9/W	
E-570	2	51	-2.5	-2.5	0	A	R	04/09/18	E-1	640	81	4.9/W	No Bonnet
E-572	1	25	-2.6	-2.6	0	A	R	04/09/18	E-1	640	81	4.9/W	
E-574	1	25	-2.7	-2.5	0.2	A	R	04/09/18	E-1	640	76	8.1/NW	No bonnet
E-576	3	7	-2.8	-2.8	0	A	R	04/09/18	E-1	640	76	8.1/NW	
E-578	3	7	-2.6	-2.6	0	A	R	04/09/18	E-1	640	76	8.1/NW	
E-580	1	25	-2.3	-1.9	0.4	A	R	04/09/18	E-1	640	76	8.1/NW	No bonnet
E-582	1	25	-2.4	-1.1	1.3	A	R	04/09/18	E-1	640	76	8.1/NW	
E-255	2	51	1.1	1.1	0	A	R	04/09/18	E-1	636	62	4.0/S	No Bonnet
E-257	5	16	1.2	1.3	0.1	A	R	04/09/18	E-1	636	62	4.0/S	
E-259	1	25	1.1	1.1	0	A	R	04/09/18	E-1	636	62	4.0/S	No Bonnet
E-261	1	25	1	1	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-263	4	13	1	1.3	0.3	A	R	04/09/18	E-1	636	62	4.0/S	
E-265	2	51	1.2	1.4	0.2	A	R	04/09/18	E-1	636	62	4.0/S	No Bonnet
E-267	7	13	1.2	154	152.8	A	R	04/09/18	E-1	636	62	4.0/S	Platform above E-402
E-269	8	15	2	904	902	A	R	04/09/18	E-1	636	62	4.0/S	Platform above E-402
E-271	4	76	2.3	15.1	12.8	A	R	04/09/18	E-1	636	62	4.0/S	
E-273	3	57	3.4	92.3	88.9	A	R	04/09/18	E-1	636	62	4.0/S	Platform above E-402
E-275	2	51	3.4	3.6	0.2	A	R	04/09/18	E-1	636	62	4.0/S	No Bonnet
E-279	1	25	3.3	4.2	0.9	A	R	04/09/18	E-1	636	62	4.0/S	
E-281	4	76	3.2	3.2	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-283	1	19	2.5	4	1.5	A	R	04/09/18	E-1	636	62	4.0/S	
E-285	3	29	3.2	6.4	3.2	A	R	04/09/18	E-1	636	62	4.0/S	
E-287	1	25	3.2	2.8	0	A	R	04/09/18	E-1	636	62	4.0/S	No Bonnet
E-289	1	25	3.6	3.7	0.1	A	R	04/09/18	E-1	636	62	4.0/S	
E-291	2	51	2.4	2.1	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-293	3	10	2	14.6	12.6	A	R	04/09/18	E-1	636	62	4.0/S	
E-295	4	25	2.8	544	541.2	A	R	04/09/18	E-1	636	62	4.0/S	Gate Valve
E-297	5	16	1	3.2	2.2	A	R	04/09/18	E-1	636	62	4.0/S	
E-299	2	51	1.1	1.5	0.4	A	R	04/09/18	E-1	636	62	4.0/S	
E-301	1	25	1.2	1.2	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-303	1	25	1	1.2	0.2	A	R	04/09/18	E-1	636	62	4.0/S	
E-305	1	25	0.9	0.9	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-307	4	13	0.9	5.6	4.7	A	R	04/09/18	E-1	636	62	4.0/S	
E-309	2	6	2	1.8	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-311	1	25	1.1	1.3	0.2	A	R	04/09/18	E-1	636	62	4.0/S	No Bonnet
E-313	2	6	0.8	0.6	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-315	2	6	0.6	0.5	0	A	R	04/09/18	E-1	636	62	4.0/S	
E-317	2	51	0.5	1.8	1.3	A	R	04/09/18	E-1	636	62	4.0/S	No Bonnet
E-319	2	51	0.7	89.5	88.8	A	R	04/09/18	E-1	636	62	4.0/S	Northside of Pump
E-321	3	19	1.4	1.4	0	A	R	04/09/18	E-1	636	62	4.0/S	Finfan deck
E-323	4	Unable to Compute	2.8	17.4	14.6	A	R	04/09/18	E-1	636	62	4.0/S	
E-325	3	Unable to Compute	3.3	3.2	0	A	R	04/09/18	E-1	636	62	4.0/S	little access
E-327	3	Unable to Compute	3.1	6.1	3	A	R	04/09/18	E-1	636	62	4.0/S	
E-329	5	Unable to Compute	3.1	3.4	0.3	A	R	04/09/18	E-1	636	62	4.0/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-331	3	Unable to Compute	2.9	134	131.1	A	R	04/09/18	E-1	636	62	4.0/S	P-107A SEAL
E-333	5	Unable to Compute	3.3	8.7	5.4	A	R	04/09/18	E-1	636	62	4.0/S	
E-335	3	Unable to Compute	2.4	4.2	1.8	A	R	04/09/18	E-1	636	62	4.0/S	
E-337	2	Unable to Compute	2.7	2.7	0	A	R	04/09/18	E-1	636	62	4.0/S	too hot to monitor
E-339	3	Unable to Compute	1.4	1.5	0.1	A	R	04/09/18	E-1	636	62	4.0/S	
E-341	4	Unable to Compute	1.4	1.5	0.1	A	R	04/09/18	E-1	636	62	4.0/S	
E-343	3	Unable to Compute	1.4	1.9	0.5	A	R	04/09/18	E-1	636	62	4.0/S	
E-345	4	Unable to Compute	1.6	3.1	1.5	A	R	04/09/18	E-1	636	62	4.0/S	
E-347	3	Unable to Compute	0.9	1	0.1	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-349	3	Unable to Compute	1	1.1	0.1	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-351	3	Unable to Compute	0.9	1.1	0.2	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-353	3	Unable to Compute	1.9	1.2	0	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-355	4	Unable to Compute	0.8	38.1	37.3	A	R	04/09/18	E-1	636	80.2	3.0/NW	East of T-102
E-357	4	Unable to Compute	1.2	3.4	2.2	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-359	3	Unable to Compute	1.6	11.4	9.8	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-361	4	Unable to Compute	2.4	5.4	3	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-363	3	Unable to Compute	2.6	1	0	A	R	04/09/18	E-1	636	80.2	3.0/NW	AB = APS Bottoms = T-101 Bottoms
E-365	4	Unable to Compute	3	3.4	0.4	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-367	3	Unable to Compute	2.9	3.3	0.4	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-369	3	Unable to Compute	2.5	2.7	0.2	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-371	3	Unable to Compute	2.4	2.1	0	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-373	4	Unable to Compute	2.1	6.2	4.1	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-375	5	Unable to Compute	1.3	9.1	7.8	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-377	4	Unable to Compute	2.1	2.8	0.7	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-379	4	Unable to Compute	2.5	2.6	0.1	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-381	4	Unable to Compute	1.9	2.6	0.7	A	R	04/09/18	E-1	636	80.2	3.0/NW	
E-383	3	19	1	1.2	0.2	A	R	04/10/18	E-1	636	66	2.1/SE	
E-385	5	6	1.1	8.6	7.5	A	R	04/10/18	E-1	636	66	2.1/SE	
E-387	4	25	1	2	1	A	R	04/10/18	E-1	636	66	2.1/SE	
E-389	4	5	1.8	1.8	0	A	R	04/10/18	E-1	636	66	2.1/SE	
E-391	4	38	1.8	1.9	0.1	A	R	04/10/18	E-1	636	66	2.1/SE	
E-393	4	8	1.3	2.5	1.2	A	R	04/10/18	E-1	636	66	2.1/SE	
E-395	3	29	1.1	4	2.9	A	R	04/10/18	E-1	636	66	2.1/SE	
E-397	5	10	1.5	8.4	6.9	A	R	04/10/18	E-1	636	66	2.1/SE	
E-399	4	102	1.1	1.4	0.3	A	R	04/10/18	E-1	636	66	2.1/SE	
E-401	3	10	1.1	1.6	0.5	A	R	04/10/18	E-1	636	66	2.1/SE	
E-403	3	57	1	1.6	0.6	A	R	04/10/18	E-1	636	66	2.1/SE	Can't Monitor housing
E-405	4	38	0.3	20.1	19.8	A	R	04/10/18	E-1	636	66	2.1/SE	
E-407	4	10	2.1	2.8	0.7	A	R	04/10/18	E-1	636	66	2.1/SE	
E-409	3	29	1.4	42.4	41	A	R	04/10/18	E-1	636	66	2.1/SE	Seal leak
E-411	5	12	2.2	2	0	A	R	04/10/18	E-1	636	66	2.1/SE	
E-413	4	38	1.7	3.4	1.7	A	R	04/10/18	E-1	636	66	2.1/SE	
E-415	4	10	1.4	1.5	0.1	A	R	04/10/18	E-1	636	66	2.1/SE	
E-417	4	38	1.1	6.5	5.4	A	R	04/10/18	E-1	636	66	2.1/SE	
E-419	4	10	1.3	1.7	0.4	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-421	3	29	1.4	1.2	0	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-423	4	10	1.2	1.6	0.4	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-425	2	19	1	1.1	0.1	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-427	4	10	1.1	1.6	0.5	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-429	3	29	1	34.6	33.6	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-431	7	5	1.2	1.8	0.6	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-433	2	19	1.6	1.8	0.2	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-435	7	5	1.5	2.2	0.7	A	R	04/10/18	E-1	1881	66	2.1/SE	
E-437	2	19	1.4	1.6	0.2	A	R	04/10/18	E-1	1881	76	5.1/E	
E-439	5	12	1.3	1.9	0.6	A	R	04/10/18	E-1	1881	76	5.1/E	
E-441	3	57	1.3	1.8	0.5	A	R	04/10/18	E-1	1881	76	5.1/E	
E-443	4	10	1.7	1.9	0.2	A	R	04/10/18	E-1	1881	76	5.1/E	
E-445	3	57	1.7	1.5	0	A	R	04/10/18	E-1	1881	76	5.1/E	
E-447	4	10	1.4	1.6	0.2	A	R	04/10/18	E-1	1881	76	5.1/E	
E-449	3	29	1	16.1	15.1	A	R	04/10/18	E-1	1881	76	5.1/E	
E-451	5	6	1.6	1902	1900.4	A	R	04/10/18	E-1	1881	76	5.1/E	PUMP RUNNING
E-453	3	29	2.3	4.3	2	A	R	04/10/18	E-1	636	76	5.1/E	
E-455	5	6	2.4	2.5	0.1	A	R	04/10/18	E-1	636	76	5.1/E	
E-457	5	16	1.4	1.5	0.1	A	R	04/10/18	E-1	636	76	5.1/E	P-4446A IS OOS and P-446B seal is enclosed
E-459	5	16	1.1	1	0	A	R	04/10/18	E-1	636	76	5.1/E	seal is enclosed
E-461	4	25	0.9	1.1	0.2	A	R	04/10/18	E-1	636	76	5.1/E	P-4460A is OOS
E-463	9	6	0.9	3.4	2.5	A	R	04/10/18	E-1	636	76	5.1/E	
E-584	4	13	0.7	1.2	0.5	A	R	04/10/18	E-1	640	57	3.5/S	
E-586	1	25	0.9	1.7	0.8	A	R	04/10/18	E-1	640	57	3.5/S	
E-588	1	25	1.5	2	0.5	A	R	04/10/18	E-1	640	57	3.5/S	
E-590	5	48	0.8	3.4	2.6	A	R	04/10/18	E-1	640	57	3.5/S	
E-592	2	51	0.7	1.7	1	A	R	04/10/18	E-1	640	57	3.5/S	
E-594	1	25	0.7	0.7	0	A	R	04/10/18	E-1	640	57	3.5/S	
E-596	2	51	0.7	1.1	0.4	A	R	04/10/18	E-1	640	57	3.5/S	
E-598	3	76	1.4	3.4	2	A	R	04/10/18	E-1	640	57	3.5/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-600	6	4	0.4	0.4	0	A	R	04/10/18	E-1	640	61	4.2/S	
E-602	3	29	0.3	1	0.7	A	R	04/10/18	E-1	640	61	4.2/S	
E-604	5	3	0.3	0.9	0.6	A	R	04/10/18	E-1	640	61	4.2/S	
E-606	3	29	0.3	0.7	0.4	A	R	04/10/18	E-1	640	61	4.2/S	
E-608	8	5	0.3	12.1	11.8	A	R	04/10/18	E-1	640	61	4.2/S	
E-610	4	38	0.3	548	547.7	A	R	04/10/18	E-1	640	61	4.2/S	PUMP RUNNING
E-612	20	19	1.7	25	23.3	A	R	04/10/18	E-1	641	61	4.2/S	
E-614	1	10	2.5	2.6	0.1	A	R	04/10/18	E-1	641	61	4.2/S	
E-616	3	3	2.6	2.7	0.1	A	R	04/10/18	E-1	640	76	5.1/E	
E-618	2	19	2.4	5	2.6	A	R	04/10/18	E-1	640	76	5.1/E	PUMP RUNNING
E-620	2	2	2.3	2.7	0.4	A	R	04/10/18	E-1	640	76	5.1/E	
E-622	2	19	2.3	7.4	5.1	A	R	04/10/18	E-1	640	76	5.1/E	PUMP RUNNING
E-624	2	2	2.7	3.1	0.4	A	R	04/10/18	E-1	640	76	5.1/E	
E-626	2	19	2.3	3.2	0.9	A	R	04/10/18	E-1	640	76	5.1/E	PUMP RUNNING
E-628	6	6	2.3	3.5	1.2	A	R	04/10/18	E-1	640	76	5.1/E	
E-630	2	19	2.2	45	42.8	A	R	04/10/18	E-1	640	76	5.1/E	Pump Seal Leak - P-701A PUMP RUNNING
E-632	5	10	1.9	4	2.1	A	R	04/10/18	E-1	640	76	5.1/E	
E-634	3	29	2.3	57	54.7	A	R	04/10/18	E-1	640	76	5.1/E	Pump Seal P-4406A PUMP RUNNING
E-636	4	4	2.5	3.5	1	A	R	04/10/18	E-1	640	76	5.1/E	
E-638	4	38	1.5	12.5	11	A	R	04/10/18	E-1	640	76	5.1/E	PUMP NOT RUNNING
E-640	4	4	1.6	1.7	0.1	A	R	04/10/18	E-1	640	76	5.1/E	
E-642	2	19	1.3	1.7	0.4	A	R	04/10/18	E-1	640	76	5.1/E	PUMP NOT RUNNING
E-644	7	4	1.2	3.2	2	A	R	04/10/18	E-1	640	76	5.1/E	
E-646	6	57	1.3	14.9	13.6	A	R	04/10/18	E-1	640	69	5.7/W	Outboard pump not running
E-648	3	29	2.6	2.7	0.1	A	R	04/10/18	E-1	640	69	5.7/W	inboard pump not running
E-650	3	38	-0.4	0.2	0.6	A	R	04/11/18	E-1	640	58	4.1/E	
E-652	2	25	-0.03	-0.3	0	A	R	04/11/18	E-1	640	58	4.1/E	
E-654	2	51	-0.4	-0.4	0	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-658	3	29	-0.3	-0.2	0.1	A	R	04/11/18	E-1	640	58	4.1/E	
E-660	2	51	-0.3	-0.1	0.2	A	R	04/11/18	E-1	640	58	4.1/E	
E-662	2	19	-0.3	-0.1	0.2	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-664	1	13	-0.3	-0.1	0.2	A	R	04/11/18	E-1	640	58	4.1/E	
E-666	2	51	-0.3	-0.2	0.1	A	R	04/11/18	E-1	640	58	4.1/E	
E-668	2	51	-0.3	-0.2	0.1	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-670	1	76	-0.3	-0.2	0.1	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-672	1	76	-0.3	-0.3	0	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-674	1	14	-0.2	-0.3	0	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-678	2	51	-0.3	-0.1	0.2	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-680	1	25	-0.3	-0.2	0.1	A	R	04/11/18	E-1	640	58	4.1/E	No Bonnet
E-682	2	51	-0.2	-0.1	0.1	A	R	04/11/18	E-1	640	58	4.1/E	
E-684	2	19	-0.4	-0.3	0.1	A	R	04/11/18	E-1	640	58	3.1/E	
E-686	1	19	-0.3	-0.3	0	A	R	04/11/18	E-1	640	58	3.1/E	
E-688	1	25	-0.4	-0.4	0	A	R	04/11/18	E-1	640	58	3.1/E	No Bonnet
E-690	3	76	-0.4	-0.2	0.2	A	R	04/11/18	E-1	640	58	3.1/E	No Bonnet
E-692	1	25	-0.4	-0.3	0.1	A	R	04/11/18	E-1	640	58	3.1/E	No Bonnet
E-694	2	25	-0.4	-0.3	0.1	A	R	04/11/18	E-1	640	58	3.1/E	
E-696	2	51	-0.3	-0.3	0	A	R	04/11/18	E-1	640	58	3.1/E	Sharpie test was at 420ppm
E-698	1	25	0.8	0.4	0	A	R	04/11/18	E-1	640	58	3.1/E	No Bonnet
E-700	1	76	0.5	0.4	0	A	R	04/11/18	E-1	640	58	3.1/E	No Bonnet
E-702	1	76	0.5	0.5	0	A	R	04/11/18	E-1	640	58	3.1/E	No Bonnet
E-704	1	76	0.4	0.3	0	A	R	04/11/18	E-1	640	58	3.1/E	No Bonnet
E-706	2	153	0.3	0.4	0.1	A	R	04/11/18	E-1	640	58	3.1/E	
E-708	1	10	0.3	0.4	0.1	A	R	04/11/18	E-1	640	58	3.1/E	
E-710	1	10	0.3	0.4	0.1	A	R	04/11/18	E-1	640	58	3.1/E	
E-712	2	6	0.2	0.2	0	A	R	04/11/18	E-1	640	58	3.1/E	
E-465	2	19	1.3	1.3	0	A	R	04/11/18	E-1	636	52	10/NE	seal is enclosed
E-467	2	19	1.2	1.2	0	A	R	04/11/18	E-1	636	52	10/NE	
E-469	4	8	1.2	1.7	0.5	A	R	04/11/18	E-1	636	52	10/NE	
E-471	5	10	1.3	1.4	0.1	U	R	04/11/18	E-1	636	52	10/NE	cant monitor pump seal (Excessive steam)
E-473	3	29	1.2	1.3	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-475	5	10	1.2	1.3	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-477	2	19	1.2	1.3	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-479	4	8	1.1	1.3	0.2	A	R	04/11/18	E-1	636	52	10/NE	
E-481	3	29	1	1.1	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-483	5	8	1	1.3	0.3	A	R	04/11/18	E-1	636	52	10/NE	
E-485	3	29	1	1.1	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-487	5	8	0.9	1.1	0.2	A	R	04/11/18	E-1	636	52	10/NE	
E-489	2	19	1	1	0	A	R	04/11/18	E-1	636	52	10/NE	
E-491	5	16	0.9	1.8	0.9	A	R	04/11/18	E-1	636	52	10/NE	
E-493	3	10	1	1.3	0.3	U	R	04/11/18	E-1	636	52	10/NE	cant monitor pump seal (Excessive steam)
E-495	3	10	0.9	1	0.1	A	R	04/11/18	E-1	636	52	10/NE	seal is enclosed
E-497	4	13	0.9	1	0.1	A	R	04/11/18	E-1	636	52	10/NE	seal is enclosed
E-499	3	29	0.8	0.9	0.1	A	R	04/11/18	E-1	636	52	10/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-501	4	10	0.8	0.9	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-503	2	19	0.8	0.9	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-505	4	10	0.8	0.9	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-507	3	76	0.7	0.8	0.1	A	R	04/11/18	E-1	636	52	10/NE	SV-46295
E-509	2	51	0.7	0.8	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-511	2	38	0.8	0.8	0	A	R	04/11/18	E-1	636	52	10/NE	
E-513	4	10	0.8	1.2	0.4	U	R	04/11/18	E-1	636	52	10/NE	cant monitor pump seal (Excessive steam)
E-515	3	29	0.8	0.8	0	A	R	04/11/18	E-1	636	52	10/NE	
E-517	4	25	0.7	0.8	0.1	A	R	04/11/18	E-1	636	52	10/NE	
E-519	6	6	0.7	1.2	0.5	A	R	04/11/18	E-1	636	52	10/NE	
E-521	3	19	0.7	0.7	0	A	R	04/11/18	E-1	636	52	10/NE	
E-523	4	13	0.7	0.7	0	A	R	04/11/18	E-1	636	52	10/NE	
E-525	3	29	2	2	0	A	R	04/11/18	E-1	636	59	18/NE	
E-527	4	13	2	2.3	0.3	A	R	04/11/18	E-1	636	59	18/NE	
E-529	3	29	1.9	2.1	0.2	A	R	04/11/18	E-1	636	59	18/NE	Housing is enclosed
E-531	4	38	2	2.1	0.1	A	R	04/11/18	E-1	636	59	18/NE	Housing is enclosed
E-533	3	76	1.9	2	0.1	A	R	04/11/18	E-1	636	59	18/NE	SV-46057
E-535	4	102	1.9	2	0.1	A	R	04/11/18	E-1	636	59	18/NE	SV-46084
E-537	3	76	1.9	1.9	0	A	R	04/11/18	E-1	636	59	18/NE	SV-46055
E-539	3	76	1.8	1.9	0.1	A	R	04/11/18	E-1	636	59	18/NE	SV-46083
E-541	5	6	1.9	19.7	17.8	U	R	04/11/18	E-1	636	59	18/NE	cant monitor pump seal (Excessive steam)
E-543	3	29	1.8	1.9	0.1	A	R	04/11/18	E-1	636	59	18/NE	
E-545	6	19	2	2	0	A	R	04/11/18	E-1	636	59	18/NE	
E-547	2	51	1.7	1.8	0.1	A	R	04/11/18	E-1	636	59	18/NE	SV-46082
E-549	3	76	1.7	1.9	0.2	A	R	04/11/18	E-1	636	59	18/NE	SV-46053
E-551	3	76	1.7	3.1	1.4	A	R	04/11/18	E-1	636	59	18/NE	SV-46038
E-553	2	19	1.8	1.9	0.1	A	R	04/11/18	E-1	636	59	18/NE	
E-555	3	76	1.7	1.9	0.2	A	R	04/11/18	E-1	636	59	18/NE	SV-46081
E-557	3	57	1.7	1.7	0	A	R	04/11/18	E-1	636	59	18/NE	Housing is enclosed
E-559	3	57	1.7	1.7	0	A	R	04/11/18	E-1	636	59	18/NE	
E-561	3	10	1.7	1.8	0.1	A	R	04/11/18	E-1	636	59	18/NE	
E-563	3	57	1.7	1.7	0	A	R	04/11/18	E-1	636	59	18/NE	
E-565	4	13	1.7	3.4	1.7	A	R	04/11/18	E-1	636	59	18/NE	
E-567	4	76	1.6	1.9	0.3	A	R	04/11/18	E-1	636	59	18/NE	
E-569	4	13	1.5	1.9	0.4	A	R	04/11/18	E-1	636	59	18/NE	
E-571	3	57	1.6	1.6	0	A	R	04/11/18	E-1	636	59	18/NE	
E-573	5	16	1.4	2.4	1	A	R	04/11/18	E-1	636	59	18/NE	
E-575	2	38	1.5	1.5	0	A	R	04/11/18	E-1	636	59	18/NE	
E-577	3	57	1.4	1.4	0	A	R	04/11/18	E-1	636	59	18/NE	
E-579	7	7	1.4	1.7	0.3	A	R	04/11/18	E-1	636	59	18/NE	
E-581	3	76	1.8	1.8	0	A	R	04/11/18	E-1	636	59	18/NE	SV-46308
E-583	3	29	0.5	0.6	0.1	A	R	04/12/18	E-1	636	57	9/E	housing is enclosed
E-585	3	29	0.4	0.7	0.3	A	R	04/12/18	E-1	636	57	9/E	housing is enclosed
E-587	3	29	0.3	0.4	0.1	A	R	04/12/18	E-1	636	57	9/E	
E-589	4	13	0.3	0.4	0.1	A	R	04/12/18	E-1	636	57	9/E	
E-591	2	51	0.4	1.2	0.8	A	R	04/12/18	E-1	636	57	9/E	SV-46044
E-593	2	51	0.3	0.3	0	A	R	04/12/18	E-1	636	57	9/E	SV-46042-PRD to atmosphere
E-595	1	25	0.3	0.3	0	A	R	04/12/18	E-1	636	57	9/E	SV-46043 - PRD to atmosphere (body is insulated)
E-597	2	51	0.2	0.3	0.1	A	R	04/12/18	E-1	636	57	9/E	SV-46060-PRD to atmosphere (body is insulated)
E-599	2	51	0.2	0.3	0.1	A	R	04/12/18	E-1	636	57	9/E	SV-46090-PRD to atmosphere (body is insulated)
E-601	1	25	0.2	0.2	0	A	R	04/12/18	E-1	636	57	9/E	SV-46039-to atmosphere (body is insulated)
E-603	3	76	0.2	0.4	0.2	A	R	04/12/18	E-1	636	57	9/E	SV-46040 to atmosphere
E-605	1	25	0.2	0.4	0.2	A	R	04/12/18	E-1	636	57	9/E	SV-46041 (body is insulated) to atmosphere
E-607	3	57	2.1	2.2	0.1	A	R	04/12/18	E-1	636	57	9/E	
E-609	4	19	2.1	2.2	0.1	A	R	04/12/18	E-1	636	57	9/E	
E-611	4	38	1.9	2	0.1	A	R	04/12/18	E-1	636	57	9/E	
E-613	5	16	1.8	2.1	0.3	A	R	04/12/18	E-1	636	57	16/E	
E-615	2	19	1.9	2	0.1	A	R	04/12/18	E-1	636	57	16/E	
E-617	5	16	1.9	2.1	0.2	A	R	04/12/18	E-1	636	57	16/E	
E-619	2	19	1.8	1.9	0.1	A	R	04/12/18	E-1	636	57	16/E	
E-621	6	14	1.8	1.8	0	A	R	04/12/18	E-1	636	57	16/E	
E-623	2	19	1.7	1.9	0.2	A	R	04/12/18	E-1	636	57	16/E	
E-625	5	12	1.7	1.8	0.1	A	R	04/12/18	E-1	636	57	16/E	
E-627	3	48	1.8	1.9	0.1	A	R	04/12/18	E-1	636	57	16/E	seal is enclosed
E-629	3	29	1.6	8.1	6.5	A	R	04/12/18	E-1	636	57	16/E	
E-631	6	10	1.9	3.8	1.9	A	R	04/12/18	E-1	636	57	16/E	
E-633	3	29	1.7	2.3	0.6	A	R	04/12/18	E-1	636	57	16/E	
E-635	4	6	2	5.4	3.4	A	R	04/12/18	E-1	636	57	16/E	
E-637	2	38	1.7	6.4	4.7	A	R	04/12/18	E-1	636	57	16/E	
E-639	4	10	2.1	7.2	5.1	A	R	04/12/18	E-1	636	57	16/E	
E-641	3	29	1.8	4.1	2.3	A	R	04/12/18	E-1	636	57	16/E	
E-643	3	7	2.1	10.4	8.3	A	R	04/12/18	E-1	636	57	16/E	
E-645	3	29	2	3.3	1.3	A	R	04/12/18	E-1	636	57	16/E	
E-647	4	10	1.9	5.7	3.8	A	R	04/12/18	E-1	636	57	16/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-714	3	10	2.7	2.8	0.1	A	R	04/12/18	E-1	640	63	0.9/W	Control valve (MOV-122) south of STR-907B 1 OF 10 NON-LEAK VALVE PICTURE
E-716	3	10	2.5	2.5	0	A	R	04/12/18	E-1	640	63	0.9/W	
E-718	2	51	2.4	2.5	0.1	A	R	04/12/18	E-1	640	63	0.9/W	No Bonnet
E-720	1	25	2.4	2.5	0.1	A	R	04/12/18	E-1	640	63	0.9/W	
E-722	1	25	2.3	2.6	0.3	A	R	04/12/18	E-1	640	63	0.9/W	No Bonnet
E-724	2	51	2.3	2.4	0.1	A	R	04/12/18	E-1	640	63	0.9/W	
E-726	1	25	2.2	2.6	0.4	A	R	04/12/18	E-1	640	63	0.9/W	No Bonnet
E-728	2	51	2.1	2.2	0.1	A	R	04/12/18	E-1	640	63	0.9/W	
E-730	2	51	2	2.6	0.6	A	R	04/12/18	E-1	640	63	0.9/W	Control valve North of STR-907, no bonnet 2 OF 10 NON-LEAK VALVE PICTURE
E-732	1	25	1.9	2	0.1	A	R	04/12/18	E-1	640	63	0.9/W	
E-734	2	51	2	2	0	A	R	04/12/18	E-1	640	63	0.9/W	No Bonnet
E-736	2	51	1.8	1.9	0.1	A	R	04/12/18	E-1	640	63	0.9/W	
E-738	2	6	1.6	1.8	0.2	A	R	04/12/18	E-1	640	63	0.9/W	
E-740(1)	2	6	1.9	1.9	0	A	R	04/12/18	E-1	640	63	0.9/W	
E-740(2)	1	25	1.5	1.9	0.4	A	R	04/12/18	E-1	640	63	0.9/W	
E-742	4	13	1.6	1.9	0.3	A	R	04/12/18	E-1	640	71	1.8/E	Control valve (MOV 121) North of STR-907Z 3 OF 10 NON-LEAK VALVE PICTURE
E-744	1	25	1.6	1.6	0	A	R	04/12/18	E-1	640	71	1.8/E	No Bonnet
E-746	2	10	1.3	1.6	0.3	A	R	04/12/18	E-1	640	71	1.8/E	Gate Valve South of STR-907B 4 OF 10 NON-LEAK VALVE PICTURE
E-748	1	25	1.1	1.2	0.1	A	R	04/12/18	E-1	640	71	1.8/E	No Bonnet
E-750	1	25	1.1	1.3	0.2	A	R	04/12/18	E-1	640	71	1.8/E	
E-752	2	51	1.1	1.2	0.1	A	R	04/12/18	E-1	640	71	1.8/E	
E-754	3	10	0.9	0.1	0	A	R	04/12/18	E-1	640	71	1.8/E	
E-756	1	25	0.9	1	0.1	A	R	04/12/18	E-1	640	71	1.8/E	
E-758	1	25	0.9	0.9	0	A	R	04/12/18	E-1	640	71	1.8/E	No Bonnet
E-760	1	25	0.8	0.9	0.1	A	R	04/12/18	E-1	640	71	1.8/E	No Bonnet
E-762	2	5	0.8	0.6	0	A	R	04/12/18	E-1	640	71	1.8/E	
E-764	3	7	0.8	0.9	0.1	A	R	04/12/18	E-1	640	71	1.8/E	
E-766	1	25	0.8	0.7	0	A	R	04/12/18	E-1	640	71	1.8/E	No Bonnet
E-768	2	51	0.6	0.6	0	A	R	04/12/18	E-1	640	71	1.8/E	
E-770	1	25	0.6	0.7	0.1	A	R	04/12/18	E-1	640	71	1.8/E	No Bonnet
E-772	1	25	0.1	0.2	0.1	A	R	04/12/18	E-1	645	64	7/W	
E-774	1	25	0	0	0	A	R	04/12/18	E-1	645	64	7/W	No Bonnet
E-776	2	5	-0.1	0.3	0.4	A	R	04/12/18	E-1	645	64	7/W	
E-778	1	25	0	0	0	A	R	04/12/18	E-1	645	64	7/W	
E-780	1	25	-0.1	0.1	0.2	A	R	04/12/18	E-1	645	64	7/W	Control valve north of STR-907B 5 OF 10 NON-LEAK VALVE PICTURE
E-782	2	5	-0.1	0	0.1	A	R	04/12/18	E-1	645	64	7/W	
E-784	2	10	-0.1	0.1	0.2	A	R	04/12/18	E-1	645	64	7/W	
E-786	1	25	-0.1	0.5	0.6	A	R	04/12/18	E-1	645	64	7/W	
E-788	1	25	-0.1	0.1	0.2	A	R	04/12/18	E-1	645	64	7/W	No Bonnet
E-790	3	14	-0.2	0.2	0.4	A	R	04/12/18	E-1	645	64	7/W	Gate valve north of CB 98058 6 OF 10 NON-LEAK VALVE PICTURE
E-792	3	14	-0.2	0.6	0.8	A	R	04/12/18	E-1	645	64	7/W	
E-794	2	10	-0.2	0.7	0.9	A	R	04/12/18	E-1	645	64	7/W	
E-796	1	5	-0.2	-0.2	0	A	R	04/12/18	E-1	645	64	7/W	
E-798	1	25	-0.3	-0.2	0.1	A	R	04/12/18	E-1	645	64	7/W	No Bonnet
E-800	1	38	0.3	-0.3	0	A	R	04/12/18	E-1	645	64	3/W	
E-802	1	38	-0.4	-0.3	0.1	A	R	04/12/18	E-1	645	64	3/W	Last record before lunch
E-804	1	38	2.4	2.5	0.1	A	R	04/12/18	E-1	645	64	3/W	Needle valve south of CV 98058 7 OF 10 NON-LEAK VALVE PICTURE
E-806	1	38	2.3	2.5	0.2	A	R	04/12/18	E-1	645	64	3/W	
E-808	1	25	2.2	2.4	0.2	A	R	04/12/18	E-1	645	64	3/W	No Bonnet
E-810	1	25	2.2	2.2	0	A	R	04/12/18	E-1	645	64	3/W	
E-812	1	10	2.1	2.2	0.1	A	R	04/12/18	E-1	645	64	3/W	
E-814	2	51	2.1	3.2	1.1	A	R	04/12/18	E-1	645	64	3/W	No Bonnet
E-816	1	25	2.1	2.3	0.2	A	R	04/12/18	E-1	645	64	3/W	
E-818	1	10	2.1	2.1	0	A	R	04/12/18	E-1	645	64	3/W	
E-820	1	10	2	2	0	A	R	04/12/18	E-1	645	64	3/W	no bonnet gate valve below str 702A 8 OF 10 NON-LEAK VALVE PICTURE
E-822	1	10	2	2.5	0.5	A	R	04/12/18	E-1	645	64	3/W	
E-824	2	5	1.9	2	0.1	A	R	04/12/18	E-1	645	64	3/W	
E-826	1	25	2	2	0	A	R	04/12/18	E-1	645	64	3/W	No Bonnet
E-828	1	10	1.8	2.7	0.9	A	R	04/12/18	E-1	645	64	3/W	Gate valve south of STR 907A 9 OF 10 NON-LEAK VALVE PICTURE
E-830	2	19	2.2	2.7	0.5	A	R	04/12/18	E-1	645	74	1.4/W	
E-832	1	10	2.1	2.7	0.6	A	R	04/12/18	E-1	645	74	1.4/W	10 OF 10 NON-LEAK VALVE PICTURE
E-834	2	9.5	Blank	Blank	0	U	R	04/12/18	E-1	645	74	1.4/W	Verify if OSS component, SG empty, PG = 0
E-834	2	19	2	2.3	0.3	A	R	04/12/18	E-1	645	74	1.4/W	
E-836	1	10	1.6	2	0.4	A	R	04/12/18	E-1	645	74	1.4/W	
E-838	2	51	1.8	2	0.2	A	R	04/12/18	E-1	645	74	1.4/W	No Bonnet/insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-840	1	25	1.7	1.9	0.2	A	R	04/12/18	E-1	645	74	1.4/W	flange North of STR 906A 1 of 10 non leaking connectors picture
E-842	1	25	1.4	1.5	0.1	A	R	04/12/18	E-1	645	74	1.4/W	No Bonnet
E-844	1	25	1.4	1.4	0	A	R	04/12/18	E-1	645	74	1.4/W	
E-846	2	6	1.3	2.2	0.9	A	R	04/12/18	E-1	645	74	1.4/W	
E-848	1	25	1.3	1.5	0.2	A	R	04/12/18	E-1	645	74	1.4/W	No Bonnet
E-850	1	25	1.4	1.4	0	A	R	04/12/18	E-1	645	74	1.4/W	
E-852	1	25	1.4	1.4	0	A	R	04/12/18	E-1	645	74	1.4/W	
E-854	1	25	1.3	1.4	0.1	A	R	04/12/18	E-1	645	74	1.4/W	plug south of STR 906A 2 of 10 non leaking connectors picture
E-856	2	6	1.3	1.4	0.1	A	R	04/12/18	E-1	640	74	1.4/W	
E-858	1	25	0.5	0.6	0.1	A	R	04/12/18	E-1	640	77	1.0/W	No bonnet/insulated
E-860	1	25	0.5	0.6	0.1	A	R	04/12/18	E-1	640	77	1.0/W	Threaded connection top of STR 906A 3 of 10 non leaking connectors picture
E-862	1	3	0.5	0.6	0.1	A	R	04/12/18	E-1	640	77	1.0/W	
E-864	1	3	0.5	0.5	0	A	R	04/12/18	E-1	640	77	1.0/W	
E-866	1	25	0.5	0.5	0	A	R	04/12/18	E-1	640	77	1.0/W	No bonnet/insulated
E-868	1	25	0.5	0.5	0	A	R	04/12/18	E-1	640	77	1.0/W	
E-870	1	25	0.5	0.5	0	A	R	04/12/18	E-1	640	77	1.0/W	
E-872	1	25	0.4	0.4	0	A	R	04/12/18	E-1	640	77	1.0/W	No bonnet/insulated
E-874	2	6	0.4	0.4	0	A	R	04/12/18	E-1	640	77	1.0/W	
E-876	1	25	0.3	0.4	0.1	A	R	04/12/18	E-1	640	77	1.0/W	
E-878	2	5	0.5	0.5	0	A	R	04/12/18	E-1	640	77	1.0/W	
E-880	1	25	0.3	0.4	0.1	A	R	04/12/18	E-1	640	77	1.0/W	No bonnet
E-882	1	25	0.4	0.3	0	A	R	04/12/18	E-1	640	77	1.0/W	No bonnet
E-884	1	25	0.3	0.4	0.1	A	R	04/12/18	E-1	640	77	1.0/W	flange south of STR 907A 4 of 10 non leaking connectors picture
E-886	2	51	1.2	1.9	0.7	A	R	04/12/18	E-1	640	72	4/W	
E-888	1	25	0.8	1.9	1.1	A	R	04/12/18	E-1	640	72	4/W	No Bonnet
E-890	2	5	0.7	0.9	0.2	A	R	04/12/18	E-1	640	72	4/W	
E-892	2	10	0.1	0.9	0.8	A	R	04/12/18	E-1	640	72	4/W	
E-894	1	19	0.8	0.5	0	A	R	04/12/18	E-1	640	72	4/W	
E-896	1	25	0.1	0.2	0.1	A	R	04/12/18	E-1	640	72	4/W	No Bonnet
E-898	1	25	0.1	0.2	0.1	A	R	04/12/18	E-1	640	72	4/W	flange south of STR 907A 5 of 10 non leaking connectors picture
E-649	3	29	0.6	1.6	1	A	R	04/17/18	E-1	636	45	2.0/W	
E-651	5	8	0.6	0.7	0.1	A	R	04/17/18	E-1	636	45	2.0/W	
E-653	3	29	0.5	0.7	0.2	A	R	04/17/18	E-1	636	45	2.0/W	
E-655	5	8	0.7	0.9	0.2	A	R	04/17/18	E-1	636	45	2.0/W	
E-657	3	7	0.8	0.8	0	A	R	04/17/18	E-1	636	45	2.0/W	seal is enclosed
E-659	3	29	0.6	1.1	0.5	A	R	04/17/18	E-1	636	45	2.0/W	
E-661	4	8	0.5	0.8	0.3	A	R	04/17/18	E-1	636	45	2.0/W	
E-663	2	19	0.4	0.6	0.2	A	R	04/17/18	E-1	636	45	2.0/W	
E-665	5	10	0.4	0.7	0.3	A	R	04/17/18	E-1	636	45	2.0/W	
E-667	3	29	0.2	0.2	0	A	R	04/17/18	E-1	636	45	2.0/W	
E-669	4	8	0.1	0.3	0.2	A	R	04/17/18	E-1	636	45	2.0/W	
E-671	2	19	0.1	1.1	1	A	R	04/17/18	E-1	636	45	2.0/W	
E-673	3	6	0.1	0.3	0.2	A	R	04/17/18	E-1	636	45	2.0/W	
E-675	3	7	0.1	0.2	0.1	A	R	04/17/18	E-1	636	45	2.0/W	seal is enclosed
E-677	4	10	0.1	0.6	0.5	A	R	04/17/18	E-1	636	45	2.0/W	seal is enclosed
E-679	3	7	0.1	0.4	0.3	A	R	04/17/18	E-1	636	49	4.0/NW	seal is enclosed
E-681	3	7	0.2	0.3	0.1	A	R	04/17/18	E-1	636	49	4.0/NW	seal is enclosed
E-683	3	57	0.1	0.2	0.1	A	R	04/17/18	E-1	636	49	4.0/NW	
E-685	4	10	0.1	0.4	0.3	A	R	04/17/18	E-1	636	49	4.0/NW	
E-687	3	57	0.1	0.2	0.1	A	R	04/17/18	E-1	636	49	4.0/NW	
E-689	4	10	0.1	0.3	0.2	A	R	04/17/18	E-1	636	49	4.0/NW	
E-691	4	10	0.1	0.3	0.2	A	R	04/17/18	E-1	636	49	4.0/NW	seal is enclosed
E-693	4	10	0.1	0.2	0.1	A	R	04/17/18	E-1	636	49	4.0/NW	seal is enclosed
E-695	3	14	0.2	0.3	0.1	A	R	04/17/18	E-1	636	49	4.0/NW	seal is enclosed
E-697	4	76	1.7	16.9	15.2	A	R	04/17/18	E-1	636	49	4.0/NW	P-1779
E-699	2	13	2.2	2.3	0.1	A	R	04/17/18	E-1	636	49	4.0/NW	
E-701	2	38	1.6	2.4	0.8	A	R	04/17/18	E-1	636	49	4.0/NW	P-1749
E-703	3	19	1.8	1.9	0.1	A	R	04/17/18	E-1	636	49	4.0/NW	
E-705	3	57	1.8	31.5	29.7	A	R	04/17/18	E-1	636	49	4.0/NW	P-1748 NOT running
E-707	4	25	2.4	2.7	0.3	A	R	04/17/18	E-1	636	49	4.0/NW	
E-709	4	38	1.5	3.7	2.2	A	R	04/17/18	E-1	636	61	5.0/NE	WSD Outboard
E-711	5	10	1.4	2.7	1.3	A	R	04/17/18	E-1	636	61	5.0/NE	WSD Housing
E-713	2	19	1.7	1.9	0.2	A	R	04/17/18	E-1	636	61	5.0/NE	WSD inboard
E-715	2	19	1.7	2	0.3	A	R	04/17/18	E-1	636	61	5.0/NE	ESD inboard
E-717	4	6	1.7	1.7	0	A	R	04/17/18	E-1	636	61	5.0/NE	ESD Housing
E-719	3	29	1.5	1.6	0.1	A	R	04/17/18	E-1	636	61	5.0/NE	ESD Outboard
E-721	4	25	1.3	1.4	0.1	A	R	04/17/18	E-1	636	61	5.0/NE	SV-1794
E-900	1	25	0	0.1	0.1	A	R	04/17/18	E-1	640	61	0.8/E	No Bonnet
E-902	1	25	0	0.1	0.1	A	R	04/17/18	E-1	640	61	0.8/E	6 OF 10 NON-LEAKS Connector Picture
E-904	1	25	0	0	0	A	R	04/17/18	E-1	640	61	0.8/E	No Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-906	1	25	0	0.1	0.1	A	R	04/17/18	E-1	640	61	0.8/E	No Bonnet
E-908	1	38	0	0	0	A	R	04/17/18	E-1	640	61	0.8/E	
E-910	2	5	0	0	0	A	R	04/17/18	E-1	640	61	0.8/E	
E-912	1	2	0	0.1	0.1	A	R	04/17/18	E-1	640	61	0.8/E	
E-914	3	10	0	0.1	0.1	A	R	04/17/18	E-1	640	61	0.8/E	
E-916	0.5	13	-0.1	0	0.1	A	R	04/17/18	E-1	640	61	0.8/E	No Bonnet
E-918	1	25	-0.1	-0.1	0	A	R	04/17/18	E-1	640	61	0.8/E	
E-920	1	6	-0.1	0	0.1	A	R	04/17/18	E-1	640	61	0.8/E	
E-922	1	5	-0.1	0	0.1	A	R	04/17/18	E-1	640	61	0.8/E	
E-924	1	2	-0.1	0	0.1	A	R	04/17/18	E-1	640	61	0.8/E	
E-926	1	25	-0.1	-0.1	0	A	R	04/17/18	E-1	640	61	0.8/E	
E-928	1	25	-0.2	-0.2	0	A	R	04/17/18	E-1	640	61	0.8/E	
E-930	1	25	-0.2	-0.2	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-932	1	5	-0.2	-0.2	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-934	1	5	-0.3	-0.3	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-936	1	5	-0.4	-0.4	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-938	1	25	-0.5	-0.4	0.1	A	R	04/17/18	E-1	640	61	1.8/N	No Bonnet
E-940	1	5	-0.5	-0.4	0.1	A	R	04/17/18	E-1	640	61	1.8/N	
E-942	2	10	-0.5	-0.4	0.1	A	R	04/17/18	E-1	640	61	1.8/N	
E-944	2	10	-0.4	-0.4	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-946	1	10	-0.4	-0.4	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-948	1	38	-0.5	-0.5	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-950	0.5	19	-0.5	-0.4	0.1	A	R	04/17/18	E-1	640	61	1.8/N	
E-952	1	25	-0.4	-0.5	0	A	R	04/17/18	E-1	640	61	1.8/N	No Bonnet
E-954	1	25	-0.5	-0.5	0	A	R	04/17/18	E-1	640	61	1.8/N	No Bonnet
E-956	1	25	-0.5	-0.5	0	A	R	04/17/18	E-1	640	61	1.8/N	
E-958	0.5	13	-0.6	-0.6	0	A	R	04/17/18	E-1	640	61	1.8/N	No Bonnet
E-960	2	6	0.7	1.2	0.5	A	R	04/17/18	E-1	638	65	1.7/E	
E-962	2	6	0.7	0.8	0.1	A	R	04/17/18	E-1	638	65	1.7/E	
E-964	1	25	0.7	0.8	0.1	A	R	04/17/18	E-1	638	65	1.7/E	No Bonnet
E-966	1	25	0.6	0.8	0.2	A	R	04/17/18	E-1	638	65	1.7/E	7 OF 10 NON-LEAKS CONNECTORS PICTURE
E-968	1	25	0.8	0.9	0.1	A	R	04/17/18	E-1	638	65	1.7/E	
E-970	1	10	0.7	0.8	0.1	A	R	04/17/18	E-1	638	65	1.7/E	
E-972	1	10	0.6	0.7	0.1	A	R	04/17/18	E-1	638	65	1.7/E	
E-974	2	6	0.7	1.3	0.6	A	R	04/17/18	E-1	638	65	1.7/E	
E-976	6	19	0.8	25.1	24.3	A	R	04/17/18	E-1	638	65	1.7/E	
E-978	2	6	0.8	1.8	1	A	R	04/17/18	E-1	638	65	1.7/E	
E-980	2	6	0.7	0.9	0.2	A	R	04/17/18	E-1	638	65	1.7/E	
E-982	1	3	0.7	0.9	0.2	A	R	04/17/18	E-1	638	65	1.7/E	8 OF 10 NON-LEAKS CONNECTORS PICTURE
E-984	0.5	13	0.7	0.7	0	A	R	04/17/18	E-1	638	65	1.7/E	No Bonnet
E-986	0.5	13	0.7	0.9	0.2	A	R	04/17/18	E-1	638	65	1.7/E	No Bonnet
E-988	1	38	0.7	0.9	0.2	A	R	04/17/18	E-1	638	75	1.6/E	
E-990	1	38	0.6	0.7	0.1	A	R	04/17/18	E-1	638	75	1.6/E	
E-992	7	22	0.8	25.3	24.5	A	R	04/17/18	E-1	638	75	1.6/E	
E-994	2	6	0.7	0.8	0.1	A	R	04/17/18	E-1	638	75	1.6/E	
E-996	2	6	0.6	0.7	0.1	A	R	04/17/18	E-1	638	75	1.6/E	
E-998	1	38	0.5	0.5	0	A	R	04/17/18	E-1	638	75	1.6/E	
E-1000	1	38	0.4	0.6	0.2	A	R	04/17/18	E-1	638	75	1.6/E	
E-1002	3	115	0.3	0	0	A	R	04/17/18	E-1	638	75	1.6/E	
E-1004	0.5	19	1.5	1.6	0.1	A	R	04/17/18	E-1	638	75	1.6/E	
E-1006	1	25	1.5	1.7	0.2	A	R	04/17/18	E-1	638	75	1.6/E	
E-1008	2	51	1.6	1.7	0.1	A	R	04/17/18	E-1	638	75	1.6/E	No Bonnet
E-1010	1	25	1.6	1.7	0.1	A	R	04/17/18	E-1	638	75	1.6/E	No Bonnet
E-1012	1	3	1.6	18	16.4	A	R	04/17/18	E-1	638	75	1.6/E	
E-1014	1	3	1.6	1.7	0.1	A	R	04/17/18	E-1	638	75	1.6/E	9 OF 10 NON-LEAKS CONNECTORS PICTURE
E-1016	3	10	1.7	1.8	0.1	A	R	04/17/18	E-1	638	75	1.6/E	
E-1018	1	25	1.6	1.8	0.2	A	R	04/17/18	E-1	638	72	2.2/E	
E-1020	1	25	1.6	1.8	0.2	A	R	04/17/18	E-1	638	72	2.2/E	
E-1022	2	6	1.6	12.6	11	A	R	04/17/18	E-1	638	72	2.2/E	
E-1024	1	25	1.6	1.7	0.1	A	R	04/17/18	E-1	638	72	2.2/E	No Bonnet
E-1026	4	102	1.5	1.9	0.4	A	R	04/17/18	E-1	638	72	2.2/E	10 OF 10 NON-LEAKS CONNECTORS PICTURE
E-1028	1	25	1.6	1.7	0.1	A	R	04/17/18	E-1	638	72	2.2/E	No Bonnet
E-1030	1	25	1.4	1.5	0.1	A	R	04/17/18	E-1	638	72	2.2/E	No Bonnet
E-1032	0.5	19	1.4	1.5	0.1	A	R	04/17/18	E-1	638	72	2.2/E	
E-1034	0.5	19	1.4	1.5	0.1	A	R	04/17/18	E-1	638	72	2.2/E	
E-1036	1	38	1.4	1.5	0.1	A	R	04/17/18	E-1	638	72	2.2/E	
E-1038	1	38	1.4	1.4	0	A	R	04/17/18	E-1	638	72	2.2/E	
E-1040	1	38	1.4	1.6	0.2	A	R	04/17/18	E-1	638	72	2.2/E	
E-1042	1	38	1.4	1.4	0	A	R	04/17/18	E-1	638	72	2.2/E	
E-1044	1	38	1.3	1.3	0	A	R	04/17/18	E-1	638	72	2.2/E	
E-1046	0.5	19	1.3	1.4	0.1	A	R	04/17/18	E-1	638	72	2.2/E	
E-1048	1	38	1.3	1.2	0	A	R	04/17/18	E-1	638	76	3.3/NW	
E-1050	1	25	1.3	1.4	0.1	A	R	04/17/18	E-1	638	76	3.3/NW	No Bonnet
E-1052	3	76	1.3	1.2	0	A	R	04/17/18	E-1	638	76	3.3/NW	
E-1054	1	25	1.2	1.4	0.2	A	R	04/17/18	E-1	638	76	3.3/NW	No Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1056	1	25	1.4	1.6	0.2	A	R	04/17/18	E-1	638	76	3.3/NW	
E-1058	1	25	1.6	1.7	0.1	A	R	04/17/18	E-1	638	76	3.3/NW	No Bonnet
E-1060	1	26	1.5	1.5	0	A	R	04/17/18	E-1	638	76	3.3/NW	No Bonnet
E-1062	1	25	1.3	1.7	0.4	A	R	04/17/18	E-1	638	76	3.3/NW	
E-1064	1	19	1.5	1.6	0.1	A	R	04/17/18	E-1	640	76	3.3/NW	No Bonnet
E-1066	3	57	1.4	2.6	1.2	A	R	04/17/18	E-1	640	76	3.3/NW	No Bonnet
E-1068	1	19	1.7	2.6	0.9	A	R	04/17/18	E-1	640	76	3.3/NW	No Bonnet
E-1070	1	19	1.8	1.6	0	A	R	04/17/18	E-1	640	76	3.3/NW	No Bonnet
E-1072	1	19	1.5	1.5	0	A	R	04/17/18	E-1	640	76	3.3/NW	
E-1074	1	19	1.3	1.3	0	A	R	04/17/18	E-1	640	76	3.3/NW	
E-1076	1	25	1.1	1.3	0.2	A	R	04/17/18	E-1	640	77	1.1/E	No Bonnet
E-1078	1	5	1.2	1.4	0.2	A	R	04/17/18	E-1	640	77	1.1/E	
E-1080	2	10	1.3	1.3	0	A	R	04/17/18	E-1	640	77	1.1/E	
E-1082	1	25	1.3	1.3	0	A	R	04/17/18	E-1	640	77	1.1/E	
E-1084	1	25	1.3	1.4	0.1	A	R	04/17/18	E-1	640	77	1.1/E	
E-1086	1	5	1.2	1.7	0.5	A	R	04/17/18	E-1	640	77	1.1/E	
E-1088	1	5	1.3	1.5	0.2	A	R	04/17/18	E-1	640	77	1.1/E	
E-1090	1	5	1.4	1.4	0	A	R	04/17/18	E-1	640	77	1.1/E	No Bonnet
E-1092	0.5	13	1.4	1.5	0.1	A	R	04/17/18	E-1	640	77	1.1/E	
E-1094	1	5	1.3	1.3	0	A	R	04/17/18	E-1	640	77	1.1/E	
E-1096	1	5	1.3	1.4	0.1	A	R	04/17/18	E-1	640	77	1.1/E	
E-1098	0.5	13	1.3	1.4	0.1	A	R	04/17/18	E-1	640	77	1.1/E	No Bonnet
E-1100	3	19	1.3	3.8	2.5	A	R	04/17/18	E-1	640	77	1.1/E	
E-1102	1	6	1.5	1.5	0	A	R	04/17/18	E-1	640	77	1.1/E	
E-1104	1	6	1.4	1.5	0.1	A	R	04/17/18	E-1	640	77	1.1/E	
E-1106	1	25	1.3	1.4	0.1	A	R	04/17/18	E-1	640	83	1.4/W	No Bonnet
E-1108	0.5	13	1.3	1.4	0.1	A	R	04/17/18	E-1	640	83	1.4/W	No Bonnet
E-1110	0.5	13	1.3	1.3	0	A	R	04/17/18	E-1	640	83	1.4/W	
E-1112	1	25	1.2	1.4	0.2	A	R	04/17/18	E-1	640	83	1.4/W	
E-1114	1	19	1.2	1.4	0.2	A	R	04/17/18	E-1	640	83	1.4/W	No Bonnet
E-1116	1	19	1.3	1.4	0.1	A	R	04/17/18	E-1	640	83	1.4/W	
E-1118	0.5	10	1.3	1.5	0.2	A	R	04/17/18	E-1	640	83	1.4/W	
E-1120	1	25	1.4	1.4	0	A	R	04/17/18	E-1	640	83	1.4/W	
E-1122	0.5	13	1.4	1.5	0.1	A	R	04/17/18	E-1	640	83	1.4/W	No Bonnet
E-723	3	76	0.9	1	0.1	A	R	04/18/18	E-1	636	55	1.1/E	
E-725	5	10	0.9	3.3	2.4	A	R	04/18/18	E-1	636	55	1.1/E	
E-727	5	10	1.3	20.1	18.8	A	R	04/18/18	E-1	636	55	1.1/E	
E-729	4	13	2.2	2.3	0.1	A	R	04/18/18	E-1	636	55	1.1/E	
E-731	5	10	1.9	4.1	2.2	A	R	04/18/18	E-1	636	55	1.1/E	
E-723	2	6	1.7	3.4	1.7	A	R	04/18/18	E-1	636	55	1.1/E	
E-725	3	76	1.6	1.5	0	A	R	04/18/18	E-1	636	55	1.1/E	No Bonnet
E-727	2	51	1.3	1.5	0.2	A	R	04/18/18	E-1	636	55	1.1/E	No Bonnet
E-729	2	51	1.3	1.4	0.1	A	R	04/18/18	E-1	636	55	1.1/E	
E-731	4	8	1.3	4.4	3.1	A	R	04/18/18	E-1	636	55	1.1/E	
E-733	3	76	1.4	1.7	0.3	A	R	04/18/18	E-1	636	55	1.1/E	
E-735	1	25	1.2	1.2	0	A	R	04/18/18	E-1	636	55	1.1/E	
E-737	4	8	1.1	1.1	0	A	R	04/18/18	E-1	636	55	1.1/E	
E-739	2	51	1	1.4	0.4	A	R	04/18/18	E-1	636	55	1.1/E	No Bonnet
E-741	1	25	1.4	1	0	A	R	04/18/18	E-1	636	55	1.1/E	
E-743	4	8	1	1	0	A	R	04/18/18	E-1	636	55	1.1/E	
E-745	2	51	0.9	1	0.1	A	R	04/18/18	E-1	636	55	1.1/E	
E-747	5	10	0.7	0.9	0.2	A	R	04/18/18	E-1	636	55	1.1/E	
E-749	4	8	0.6	3.4	2.8	A	R	04/18/18	E-1	636	55	1.1/E	
E-751	3	10	0.7	0.9	0.2	A	R	04/18/18	E-1	636	55	1.1/E	
E-753	6	11	0.7	6.7	6	A	R	04/18/18	E-1	636	55	1.1/E	
E-755	2	51	0.7	1.7	1	A	R	04/18/18	E-1	636	55	1.1/E	No Bonnet
E-757	1	25	0.9	1.1	0.2	A	R	04/18/18	E-1	636	55	1.1/E	
E-759	5	10	0.6	3.2	2.6	A	R	04/18/18	E-1	636	55	1.1/E	
E-761	4	8	0.9	1.4	0.5	A	R	04/18/18	E-1	636	55	1.1/E	
E-763	2	51	0.5	1.1	0.6	A	R	04/18/18	E-1	636	55	1.1/E	No Bonnet
E-765	1	25	0.6	0.6	0	A	R	04/18/18	E-1	636	55	1.1/E	
E-767	2	51	0.5	0.8	0.3	A	R	04/18/18	E-1	636	55	1.1/E	No Bonnet
E-769	1	25	0.8	1	0.2	A	R	04/18/18	E-1	636	55	1.1/E	
E-771	2	51	0.8	0.9	0.1	A	R	04/18/18	E-1	636	55	1.1/E	No Bonnet
E-773	1	25	1.1	1.2	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-775	2	51	1.1	1.2	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-777	1	25	1.3	1.6	0.3	A	R	04/18/18	E-1	636	56	1.1/E	
E-779	2	51	1.4	1.5	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-781	1	25	1.1	2.8	1.7	A	R	04/18/18	E-1	636	56	1.1/E	
E-783	2	3	1.1	1.5	0.4	A	R	04/18/18	E-1	636	56	1.1/E	STEM AND PACKING ONLY
E-785	2	38	1.3	1.4	0.1	A	R	04/18/18	E-1	636	56	1.1/E	No Bonnet
E-787	1	19	1.1	1.5	0.4	A	R	04/18/18	E-1	636	56	1.1/E	
E-789	2	3	1.1	1.3	0.2	A	R	04/18/18	E-1	636	56	1.1/E	STEM ONLY
E-791	1	25	1.1	1.2	0.1	A	R	04/18/18	E-1	636	56	1.1/E	No Bonnet
E-793	1	25	1	1.2	0.2	A	R	04/18/18	E-1	636	56	1.1/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-795	2	3	1	1.1	0.1	A	R	04/18/18	E-1	636	56	1.1/E	STEM ONLY
E-797	2	3	1	1.1	0.1	A	R	04/18/18	E-1	636	56	1.1/E	STEM ONLY
E-799	2	51	1	1.1	0.1	A	R	04/18/18	E-1	636	56	1.1/E	No Bonnet
E-801	1	25	1	1.4	0.4	A	R	04/18/18	E-1	636	56	1.1/E	
E-803	3	19	1	1.1	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-805	2	51	1	1	0	A	R	04/18/18	E-1	636	56	1.1/E	No Bonnet
E-807	3	29	0.9	1.1	0.2	A	R	04/18/18	E-1	636	56	1.1/E	
E-809	2	19	0.9	1	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-811	4	10	1	1	0	A	R	04/18/18	E-1	636	56	1.1/E	
E-813	5	12	1	28.7	27.7	A	R	04/18/18	E-1	636	56	1.1/E	Northside of e-903
E-815	2	51	2.1	2.3	0.2	A	R	04/18/18	E-1	636	56	1.1/E	
E-817	1	25	2.1	6.7	4.6	A	R	04/18/18	E-1	636	56	1.1/E	
E-819	4	25	2.1	9.7	7.6	A	R	04/18/18	E-1	636	56	1.1/E	
E-821	3	19	1.1	1.3	0.2	A	R	04/18/18	E-1	636	56	1.1/E	
E-823	3	5	1.1	1.2	0.1	A	R	04/18/18	E-1	636	56	1.1/E	4F045
E-825	2	51	1.1	1.2	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-827	1	25	1.1	1.1	0	A	R	04/18/18	E-1	636	56	1.1/E	
E-829	5	48	1	18	17	A	R	04/18/18	E-1	636	56	1.1/E	
E-831	2	19	0.3	0.3	0	A	R	04/18/18	E-1	636	56	1.1/E	
E-833	5	8	2	2.3	0.3	A	R	04/18/18	E-1	636	56	1.1/E	
E-835	2	51	2.1	2.1	0	A	R	04/18/18	E-1	636	56	1.1/E	
E-837	1	25	1.9	2	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-839	2	51	1.8	1.9	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-841	5	8	1.7	2.8	1.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-843	4	6	1.7	2	0.3	A	R	04/18/18	E-1	636	56	1.1/E	
E-845	3	5	1.8	1.9	0.1	A	R	04/18/18	E-1	636	56	1.1/E	
E-847	2	51	1.8	1.8	0	A	R	04/18/18	E-1	636	56	1.1/E	No Bonnet
E-849	2	51	1.7	1.7	0	A	R	04/18/18	E-1	636	56	1.1/E	
E-1124	1	10	1.2	1.3	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1126	1	10	1.2	1.3	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1128	1	25	1.3	1.3	0	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1130	2	19	1.3	1.3	0	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1132	1	10	1.2	1.4	0.2	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1134	1	10	1.3	1.4	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1136	1	10	1.3	1.3	0	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1138	1	25	1.3	1.4	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	No Bonnet
E-1140	1	38	1.3	1.4	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1142	3	115	1.3	3.9	2.6	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1144	2	51	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	No Bonnet
E-1146	1	25	2.3	2.4	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	No Bonnet
E-1148	1	25	2.5	2.7	0.2	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1150	0.5	19	2.5	2.5	0	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1152	1	38	2.3	2.4	0.1	A	R	04/18/18	E-1	1881	55	1.1/E	
E-1154	1	10	2	2.3	0.3	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1156	1	25	2.1	2.2	0.1	A	R	04/18/18	E-1	1881	61	3.6/E	
E-1158	1	25	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	61	3.6/E	
E-1160	1	10	2	2.4	0.4	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1162	1	25	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	61	3.6/E	
E-1164	0.5	13	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1166	1	25	2.2	2.2	0	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1168	1	10	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1170	1	19	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1172	2	10	2.1	2.5	0.4	A	R	04/18/18	E-1	1881	61	3.6/E	
E-1174	1	25	1.9	2.6	0.7	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1176	1	25	2.6	2.9	0.3	A	R	04/18/18	E-1	1881	61	3.6/E	
E-1178	2	51	2.8	2.9	0.1	A	R	04/18/18	E-1	1881	61	3.6/E	No Bonnet
E-1180	1	25	2.6	2.9	0.3	A	R	04/18/18	E-1	1881	61	3.6/E	
E-1182	3	19	2.9	3.2	0.3	A	R	04/18/18	E-1	1881	61	3.6/E	
E-1184	1	6	0.1	0.2	0.1	A	R	04/18/18	E-1	640	77	1.6/S	No Bonnet
E-1186	1	6	0.1	0.2	0.1	A	R	04/18/18	E-1	640	77	1.6/S	
E-1188	1	10	0.1	0.2	0.1	A	R	04/18/18	E-1	640	77	1.6/S	
E-1190	0.5	19	0.1	0.2	0.1	A	R	04/18/18	E-1	640	77	1.6/S	No Bonnet
E-1192	1	38	0.3	0.3	0	A	R	04/18/18	E-1	640	77	1.6/S	
E-1194	2	10	0.1	0.2	0.1	A	R	04/18/18	E-1	640	77	1.6/S	
E-1196	2	51	0.1	0.2	0.1	A	R	04/18/18	E-1	640	77	1.6/S	No Bonnet
E-1198	1	25	0.2	0.2	0	A	R	04/18/18	E-1	640	77	1.6/S	
E-1200	1	25	0.1	0.2	0.1	A	R	04/18/18	E-1	640	77	1.6/S	
E-1202	2	51	0.1	0.5	0.4	A	R	04/18/18	E-1	640	77	1.6/S	
E-1204	3	6	0	2.5	2.5	A	R	04/18/18	E-1	640	77	1.6/S	
E-1206	0.5	13	0	0	0	A	R	04/18/18	E-1	640	77	1.6/S	No Bonnet
E-1208	0.5	13	0	0.1	0.1	A	R	04/18/18	E-1	640	77	1.6/S	No Bonnet
E-1210	0.5	13	0	0.1	0.1	A	R	04/18/18	E-1	640	77	1.6/S	No Bonnet
E-1212	1	25	0	0.1	0.1	A	R	04/18/18	E-1	640	67	4.5/E	
E-1214	1	25	0	0	0	A	R	04/18/18	E-1	640	67	4.5/E	No Bonnet/Insulated
E-1216	0.5	13	0	0	0	A	R	04/18/18	E-1	640	67	4.5/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1218	1	25	0	0.1	0.1	A	R	04/18/18	E-1	640	67	4.5/E	
E-1220	4	8	0	0.9	0.9	A	R	04/18/18	E-1	640	67	4.5/E	
E-1222	0.5	13	0	0.1	0.1	A	R	04/18/18	E-1	640	67	4.5/E	
E-1224	0.5	5	0	0.2	0.2	A	R	04/18/18	E-1	640	67	4.5/E	No Bonnet
E-1226	0.5	5	0	0.1	0.1	A	R	04/18/18	E-1	640	67	4.5/E	
E-1228	0.5	5	0	0.1	0.1	A	R	04/18/18	E-1	640	67	4.5/E	
E-1230	1	10	0	0.1	0.1	A	R	04/18/18	E-1	640	67	4.5/E	
E-1232	1	10	0	0	0	A	R	04/18/18	E-1	640	67	4.5/E	
E-1234	2	19	0	0	0	A	R	04/18/18	E-1	640	67	4.5/E	
E-1236	1	10	0.5	0.2	0	A	R	04/18/18	E-1	640	67	4.5/E	
E-1238	2	19	0	0.6	0.6	P	R	04/18/18	E-1	640	67	4.5/E	INSULATED BONNET
E-1240	1	10	0	0.1	0.1	A	R	04/18/18	E-1	640	67	4.5/E	
E-1242	2	4	0	0.4	0.4	A	R	04/18/18	E-1	640	67	4.1/E	last inspection before lunch
E-1244	3	6	2.2	2.3	0.1	A	R	04/18/18	E-1	640	67	4.1/E	
E-1246	1	25	2.2	2.2	0	A	R	04/18/18	E-1	640	67	4.1/E	
E-1248	1	25	2.1	2.2	0.1	A	R	04/18/18	E-1	640	67	4.1/E	
E-1250	1	25	2.1	2.2	0.1	A	R	04/18/18	E-1	640	67	4.1/E	No Bonnet
E-1252	2	51	2.1	2.1	0	A	R	04/18/18	E-1	640	67	4.1/E	
E-1254	1	25	2.1	2.2	0.1	A	R	04/18/18	E-1	640	67	4.1/E	
E-1256	2	38	2.2	2.1	0	A	R	04/18/18	E-1	640	67	4.1/E	
E-1258	2	38	2.1	2.1	0	A	R	04/18/18	E-1	640	67	4.1/E	
E-1260	1	19	1.9	2.1	0.2	A	R	04/18/18	E-1	640	67	4.1/E	No Bonnet/Insulated
E-1262	3	7	1.9	2.4	0.5	A	R	04/18/18	E-1	640	67	4.1/E	
E-1264	1	3	2.3	2	0	A	R	04/18/18	E-1	640	67	4.1/E	
E-1266	1	3	2.2	2.3	0.1	A	R	04/18/18	E-1	640	67	4.1/E	
E-1268	2	6	2.1	2.2	0.1	A	R	04/18/18	E-1	640	67	4.1/E	
E-1270	1	25	2	2.1	0.1	A	R	04/18/18	E-1	640	67	4.1/E	
E-1272	2	6	1.9	2	0.1	A	R	04/18/18	E-1	640	63	5.2/E	
E-1274	1	3	1.8	2	0.2	A	R	04/18/18	E-1	640	63	5.2/E	
E-1276	1	19	1.9	1.9	0	A	R	04/18/18	E-1	640	63	5.2/E	No Bonnet
E-1278	1	19	1.9	1.9	0	A	R	04/18/18	E-1	640	63	5.2/E	
E-1280	1	19	1.8	2	0.2	A	R	04/18/18	E-1	640	63	5.2/E	No Bonnet
E-1282	1	38	1.8	1.9	0.1	A	R	04/18/18	E-1	640	63	5.2/E	
E-1284	2	19	1.8	1.9	0.1	A	R	04/18/18	E-1	640	63	5.2/E	
E-1286	4	102	1.8	1.7	0	A	R	04/18/18	E-1	640	63	5.2/E	No Bonnet
E-1288	1	25	1.8	1.8	0	A	R	04/18/18	E-1	640	63	5.2/E	
E-1290	2	10	1.7	1.9	0.2	A	R	04/18/18	E-1	640	63	5.2/E	
E-1292	1	25	1.7	1.8	0.1	A	R	04/18/18	E-1	640	63	5.2/E	
E-1294	5	127	1.7	13.7	12	A	R	04/18/18	E-1	640	63	5.2/E	
E-1296	2	13	1.4	1.4	0	A	R	04/18/18	E-1	1881	63	5.2/E	
E-1298	1	25	1.4	1.5	0.1	A	R	04/18/18	E-1	1881	63	5.2/E	
E-1300	1	6	1.3	1.5	0.2	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1302	1	25	1.4	1.5	0.1	A	R	04/18/18	E-1	1881	64	0.9/E	No Bonnet
E-1304	3	19	1.4	3.4	2	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1306	2	13	2.8	2.9	0.1	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1308	2	13	2.6	3.3	0.7	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1310	1	6	2.2	2.5	0.3	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1312	0.5	13	2.3	2.5	0.2	A	R	04/18/18	E-1	1881	64	0.9/E	No Bonnet
E-1314	1	6	2.3	2.4	0.1	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1316	1	25	2.3	2.3	0	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1318	1	38	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1320	1	5	2.2	2.3	0.1	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1322	1	5	2.1	2	0	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1324	1	10	2	2	0	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1326	0.5	5	1.7	1.8	0.1	A	R	04/18/18	E-1	1881	64	0.9/E	No Bonnet
E-1328	2	5	1.7	1.9	0.2	A	R	04/18/18	E-1	1881	64	0.9/E	
E-1330	1	2	1.8	1.8	0	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1332	1	2	1.8	1.8	0	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1334	1	25	1.7	1.8	0.1	P	R	04/18/18	E-1	1881	63	4.2/E	Bonnet Insulated
E-1336	1	25	1.8	1.8	0	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1338	1	25	1.7	1.7	0	P	R	04/18/18	E-1	1881	63	4.2/E	Bonnet Insulated
E-1340	1	25	1.7	1.7	0	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1342	1	25	1.6	1.8	0.2	A	R	04/18/18	E-1	1881	63	4.2/E	No Bonnet
E-1344	2	10	1.7	1.8	0.1	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1346	1	19	1.6	1.7	0.1	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1348	1	19	1.7	1.7	0	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1350	0.5	13	1.7	1.7	0	A	R	04/18/18	E-1	1881	63	4.2/E	
E-1352	0.5	13	1.7	1.8	0.1	A	R	04/18/18	E-1	1881	63	4.2/E	
E-879	3	29	1.2	1.5	0.3	A	R	04/19/18	E-1	636	49	6/NE	
E-881	5	8	1.3	2.9	1.6	A	R	04/19/18	E-1	636	49	6/NE	
E-883	3	29	0.9	9	8.1	A	R	04/19/18	E-1	636	49	6/NE	
E-885	6	1	2.7	6	3.3	A	R	04/19/18	E-1	636	49	6/NE	
E-887	5	95	3	3.1	0.1	U	R	04/19/18	E-1	636	49	6/NE	cant monitor pump seal (Excessive steam)
E-889	3	57	0.9	1	0.1	A	R	04/19/18	E-1	636	49	6/NE	
E-891	5	10	1	1.4	0.4	A	R	04/19/18	E-1	636	49	6/NE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-893	2	38	0.8	0.9	0.1	A	R	04/19/18	E-1	636	49	6/NE	
E-895	6	11	0.8	0.9	0.1	A	R	04/19/18	E-1	636	49	6/NE	
E-897	5	16	0.6	0.8	0.2	A	R	04/19/18	E-1	636	49	6/NE	9h005
E-899	5	16	0.7	0.7	0	A	R	04/19/18	E-1	636	49	6/NE	9f154
E-901	3	38	0.6	0.8	0.2	A	R	04/19/18	E-1	636	49	6/NE	No Bonnet
E-903	4	13	0.6	0.8	0.2	A	R	04/19/18	E-1	636	49	6/NE	
E-905	6	19	0.6	1.1	0.5	A	R	04/19/18	E-1	636	49	6/NE	
E-907	4	13	0.6	0.8	0.2	A	R	04/19/18	E-1	636	49	6/NE	
E-851	3	29	0.9	1.1	0.2	U	R	04/19/18	E-1	636	49	6/NE	cant monitor pump seal (Excessive steam)
E-853	4	8	0.7	1	0.3	A	R	04/19/18	E-1	636	49	6/NE	
E-855	3	29	0.8	1.5	0.7	U	R	04/19/18	E-1	636	49	6/NE	cant monitor pump seal (Excessive steam)
E-857	5	10	0.8	3.1	2.3	A	R	04/19/18	E-1	636	49	6/NE	
E-859	3	29	1.5	1.4	0	A	R	04/19/18	E-1	636	49	6/NE	
E-861	4	13	1	1.1	0.1	A	R	04/19/18	E-1	636	49	6/NE	
E-863	4	13	0.9	1	0.1	U	R	04/19/18	E-1	636	49	6/NE	cant monitor pump seal (Excessive steam)
E-865	5	10	0.9	1.2	0.3	U	R	04/19/18	E-1	636	49	6/NE	cant monitor pump seal (Excessive steam)
E-867	2	19	1	1.3	0.3	A	R	04/19/18	E-1	636	49	6/NE	
E-869	5	10	0.9	1.5	0.6	A	R	04/19/18	E-1	636	49	6/NE	
E-871	3	29	1	2.5	1.5	A	R	04/19/18	E-1	636	49	6/NE	
E-873	5	10	2	2.2	0.2	A	R	04/19/18	E-1	636	49	6/NE	
E-875	5	10	1.1	2.6	1.5	U	R	04/19/18	E-1	636	49	6/NE	cant monitor pump seal (Excessive steam)
E-877	6	10	1	2.4	1.4	U	R	04/19/18	E-1	636	49	6/NE	cant monitor pump seal (Excessive steam)
E-1354	2	51	1.1	1.1	0	A	R	04/19/18	E-1	1881	49	6/NE	
E-1356	1	25	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	
E-1358	1	25	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	No Bonnet
E-1360	2	5	0	2.7	2.7	A	R	04/19/18	E-1	1881	49	6/NE	
E-1362	1	6	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	No Bonnet
E-1364	2	5	0	0	0	A	R	04/19/18	E-1	1881	49	6/NE	
E-1366	2	5	0.3	0.5	0.2	A	R	04/19/18	E-1	1881	49	6/NE	
E-1368	1	19	0.1	0.1	0	A	R	04/19/18	E-1	1881	49	6/NE	No Bonnet/Insulated
E-1370	1	25	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	
E-1372	1	25	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	Bonnet Insulated
E-1374	2	13	0	1	1	A	R	04/19/18	E-1	1881	49	6/NE	
E-1376	1	25	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	No Bonnet
E-1378	1	25	0	0	0	A	R	04/19/18	E-1	1881	49	6/NE	Bonnet Insulated
E-1380	1	25	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	Bonnet Insulated
E-1382	2	76	0	0.1	0.1	A	R	04/19/18	E-1	1881	49	6/NE	
E-1384	2	76	0	0	0	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1386	1	25	0.1	0.1	0	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1388	1	25	0	0	0	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1390	1	25	0	0.1	0.1	A	R	04/19/18	E-1	1881	68	4.8/E	No Bonnet
E-1392	1	25	0	0	0	A	R	04/19/18	E-1	1881	68	4.8/E	No Bonnet
E-1394	1	5	0	0	0	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1396	1	25	0	0	0	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1398	0.5	2	0	0	0	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1400	1	10	0.9	1	0.1	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1402	1	5	0.9	1	0.1	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1404	1	25	0.9	1	0.1	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1406	1	25	0.9	0.9	0	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1408	1	25	0.8	0.9	0.1	A	R	04/19/18	E-1	1881	68	4.8/E	No Bonnet
E-1410	1	25	0.9	1	0.1	A	R	04/19/18	E-1	1881	68	4.8/E	No Bonnet
E-1412	1	25	0.8	0.9	0.1	A	R	04/19/18	E-1	1881	68	4.8/E	
E-1414	2	76	1	1.2	0.2	A	R	04/19/18	E-1	640	61	2.9/SE	
E-1416	1	25	1	1	0	P	R	04/19/18	E-1	640	61	2.9/SE	Bonnet Insulated
E-1418	0.5	13	0.9	1.1	0.2	P	R	04/19/18	E-1	640	61	2.9/SE	Bonnet Insulated
E-1420	0.5	13	0.9	0.9	0	P	R	04/19/18	E-1	640	61	2.9/SE	Bonnet Insulated
E-1422	0.5	13	0.9	0.9	0	A	R	04/19/18	E-1	640	61	2.9/SE	
E-1424	1	25	0.9	1	0.1	A	R	04/19/18	E-1	640	61	2.9/SE	No Bonnet
E-1426	0.5	13	0.9	0.9	0	A	R	04/19/18	E-1	640	61	2.9/SE	No Bonnet
E-1428	0.5	13	0.8	0.9	0.1	A	R	04/19/18	E-1	640	61	2.9/SE	No Bonnet
E-1430	0.5	13	0.8	0.9	0.1	A	R	04/19/18	E-1	640	61	2.9/SE	No Bonnet
E-1432	0.5	5	0.9	0.9	0	A	R	04/19/18	E-1	640	61	2.9/SE	
E-1434	1	10	0.8	0.9	0.1	A	R	04/19/18	E-1	640	61	2.9/SE	
E-1436	2	10	0.8	0.9	0.1	A	R	04/19/18	E-1	640	61	2.9/SE	
E-1438	2	10	0.9	1	0.1	A	R	04/19/18	E-1	640	61	2.9/SE	
E-1440	1	25	0.9	1.2	0.3	A	R	04/19/18	E-1	640	61	2.9/SE	No Bonnet
E-1442	1	25	1.1	1.2	0.1	A	R	04/19/18	E-1	640	62	7.1/E	No Bonnet
E-1444	1	5	1.3	1.4	0.1	A	R	04/19/18	E-1	640	62	7.1/E	
E-1446	1	10	1.4	1.4	0	A	R	04/19/18	E-1	640	62	7.1/E	
E-1448	2	13	1.3	1.3	0	A	R	04/19/18	E-1	640	62	7.1/E	
E-1450	2	13	1.2	1.3	0.1	A	R	04/19/18	E-1	640	62	7.1/E	
E-1452	1	5	1.3	1.4	0.1	A	R	04/19/18	E-1	640	62	7.1/E	
E-1454	1	10	1.3	1.4	0.1	A	R	04/19/18	E-1	640	62	7.1/E	
E-1456	1	5	1.3	1.3	0	A	R	04/19/18	E-1	640	62	7.1/E	
E-1458	1	10	1.2	1.3	0.1	A	R	04/19/18	E-1	640	62	7.1/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1460	1	25	1.2	1.3	0.1	A	R	04/19/18	E-1	640	62	7.1/E	No Bonnet
E-1462	1	10	1.3	1.3	0	P	R	04/19/18	E-1	640	62	7.1/E	Bonnet Insulated
E-1464	2	19	1.3	1.3	0	P	R	04/19/18	E-1	640	62	7.1/E	Bonnet Insulated
E-1466	1	25	1.2	1.3	0.1	A	R	04/19/18	E-1	640	62	7.1/E	
E-1468	1	25	1.2	1.2	0	A	R	04/19/18	E-1	640	62	7.1/E	
E-1470	2	10	1.2	1.2	0	A	R	04/19/18	E-1	640	62	7.1/E	
E-1472	3	14	1.1	1.2	0.1	A	R	04/19/18	E-1	640	61	6.7/E	
E-1474	0.5	13	0.5	0.6	0.1	A	R	04/19/18	E-1	638	61	6.7/E	
E-1476	1	6	0.3	0.5	0.2	A	R	04/19/18	E-1	638	61	6.7/E	
E-1478	2	19	0.3	0.4	0.1	A	R	04/19/18	E-1	638	61	6.7/E	No Bonnet
E-1480	2	10	0.3	1.7	1.4	A	R	04/19/18	E-1	638	61	6.7/E	
E-1482	1	5	0.4	0.4	0	A	R	04/19/18	E-1	638	61	6.7/E	
E-1484	1	25	0.4	0.5	0.1	A	R	04/19/18	E-1	638	61	6.7/E	No Bonnet
E-1486	1	5	0.4	0.5	0.1	A	R	04/19/18	E-1	638	61	6.7/E	
E-1488	2	10	0.4	0.7	0.3	A	R	04/19/18	E-1	638	61	6.7/E	
E-1490	2	10	0.4	0.4	0	A	R	04/19/18	E-1	638	61	6.7/E	
E-1492	1	10	0.4	0.5	0.1	A	R	04/19/18	E-1	638	61	6.7/E	No Bonnet
E-1494	3	14	0.4	1	0.6	A	R	04/19/18	E-1	638	61	6.7/E	
E-1496	2	76	0.4	0.5	0.1	A	R	04/19/18	E-1	638	61	6.7/E	last inspection before lunch
E-1498	1	38	2.1	2	0	A	R	04/19/18	E-1	640	75	1.8/E	
E-1500	1	38	2	2	0	A	R	04/19/18	E-1	640	75	1.8/E	
E-1502	1	38	1.9	2.3	0.4	A	R	04/19/18	E-1	640	75	1.8/E	
E-1504	1	38	1.8	1.9	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1506	1	38	1.7	1.7	0	A	R	04/19/18	E-1	640	75	1.8/E	
E-1508	1	38	1.7	1.8	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1510	1	38	1.7	1.8	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1512	1	38	1.7	1.8	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1514	1	38	1.7	1.8	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1516	1	38	1.7	1.8	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1518	1	38	1.6	1.7	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1520	3	14	1.7	1.8	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1522	3	14	1.7	1.5	0	A	R	04/19/18	E-1	640	75	1.8/E	
E-1524	0.5	13	2.2	2.1	0	A	R	04/19/18	E-1	640	75	1.8/E	
E-1526	1	25	2	2.1	0.1	A	R	04/19/18	E-1	640	75	1.8/E	
E-1528	1	10	1.8	1.9	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1530	2	13	1.8	1.9	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1532	1	25	1.7	1.8	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	No Bonnet/Insulated
E-1534	1	25	1.7	1.6	0	A	R	04/19/18	E-1	640	72	6.1/NE	No Bonnet
E-1536	2	19	1.5	1.6	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1538	2	19	1.6	1.6	0	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1540	1	25	1.6	1.6	0	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1542	3	4	1.4	1.5	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1544	2	51	1.4	1.5	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1546	1	25	1.4	1.5	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1548	1	25	1.3	1.4	0.1	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1550	2	2	1.3	1.3	0	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1552	1	38	1.4	1.4	0	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1554	1	38	1.4	1.4	0	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1556	2	51	1.4	1.3	0	A	R	04/19/18	E-1	640	72	6.1/NE	
E-1558	3	4	0.7	0.8	0.1	A	R	04/19/18	E-1	638	74	2.4/E	
E-1560	2	19	0.6	0.7	0.1	A	R	04/19/18	E-1	638	74	2.4/E	
E-1562	1	10	0.6	1	0.4	A	R	04/19/18	E-1	638	74	2.4/E	
E-1564	3	4	0.3	0.4	0.1	A	R	04/19/18	E-1	638	74	2.4/E	
E-1566	1	25	0.3	0.3	0	A	R	04/19/18	E-1	638	74	2.4/E	
E-1568	1	25	0.4	0.4	0	A	R	04/19/18	E-1	638	74	2.4/E	
E-1570	2	51	0.4	0.6	0.2	A	R	04/19/18	E-1	638	74	2.4/E	
E-1572	2	2	0.2	0.4	0.2	A	R	04/19/18	E-1	638	74	2.4/E	
E-1574	2	38	0.2	0.2	0	A	R	04/19/18	E-1	638	74	2.4/E	No Bonnet
E-1576	1	25	0.1	0.2	0.1	A	R	04/19/18	E-1	638	74	2.4/E	No Bonnet
E-1578	1	19	0.1	0.3	0.2	A	R	04/19/18	E-1	638	74	2.4/E	No Bonnet
E-1580	2	19	0.1	0.3	0.2	A	R	04/19/18	E-1	638	74	2.4/E	No Bonnet
E-1582	1	10	0	0.1	0.1	A	R	04/19/18	E-1	638	74	2.4/E	No Bonnet
E-1584	2	2	0	0.2	0.2	P	R	04/19/18	E-1	638	74	2.4/E	Bonnet Insulated
E-1786	1	10	0.1	0.3	0.2	A	R	04/19/18	E-1	638	70	3.1/E	No Bonnet
E-1788	2	19	0.1	0.4	0.3	A	R	04/19/18	E-1	638	70	3.1/E	
E-1790	1	10	0.1	0.2	0.1	P	R	04/19/18	E-1	638	70	3.1/E	Bonnet Insulated
E-1792	1	25	0.1	0.1	0	P	R	04/19/18	E-1	638	70	3.1/E	Bonnet Insulated
E-1794	2	2	0.1	0.2	0.1	A	R	04/19/18	E-1	638	70	3.1/E	
E-1796	2	51	0	0	0	A	R	04/19/18	E-1	638	70	3.1/E	No Bonnet
E-879	4	13	2.4	2.8	0.4	A	R	04/19/18	E-1	636	63	11/E	
E-881	4	13	2.3	2.6	0.3	A	R	04/19/18	E-1	636	63	11/E	
E-883	3	38	2.2	2.3	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-885	3	115	2.2	2.2	0	A	R	04/19/18	E-1	636	63	11/E	
E-887	1	38	2	2.1	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-889	1	38	2.1	2.1	0	A	R	04/19/18	E-1	636	63	11/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-891	1	38	2	2.1	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-893	1	38	2.1	2.1	0	A	R	04/19/18	E-1	636	63	11/E	
E-895	2	25	2	2.2	0.2	A	R	04/19/18	E-1	636	63	11/E	
E-897	2	38	2.2	2.3	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-899	2	51	2.1	2.1	0	A	R	04/19/18	E-1	636	63	11/E	
E-901	1	25	2.1	2.1	0	A	R	04/19/18	E-1	636	63	11/E	
E-903	2	51	2	2.1	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-905	1	38	1.9	2	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-907	2	51	1.9	2	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-909	2	51	1.9	1.9	0	A	R	04/19/18	E-1	636	63	11/E	No Bonnet
E-911	3	10	1.8	1.9	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-913	2	6	1.8	2.8	1	A	R	04/19/18	E-1	636	63	11/E	
E-915	3	76	2.8	3.3	0.5	A	R	04/19/18	E-1	636	63	11/E	No Bonnet
E-917	1	25	2	2.7	0.7	A	R	04/19/18	E-1	636	63	11/E	
E-919	3	76	2.2	2.3	0.1	A	R	04/19/18	E-1	636	63	11/E	No Bonnet
E-921	1	25	1.9	1.9	0	A	R	04/19/18	E-1	636	63	11/E	
E-923	3	76	1.7	1.8	0.1	A	R	04/19/18	E-1	636	63	11/E	No Bonnet
E-925	2	51	1.7	1.8	0.1	A	R	04/19/18	E-1	636	63	11/E	No Bonnet
E-927	2	51	1.7	1.9	0.2	A	R	04/19/18	E-1	636	63	11/E	No Bonnet
E-929	2	19	1.7	1.7	0	A	R	04/19/18	E-1	636	63	11/E	
E-931	2	51	1.6	1.6	0	A	R	04/19/18	E-1	636	63	11/E	No Bonnet
E-933	2	51	1.6	5.1	3.5	A	R	04/19/18	E-1	636	63	11/E	
E-935	3	10	1.7	1.8	0.1	A	R	04/19/18	E-1	636	63	11/E	
E-937	3	10	1.7	5.1	3.4	A	R	04/19/18	E-1	636	63	11/E	
E-939	2	5	3.2	3.4	0.2	A	R	04/19/18	E-1	1881	65	13/E	STEM ONLY
E-941	2	25	3.1	3.1	0	A	R	04/19/18	E-1	1881	65	13/E	
E-943	2	25	2.9	3	0.1	A	R	04/19/18	E-1	1881	65	13/E	
E-945	5	12	2.9	30.5	27.6	A	R	04/19/18	E-1	1881	65	13/E	SOUTHSIDE OF E-903
E-947	5	12	2.7	3.4	0.7	A	R	04/19/18	E-1	1881	65	13/E	
E-949	5	12	2.7	3.1	0.4	A	R	04/19/18	E-1	1881	65	13/E	
E-951	2	51	2.6	2.8	0.2	A	R	04/19/18	E-1	1881	65	13/E	
E-953	1	25	2.7	2.8	0.1	A	R	04/19/18	E-1	1881	65	13/E	
E-955	4	38	2.6	2.9	0.3	A	R	04/19/18	E-1	1881	65	13/E	SEAL ENCLOSED
E-957	4	38	2.1	3	0.9	A	R	04/19/18	E-1	1881	65	13/E	SEAL ENCLOSED
E-959	3	5	2.5	2.9	0.4	A	R	04/19/18	E-1	1881	65	13/E	9F108
E-961	3	57	2.7	2.7	0	A	R	04/19/18	E-1	1881	65	13/E	No Bonnet
E-963	1	19	2.7	3	0.3	A	R	04/19/18	E-1	1881	65	13/E	
E-965	5	8	2.7	3	0.3	A	R	04/19/18	E-1	1881	65	13/E	PACKING AND STEM ONLY
E-967	4	102	2.5	2.8	0.3	A	R	04/19/18	E-1	1881	65	13/E	
E-969	6	10	2.6	3.4	0.8	A	R	04/19/18	E-1	1881	65	13/E	
E-971	2	51	2.5	2.6	0.1	A	R	04/19/18	E-1	1881	65	13/E	No Bonnet
E-973	1	25	2.3	2.5	0.2	A	R	04/19/18	E-1	1881	65	13/E	
E-975	5	8	2.4	3.1	0.7	A	R	04/19/18	E-1	1881	65	13/E	
E-977	2	51	2.3	2.4	0.1	A	R	04/19/18	E-1	1881	65	13/E	No Bonnet
E-979	1	25	2.2	2.4	0.2	A	R	04/19/18	E-1	1881	65	13/E	
E-981	2	51	2.2	2.3	0.1	A	R	04/19/18	E-1	1881	65	13/E	No Bonnet
E-983	2	25	2	2.2	0.2	A	R	04/19/18	E-1	1881	65	13/E	
E-985	1	13	2	2.4	0.4	A	R	04/19/18	E-1	1881	65	13/E	
E-987	2	51	2.1	2.2	0.1	A	R	04/19/18	E-1	1881	65	13/E	
E-989	1	25	2.1	2.1	0	A	R	04/19/18	E-1	1881	65	13/E	
E-909	1	25	1.2	1.4	0.2	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-911	1	25	1.2	1.3	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-913	1	5	1.2	1.3	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	
E-915	2	10	1.2	1.3	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	
E-917	1	5	1.3	1.3	0	A	R	04/23/18	E-1	636	59	4.4/SE	
E-919	1	25	1.3	1.3	0	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-921	1	5	1.1	1.3	0.2	A	R	04/23/18	E-1	636	59	4.4/SE	
E-923	1	25	1.2	1.3	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-925	1	25	1.3	1.3	0	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-927	0.5	13	1.2	1.2	0	A	R	04/23/18	E-1	636	59	4.4/SE	
E-929	1	25	1.2	1.3	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-931	0.5	13	1.2	1.5	0.3	A	R	04/23/18	E-1	636	59	4.4/SE	
E-933	2	5	1.3	1.4	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	
E-935	2	5	1.1	4	2.9	A	R	04/23/18	E-1	636	59	4.4/SE	
E-937	2	5	1.3	1.5	0.2	A	R	04/23/18	E-1	636	59	4.4/SE	
E-939	1	25	1.2	1.7	0.5	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-941	0.5	13	1.2	1.4	0.2	A	R	04/23/18	E-1	636	59	4.4/SE	
E-943	1	25	1.2	1.3	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-945	1	19	1.2	1.2	0	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-947	1	25	1.1	1.2	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-949	0.5	13	1.1	1.1	0	A	R	04/23/18	E-1	636	59	4.4/SE	
E-951	2	10	1.1	1.1	0	A	R	04/23/18	E-1	636	59	4.4/SE	
E-953	1	25	1	1.1	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-955	1	5	1	1.1	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	
E-957	1	5	1.1	1.1	0	A	R	04/23/18	E-1	636	59	4.4/SE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-959	1	5	1.1	1.1	0	A	R	04/23/18	E-1	636	59	4.4/SE	
E-961	1	25	1.1	1	0	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-963	0.5	13	1.1	1	0	A	R	04/23/18	E-1	636	59	4.4/SE	
E-965	1	25	1	1	0	A	R	04/23/18	E-1	636	59	4.4/SE	No Bonnet
E-967	1	25	1	1.1	0.1	A	R	04/23/18	E-1	636	59	4.4/SE	
E-969	1	6	0.9	1.2	0.3	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-971	1	25	0.9	0.9	0	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-973	1	25	0.9	0.9	0	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-975	1	6	0.8	1.3	0.5	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-977	1	10	1.1	1.3	0.2	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-979	1	25	0.8	1.2	0.4	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-981	1	10	1.4	1.5	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-983	1	25	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-985	2	4	1.1	1.5	0.4	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-987	2	38	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-989	1	10	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-991	0.5	13	1.1	1.1	0	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-993	2	4	1.1	1.3	0.2	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-995	1	10	1.1	1.1	0	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-997	1	6	1.1	1.1	0	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-999	1	25	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-1001	0.5	13	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-1003	1	38	1.1	1.1	0	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1005	0.5	19	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1007	0.5	19	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1009	1	38	1.1	1.3	0.2	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1011	0.5	19	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1013	1	38	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1015	1	38	1.1	1.3	0.2	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1017	2	13	1.1	1.2	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1019	1	25	1.1	1.3	0.2	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-1021	0.5	13	1.2	1.3	0.1	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1023	1	25	1.1	1.1	0	A	R	04/23/18	E-1	1881	59	4.4/SE	No Bonnet
E-1025	2	51	1.1	1.1	0	A	R	04/23/18	E-1	1881	59	4.4/SE	
E-1027	1	6	1.2	1.3	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1029	2	13	1.1	1.3	0.2	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1031	1	6	1.1	1.2	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1033	1	6	1	1.3	0.3	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1035	1	25	1.1	1.1	0	A	R	04/23/18	E-1	645	59	4.4/SE	No Bonnet
E-1037	0.5	19	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1039	1	25	1	1.2	0.2	A	R	04/23/18	E-1	645	59	4.4/SE	No Bonnet
E-1041	2	19	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1043	1	6	1	1.2	0.2	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1045	1	10	0.9	1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1047	0.5	5	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1049	0.5	13	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	No Bonnet
E-1051	0.5	13	1	1	0	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1053	1	6	1	1.4	0.4	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1055	0.5	13	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	No Bonnet
E-1057	0.5	13	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1059	1	6	1	1	0	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1061	1	6	0.8	1	0.2	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1063	1	25	0.9	0.9	0	A	R	04/23/18	E-1	645	59	4.4/SE	No Bonnet
E-1065	1	25	0.9	1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	No Bonnet
E-1067	0.5	13	0.9	1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1069	1	6	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1071	2	51	0.9	4.5	3.6	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1073	0.5	13	1.1	1.8	0.7	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1075	1	25	1	1.1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	No Bonnet
E-1077	0.5	19	1	1	0	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1079	0.5	19	0.9	1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1081	0.5	19	0.8	0.9	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1083	0.5	19	0.8	0.9	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1085	1	38	0.9	1	0.1	A	R	04/23/18	E-1	645	59	4.4/SE	
E-1087	0.5	5	0.4	0.4	0	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1089	2	10	0.4	0.4	0	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1091	1	25	0.3	0.4	0.1	A	R	04/23/18	E-1	637	59	4.4/SE	No Bonnet
E-1093	0.5	13	0.3	0.4	0.1	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1095	1	5	0.4	0.5	0.1	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1097	2	6	0.4	0.4	0	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1099	1	38	0.3	0.3	0	A	R	04/23/18	E-1	637	59	4.4/SE	No Bonnet
E-1101	0.5	19	0.2	0.3	0.1	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1103	1	25	0.2	0.3	0.1	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1105	1	38	0.3	0.5	0.2	A	R	04/23/18	E-1	637	59	4.4/SE	No Bonnet
E-1107	0.5	19	0.3	0.3	0	A	R	04/23/18	E-1	637	59	4.4/SE	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1109	2	6	0.3	0.4	0.1	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1111	1	10	0.3	0.41	0.1	A	R	04/23/18	E-1	637	59	4.4/SE	No Bonnet
E-1113	1	10	0.1	0.3	0.2	A	R	04/23/18	E-1	637	59	4.4/SE	
E-1115	2	6	0.3	0.3	0	A	R	04/23/18	E-1	637	59	4.4/SE	last inspection before lunch
E-1117	3	6	1.5	29.8	28.3	A	R	04/23/18	E-1	636	85	4.4/SE	Stem leaking E of CV-9F036
E-1119	1	25	1.5	1.6	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1121	0.5	13	1.4	1.5	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1123	1	25	1.4	1.5	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1125	0.5	13	1.4	1.4	0	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1127	1	25	1.4	1.4	0	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1129	0.5	13	1.4	1.6	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1131	1	25	1.4	2	0.6	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1133	1	25	1.4	1.5	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1135	2	4	1.4	1.7	0.3	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1137	1	25	1.4	1.4	0	A	R	04/23/18	E-1	636	85	4.4/SE	No Bonnet
E-1139	2	4	1.3	1.5	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1141	1	25	1.3	1.3	0	A	R	04/23/18	E-1	636	85	4.4/SE	No Bonnet
E-1143	1	25	1.3	1.4	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1145	1	10	1.2	1.3	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1147	1	25	1.2	1.3	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	No Bonnet
E-1149	0.5	19	1.2	1.2	0	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1151	1	25	1.2	1.4	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1153	2	13	1.2	1.4	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1155	0.5	13	1.2	1.2	0	A	R	04/23/18	E-1	636	85	4.4/SE	No Bonnet
E-1157	0.5	13	1.2	1.2	0	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1159	0.5	13	1.2	1.2	0	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1161	2	13	1.2	1.3	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1163	1	25	1.1	1.2	0.1	A	R	04/23/18	E-1	636	85	4.4/SE	No Bonnet
E-1165	0.5	13	1.1	1.3	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1167	1	25	1	1.2	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1169	1	25	1.1	1.3	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1171	2	13	1.1	1.4	0.3	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1173	1	6	1.2	1.4	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1175	1	25	1.1	1.3	0.2	A	R	04/23/18	E-1	636	85	4.4/SE	No Bonnet
E-1177	1	6	1.1	1.4	0.3	A	R	04/23/18	E-1	636	85	4.4/SE	
E-1179	2	13	1.5	1.6	0.1	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1181	1	25	1.5	1.6	0.1	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1183	0.5	13	1.4	1.7	0.3	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1185	0.5	13	1.7	1.7	0	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1187	1	6	1.6	1.8	0.2	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1189	2	13	1.5	1.7	0.2	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1191	2	19	1.3	1.4	0.1	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1193	1	10	1.4	1.3	0	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1195	1	10	1.4	1.5	0.1	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1197	1	10	1.4	5.1	3.7	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1199	2	19	1.7	8.4	6.7	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1201	1	10	1.5	1.7	0.2	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1203	1	25	1.4	1.4	0	A	R	04/23/18	E-1	1881	85	4.4/SE	No Bonnet
E-1205	2	4	1.4	1.6	0.2	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1207	1	2	1.4	2.2	0.8	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1209	1	25	1.5	1.5	0	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1211	1	25	1.6	1.9	0.3	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1213	0.5	13	1.6	1.7	0.1	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1215	1	25	1.4	2.9	1.5	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1217	1	25	1.3	2.1	0.8	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1219	1	25	1.5	1.8	0.3	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1221	0.5	13	1.3	1.8	0.5	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1223	0.5	13	1.3	1.5	0.2	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1225	4	8	1.4	1148.1	1146.7	A	R	04/23/18	E-1	1881	85	4.4/SE	LEAKING ON THE BONNET
E-1227	3	29	1.3	2.2	0.9	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1229	1	10	1.2	1.6	0.4	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1231	1	10	1.2	1.7	0.5	A	R	04/23/18	E-1	1881	85	4.4/SE	
E-1233	2	19	1.4	1.2	0	A	R	04/23/18	E-1	1881	85	4.4/SE	No Bonnet
E-1798	1	25	0.9	1	0.1	A	R	04/23/18	E-1	640	59	4.4/SE	No Bonnet
E-1800	1	25	1	1	0	A	R	04/23/18	E-1	640	59	4.4/SE	
E-1802	1	25	1	1.1	0.1	A	R	04/23/18	E-1	640	59	4.4/SE	No Bonnet
E-1804	1	25	1	1	0	A	R	04/23/18	E-1	640	59	4.4/SE	No Bonnet
E-1806	1	13	0.9	1.2	0.3	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated
E-1808	1	13	1	1.1	0.1	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated
E-1810	2	13	1.1	1.2	0.1	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated
E-1812	2	25	1.1	1.3	0.2	A	R	04/23/18	E-1	640	59	4.4/SE	
E-1814	2	25	1	1.6	0.6	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated
E-1816	7	178	1.6	6.1	4.5	A	R	04/23/18	E-1	640	59	4.4/SE	No Bonnet
E-1818	3	29	1.4	2	0.6	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated
E-1820	1	13	1.2	2	0.8	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1822	1	13	1.2	1.9	0.7	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated
E-1824	1	13	1	1	0	A	R	04/23/18	E-1	640	59	4.4/SE	
E-1826	1	6	0.9	1.5	0.6	P	R	04/23/18	E-1	640	59	4.4/SE	Bonnet Insulated
E-1828	0.5	10	0.9	0.9	0	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1830	1	19	0.7	0.8	0.1	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1832	1	13	0.7	0.8	0.1	A	R	04/23/18	E-1	640	62	4.9/SE	No Bonnet
E-1834	1	13	0.7	0.8	0.1	A	R	04/23/18	E-1	640	62	4.9/SE	
E-1836	2	13	0.6	0.7	0.1	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1838	1	13	0.6	0.7	0.1	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1840	0.5	13	0.6	1.1	0.5	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1842	0.5	6	0.6	0.7	0.1	A	R	04/23/18	E-1	640	62	4.9/SE	No Bonnet
E-1844	1	13	0.5	0.8	0.3	A	R	04/23/18	E-1	640	62	4.9/SE	
E-1846	1	6	0.5	0.7	0.2	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1848	1	13	0.4	0.5	0.1	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1850	1	13	0.4	0.5	0.1	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1852	1	13	0.4	0.4	0	A	R	04/23/18	E-1	640	62	4.9/SE	
E-1854	1	6	0.3	0.4	0.1	P	R	04/23/18	E-1	640	62	4.9/SE	Bonnet Insulated
E-1856	1	13	0.4	0.4	0	A	R	04/23/18	E-1	640	62	4.9/SE	No Bonnet
E-1858A	2	25	1.6	1.7	0.1	P	R	04/23/18	E-1	641	76	5.2/SE	Bonnet Insulated
E-1860A	2	25	1.6	1.9	0.3	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1862A	2	25	1.6	2.5	0.9	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1864A	2	13	1.8	1.9	0.1	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1866A	1	13	1.6	2	0.4	A	R	04/23/18	E-1	641	76	5.2/SE	No Bonnet
E-1868A	2	25	1.8	1.9	0.1	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1870A	1	25	1.5	1.7	0.2	A	R	04/23/18	E-1	641	76	5.2/SE	No Bonnet
E-1872A	4	102	1.3	1.9	0.6	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1874A	2	25	1.4	2	0.6	P	R	04/23/18	E-1	641	76	5.2/SE	Bonnet Insulated
E-1876A	3	57	1.8	2	0.2	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1878A	1	19	1.7	1.7	0	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1880A	1	13	1.5	1.5	0	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1882A	2	13	1.6	1.7	0.1	A	R	04/23/18	E-1	641	76	5.2/SE	
E-1884A	0.5	6	1.4	1.7	0.3	A	R	04/23/18	E-1	641	76	5.2/SE	No Bonnet
E-1886A	1	19	1.4	1.5	0.1	A	R	04/23/18	E-1	641	76	5.2/SE	No Bonnet
E-1888A	2	38	1.6	1.8	0.2	P	R	04/23/18	E-1	641	78	5.2/SE	Bonnet Insulated
E-1890A	1	13	1.4	2.2	0.8	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1892A	1	6	1.3	1.6	0.3	P	R	04/23/18	E-1	641	78	5.2/SE	Bonnet Insulated
E-1894A	1	13	1.3	1.4	0.1	A	R	04/23/18	E-1	641	78	5.2/SE	No Bonnet
E-1896A	1	19	1.1	1.2	0.1	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1898A	2	38	1.1	1.3	0.2	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1900A	1	13	1.1	2	0.9	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1902A	1	6	1.2	1.5	0.3	P	R	04/23/18	E-1	641	78	5.2/SE	Bonnet Insulated
E-1904A	1	13	1.1	1.3	0.2	A	R	04/23/18	E-1	641	78	5.2/SE	No Bonnet
E-1906A	2	25	1.1	1.2	0.1	A	R	04/23/18	E-1	641	78	5.2/SE	No Bonnet
E-1908A	1	19	1	1.3	0.3	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1910A	2	38	1.1	1.1	0	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1912A	1	13	1	1.2	0.2	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1914A	3	19	1.3	2.9	1.6	P	R	04/23/18	E-1	641	78	5.2/SE	Bonnet Insulated
E-1916A	2	13	1	1.4	0.4	A	R	04/23/18	E-1	641	78	5.2/SE	
E-1858B	2	38	1.1	1.1	0	A	R	04/23/18	E-1	638	87	5.4/SE	
E-1860B	2	38	0.8	1	0.2	A	R	04/23/18	E-1	638	87	5.4/SE	
E-1862B	1	13	0.7	0.9	0.2	A	R	04/23/18	E-1	638	87	5.4/SE	
E-1864B	1	6	0.7	0.7	0	P	R	04/23/18	E-1	638	87	5.4/SE	Bonnet Insulated
E-1866B	1	13	0.6	0.8	0.2	A	R	04/23/18	E-1	638	87	5.4/SE	No Bonnet
E-1868B	0.5	6	0.7	0.9	0.2	A	R	04/23/18	E-1	638	87	5.4/SE	No Bonnet
E-1870B	1	25	0.5	0.7	0.2	A	R	04/23/18	E-1	638	87	5.4/SE	No Bonnet
E-1872B	1	25	0.5	0.6	0.1	A	R	04/23/18	E-1	638	87	5.4/SE	
E-1874B	1	13	0.4	0.7	0.3	A	R	04/23/18	E-1	638	87	5.4/SE	No Bonnet
E-1876B	1	25	0.4	0.5	0.1	A	R	04/23/18	E-1	638	87	5.4/SE	No Bonnet
E-1878B	1	25	0.4	0.5	0.1	A	R	04/23/18	E-1	638	87	5.4/SE	
E-1880B	1	6	0.4	0.5	0.1	P	R	04/23/18	E-1	638	87	5.4/SE	Bonnet Insulated
E-1882B	1	13	0.4	0.5	0.1	A	R	04/23/18	E-1	638	87	5.4/SE	
E-1884B	1	19	0.4	0.5	0.1	A	R	04/23/18	E-1	638	87	5.4/SE	
E-1886B	1	19	0.3	0.4	0.1	A	R	04/23/18	E-1	638	87	5.4/SE	No Bonnet
E-1888B	1	13	0.2	0.3	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	No Bonnet
E-1890B	1	6	0.3	0.3	0	P	R	04/23/18	E-1	638	94	3.3/SE	Bonnet Insulated
E-1892B	3	38	0.2	1.2	1	A	R	04/23/18	E-1	638	94	3.3/SE	No Bonnet
E-1894B	1	13	0.9	1	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	
E-1896B	1	19	0.4	0.4	0	A	R	04/23/18	E-1	638	94	3.3/SE	
E-1898B	1	19	0.3	0.5	0.2	P	R	04/23/18	E-1	638	94	3.3/SE	Bonnet Insulated
E-1900B	2	13	0.1	0.2	0.1	P	R	04/23/18	E-1	638	94	3.3/SE	Bonnet Insulated
E-1902B	1	13	0.1	0.2	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	
E-1904B	1	19	0.1	0.2	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	
E-1906B	1	19	0.1	0.2	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	
E-1908B	1	13	-0.1	0	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	No Bonnet
E-1910B	1	6	-0.1	0	0.1	P	R	04/23/18	E-1	638	94	3.3/SE	Bonnet Insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1912B	1	25	-0.1	0	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	No Bonnet
E-1914B	0.5	13	-0.1	0	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	
E-1916B	0.5	13	-0.1	0	0.1	A	R	04/23/18	E-1	638	94	3.3/SE	No Bonnet
E-1918	1	25	1.5	1.8	0.3	A	R	04/23/18	E-1	641	103	3.3/SE	No Bonnet
E-1920	1	25	1.4	1.6	0.2	A	R	04/23/18	E-1	641	103	3.3/SE	No Bonnet
E-1922	1	25	1.4	1.5	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	No Bonnet
E-1924	0.5	13	1.4	1.5	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	No Bonnet
E-1926	1	25	1.4	1.5	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1928	1	25	1.4	1.5	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	No Bonnet
E-1930	1	25	1.4	1.5	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1932	0.5	13	1.4	1.5	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1934	0.5	13	1.5	1.5	0	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1936	0.5	13	1.4	1.5	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1938	1	6	1.4	1.5	0.1	P	R	04/23/18	E-1	641	103	3.3/SE	Bonnet Insulated
E-1940	2	25	1.4	3	1.6	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1942	1	13	1.5	1.6	0.1	A	R	04/23/18	E-1	641	103	3.3/SE	No Bonnet
E-1944	1	19	1.5	1.8	0.3	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1946	1	19	1.4	1.4	0	A	R	04/23/18	E-1	641	103	3.3/SE	
E-1948	1	6	1	1.1	0.1	P	R	04/23/18	E-1	641	92	1.6/W	Bonnet Insulated
E-1950	2	25	1.1	1.1	0	A	R	04/23/18	E-1	641	92	1.6/W	
E-1952	1	13	1	1	0	A	R	04/23/18	E-1	641	92	1.6/W	No Bonnet
E-1954	3	38	1	7	6	A	R	04/23/18	E-1	641	92	1.6/W	
E-1956	1	19	1.3	1.2	0	A	R	04/23/18	E-1	641	92	1.6/W	
E-1958	1	19	1.2	1.2	0	A	R	04/23/18	E-1	641	92	1.6/W	No Bonnet
E-1960	1	19	1.1	1.7	0.6	A	R	04/23/18	E-1	641	92	1.6/W	
E-1962	1	19	1.2	1.2	0	A	R	04/23/18	E-1	641	92	1.6/W	
E-1964	1	13	1.1	1.1	0	A	R	04/23/18	E-1	641	92	1.6/W	
E-1966	1	6	1	1.1	0.1	P	R	04/23/18	E-1	641	92	1.6/W	Bonnet Insulated
E-1968	1	13	1	1.1	0.1	A	R	04/23/18	E-1	641	92	1.6/W	No Bonnet
E-1970	1	6	1	1.1	0.1	P	R	04/23/18	E-1	641	92	1.6/W	Bonnet Insulated
E-1972	1	13	1.1	1.1	0	A	R	04/23/18	E-1	641	92	1.6/W	
E-1974	1	19	1	1.1	0.1	A	R	04/23/18	E-1	641	92	1.6/W	
E-1976	1	19	1.1	1.9	0.8	A	R	04/23/18	E-1	641	92	1.6/W	
E-1978	2	6	1.4	2	0.6	A	R	04/23/18	E-1	640	102	2.2/W	
E-1980	1	3	1.3	1.5	0.2	A	R	04/23/18	E-1	640	102	2.2/W	
E-1982	1	13	1.3	1.3	0	A	R	04/23/18	E-1	640	102	2.2/W	No Bonnet
E-1984	1	6	1.2	1.4	0.2	P	R	04/23/18	E-1	640	102	2.2/W	Bonnet Insulated
E-1986	0.5	6	1.3	1.4	0.1	A	R	04/23/18	E-1	640	102	2.2/W	
E-1988	0.5	10	1.3	1.3	0	P	R	04/23/18	E-1	640	102	2.2/W	Bonnet Insulated
E-1990	1	19	1.2	1.3	0.1	A	R	04/23/18	E-1	640	102	2.2/W	
E-1992	1	19	1.1	1.3	0.2	A	R	04/23/18	E-1	640	102	2.2/W	
E-1994	1	19	1.2	1.2	0	A	R	04/23/18	E-1	640	102	2.2/W	
E-1996	1	13	1.1	1.2	0.1	A	R	04/23/18	E-1	640	102	2.2/W	
E-1998	1	6	1.1	1.1	0	P	R	04/23/18	E-1	640	102	2.2/W	Bonnet Insulated
E-2000	1	13	1.2	1.2	0	A	R	04/23/18	E-1	640	102	2.2/W	No Bonnet
E-2002	1	25	1.1	1.2	0.1	A	R	04/23/18	E-1	640	102	2.2/W	
E-2004	0.5	13	1	1.1	0.1	A	R	04/23/18	E-1	640	102	2.2/W	
E-2006	1	13	1.2	1.2	0	A	R	04/23/18	E-1	640	102	2.2/W	No Bonnet
E-2008	1	19	1.1	1.2	0.1	A	R	04/23/18	E-1	640	98	4.2/W	No Bonnet
E-2010	1	19	1.2	1.1	0	A	R	04/23/18	E-1	640	98	4.2/W	
E-2012	1	13	1.1	1.2	0.1	A	R	04/23/18	E-1	640	98	4.2/W	No Bonnet
E-2014	1	25	1.2	3.2	2	A	R	04/23/18	E-1	640	98	4.2/W	No Bonnet
E-2016	0.5	13	1.2	1.2	0	A	R	04/23/18	E-1	640	98	4.2/W	
E-2018	0.5	10	1.2	1.2	0	A	R	04/23/18	E-1	640	98	4.2/W	
E-2020	0.5	10	1.1	1.1	0	A	R	04/23/18	E-1	640	98	4.2/W	
E-2022	0.5	6	1.2	1.2	0	A	R	04/23/18	E-1	640	98	4.2/W	
E-2024	0.5	3	1.2	1.2	0	P	R	04/23/18	E-1	640	98	4.2/W	ONLY STEM SHOWING
E-2026	1	13	1.1	1.2	0.1	A	R	04/23/18	E-1	640	98	4.2/W	No Bonnet
E-2028	1	19	1.3	3.3	2	A	R	04/23/18	E-1	640	98	4.2/W	
E-2030	1	19	1.8	1.2	0	A	R	04/23/18	E-1	640	98	4.2/W	
E-2032	0.5	6	1.1	1.2	0.1	A	R	04/23/18	E-1	640	98	4.2/W	
E-2034	0.5	3	1.1	1.2	0.1	A	R	04/23/18	E-1	640	98	4.2/W	No Bonnet
E-2036	0.5	6	1	1	0	A	R	04/23/18	E-1	640	98	4.2/W	No Bonnet
E-1531	1	25	1.8	1.8	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1533	2	6	1.7	7.2	5.5	A	R	04/24/18	E-1	641	76	1.8/S	
E-1535	2	6	2.8	2.4	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1537	2	6	2.8	3.7	0.9	A	R	04/24/18	E-1	641	76	1.8/S	
E-1539	2	6	2.5	2.8	0.3	A	R	04/24/18	E-1	641	76	1.8/S	
E-1541	1	10	1.7	1.7	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1543	0.5	5	1.2	1.3	0.1	A	R	04/24/18	E-1	641	76	1.8/S	
E-1545	0.5	13	1.1	1.1	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1548	1	25	0.3	0.4	0.1	A	R	04/24/18	E-1	641	76	1.8/S	No Bonnet
E-1549	0.5	13	0.3	0.3	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1551	1	5	0.4	0.4	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1553	1	6	0.3	0.4	0.1	A	R	04/24/18	E-1	641	76	1.8/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1555	1	6	0.3	2.1	1.8	A	R	04/24/18	E-1	641	76	1.8/S	
E-1557	1	6	0.7	1	0.3	A	R	04/24/18	E-1	641	76	1.8/S	
E-1559	1	25	0.5	240	239.5	A	R	04/24/18	E-1	641	76	1.8/S	No Bonnet, leaking on packing west of P-133
E-2038	3	10	0.8	0.7	0	A	R	04/24/18	E-1	640	66	1.3/N	
E-2040	0.5	13	0.8	0.9	0.1	A	R	04/24/18	E-1	640	66	1.3/N	
E-2042	3	10	0.7	4.4	3.7	A	R	04/24/18	E-1	640	66	1.3/N	
E-2044	2	6	1.6	1.2	0	A	R	04/24/18	E-1	640	66	1.3/N	
E-2046	3	10	0.8	1	0.2	A	R	04/24/18	E-1	640	66	1.3/N	
E-2048	4	13	0.8	1.2	0.4	A	R	04/24/18	E-1	640	66	1.3/N	
E-2050	3	10	0.4	0.7	0.3	A	R	04/24/18	E-1	640	66	1.3/N	
E-2052	2	10	0.4	0.5	0.1	A	R	04/24/18	E-1	640	66	1.3/N	
E-2054	3	14	0.4	0.5	0.1	A	R	04/24/18	E-1	640	66	1.3/N	
E-2056	1	25	0.4	0.5	0.1	A	R	04/24/18	E-1	640	66	1.3/N	No Bonnet
E-2058	1	25	0.4	0.5	0.1	A	R	04/24/18	E-1	640	66	1.3/N	No Bonnet
E-2060	1	25	0.3	0.3	0	A	R	04/24/18	E-1	640	66	1.3/N	
E-2062	2	51	0.7	0.5	0	A	R	04/24/18	E-1	640	66	1.3/N	
E-2064	1	25	0.7	4.5	3.8	A	R	04/24/18	E-1	640	66	1.3/N	No Bonnet
E-2066	3	76	1.6	1.9	0.3	A	R	04/24/18	E-1	640	66	1.3/N	No Bonnet
E-2068	2	51	1.2	1.4	0.2	A	R	04/24/18	E-1	640	76	1.8/S	
E-2070	1	25	0.7	0.8	0.1	A	R	04/24/18	E-1	640	76	1.8/S	No Bonnet
E-2072	1	25	0.7	0.7	0	A	R	04/24/18	E-1	640	76	1.8/S	
E-2074	2	51	0.9	0.6	0	A	R	04/24/18	E-1	640	76	1.8/S	No Bonnet
E-2076	6	19	0.5	6	5.5	A	R	04/24/18	E-1	640	76	1.8/S	
E-2078	3	14	1	0.8	0	A	R	04/24/18	E-1	640	76	1.8/S	
E-2080	1	5	0.6	0.5	0	A	R	04/24/18	E-1	640	76	1.8/S	
E-2082	4	102	0.5	180	179.5	A	R	04/24/18	E-1	640	76	1.8/S	Gate Valve south of P-119B
E-2084	2	51	1.9	2	0.1	A	R	04/24/18	E-1	640	76	1.8/S	
E-2086	13	331	1.8	29	27.2	A	R	04/24/18	E-1	640	76	1.8/S	TEE BELOW PSI ABOVE VALVE
E-2088	7	178	0.6	25.3	24.7	A	R	04/24/18	E-1	1881	76	1.8/S	Change TVA TO 1881
E-2090	4	306	1.9	16.3	14.4	A	R	04/24/18	E-1	1881	76	1.8/S	No Bonnet
E-2092	5	127	0.9	12.4	11.5	A	R	04/24/18	E-1	1881	76	1.8/S	No Bonnet
E-2094	2	51	1.4	1.4	0	A	R	04/24/18	E-1	1881	76	1.8/S	No Bonnet
E-2096	0.5	13	1.2	1.5	0.3	A	R	04/24/18	E-1	1881	76	1.8/S	
E-2098	2	153	1.3	2	0.7	A	R	04/24/18	E-1	1881	78	3.1/S	
E-2100	1	25	1.9	2.1	0.2	A	R	04/24/18	E-1	1881	78	3.1/S	
E-2102	1	25	1.9	2.5	0.6	A	R	04/24/18	E-1	1881	78	3.1/S	
E-2104	1	25	1.9	2	0.1	A	R	04/24/18	E-1	1881	78	3.1/S	
E-2106	1	25	1.8	1.6	0	A	R	04/24/18	E-1	1881	78	3.1/S	No Bonnet
E-2108	2	51	1.3	5.2	3.9	A	R	04/24/18	E-1	1881	78	3.1/S	
E-2110	3	76	1.9	1115	1113.1	A	R	04/24/18	E-1	1881	78	3.1/S	Gate Valve east of E-107
E-2112	4	19	2	80	78	A	R	04/24/18	E-1	1881	78	3.1/S	Gate Valve east of E-107
E-2114	2	10	2.9	2084	2081.1	A	R	04/24/18	E-1	1881	78	3.1/S	Gate Valve east of E-107
E-1235	1	25	1.1	1.7	0.6	A	R	04/24/18	E-1	636	63	0.8/E	
E-1237	1	25	1.2	1.3	0.1	A	R	04/24/18	E-1	636	63	0.8/E	
E-1239	1	38	1.1	1.2	0.1	A	R	04/24/18	E-1	636	63	0.8/E	
E-1241	1	38	1.3	1.9	0.6	A	R	04/24/18	E-1	636	63	0.8/E	
E-1243	1	25	1.2	1.8	0.6	A	R	04/24/18	E-1	636	63	0.8/E	
E-1245	1	25	1.1	1.8	0.7	A	R	04/24/18	E-1	636	63	0.8/E	
E-1247	2	19	1.1	1.4	0.3	A	R	04/24/18	E-1	636	63	0.8/E	
E-1249	0.5	5	1.2	1.4	0.2	A	R	04/24/18	E-1	636	63	0.8/E	
E-1251	0.5	13	1.2	1.2	0	A	R	04/24/18	E-1	636	63	0.8/E	
E-1253	0.5	19	1	1.3	0.3	A	R	04/24/18	E-1	636	63	0.8/E	
E-1255	1	38	1.1	1.2	0.1	A	R	04/24/18	E-1	636	63	0.8/E	
E-1257	1	25	1.1	1.1	0	A	R	04/24/18	E-1	636	63	0.8/E	
E-1259	1	25	1.1	1.3	0.2	A	R	04/24/18	E-1	636	63	0.8/E	
E-1261	1	25	1	1.1	0.1	A	R	04/24/18	E-1	636	63	0.8/E	
E-1263	1	25	1	1.4	0.4	A	R	04/24/18	E-1	636	63	0.8/E	
E-1265	1	25	1.3	1.3	0	A	R	04/24/18	E-1	636	63	0.8/E	
E-1267	1	25	1.2	1.8	0.6	A	R	04/24/18	E-1	636	63	0.8/E	
E-1269	1	25	1.2	1.3	0.1	A	R	04/24/18	E-1	636	63	0.8/E	
E-1271	1	25	1.1	1.8	0.7	A	R	04/24/18	E-1	636	63	0.8/E	
E-1273	1	25	1	1.4	0.4	A	R	04/24/18	E-1	636	63	0.8/E	
E-1275	1	25	0.9	2	1.1	A	R	04/24/18	E-1	636	63	0.8/E	
E-1277	1	10	0.9	1.4	0.5	A	R	04/24/18	E-1	636	63	0.8/E	
E-1279	4	4	1.1	1.6	0.5	A	R	04/24/18	E-1	636	63	0.8/E	
E-1281	1	38	1.2	1.7	0.5	A	R	04/24/18	E-1	636	63	0.8/E	
E-1283	0.5	19	1.3	1.9	0.6	A	R	04/24/18	E-1	636	63	0.8/E	
E-1285	0.5	5	1.4	3.9	2.5	A	R	04/24/18	E-1	636	63	0.8/E	
E-1287	1	10	1	2.4	1.4	A	R	04/24/18	E-1	636	63	0.8/E	
E-1289	1	10	1.6	1.8	0.2	A	R	04/24/18	E-1	636	63	0.8/E	
E-1291	2	51	1.2	5.4	4.2	A	R	04/24/18	E-1	636	63	0.8/E	
E-1293	1	25	1.2	5.3	4.1	A	R	04/24/18	E-1	636	63	0.8/E	
E-1295	1	25	1	1	0	A	R	04/24/18	E-1	641	63	0.8/E	
E-1297	0.5	13	1	1.1	0.1	A	R	04/24/18	E-1	641	63	0.8/E	
E-1299	0.5	5	1	1.1	0.1	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1301	1	10	1.1	1.1	0	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1303	1	25	1	1.3	0.3	A	R	04/24/18	E-1	641	63	0.8/E	
E-1305	1	10	0.9	1	0.1	A	R	04/24/18	E-1	641	63	0.8/E	
E-1307	1	10	0.9	1.1	0.2	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1309	1	25	1	1.1	0.1	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1311	0.5	5	1	1	0	A	R	04/24/18	E-1	641	63	0.8/E	
E-1313	1	10	0.9	1	0.1	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1315	1	10	0.9	0.9	0	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1317	1	25	0.9	1	0.1	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1319	0.5	5	1	1.1	0.1	A	R	04/24/18	E-1	641	63	0.8/E	
E-1321	1	10	1	1.2	0.2	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1323	1	10	0.9	1.7	0.8	P	R	04/24/18	E-1	641	63	0.8/E	Bonnet Insulated
E-1325	1	25	0.9	1.1	0.2	A	R	04/24/18	E-1	641	63	0.8/E	
E-1327	1	25	0.9	2.7	1.8	A	R	04/24/18	E-1	641	63	0.8/E	
E-1329	1	25	1.1	1.3	0.2	A	R	04/24/18	E-1	641	63	0.8/E	
E-1331	1	25	1	1.1	0.1	A	R	04/24/18	E-1	641	63	0.8/E	
E-1333	1	25	0.8	1	0.2	A	R	04/24/18	E-1	641	63	0.8/E	NO BONNET
E-1335	1	25	0.9	1.1	0.2	A	R	04/24/18	E-1	641	63	0.8/E	NO BONNET
E-1337	0.5	13	0.9	1	0.1	A	R	04/24/18	E-1	641	63	0.8/E	NO BONNET
E-1339	1	25	0.9	1.1	0.2	A	R	04/24/18	E-1	641	63	0.8/E	
E-1341	0.5	13	1	1	0	A	R	04/24/18	E-1	641	63	0.8/E	
E-1343	1	38	1	1.2	0.2	A	R	04/24/18	E-1	641	63	0.8/E	
E-1345	2	76	0.9	1	0.1	A	R	04/24/18	E-1	641	63	0.8/E	
E-1347	0.5	19	1	0.9	0	A	R	04/24/18	E-1	641	63	0.8/E	
E-1349	1	25	1	1	0	A	R	04/24/18	E-1	641	63	0.8/E	
E-1351	0.5	19	1	1.2	0.2	A	R	04/24/18	E-1	641	63	0.8/E	
E-1353	1	6	1	1.1	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1355	0.5	3	0.9	1	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1357	1	25	0.9	1.1	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1359	2	10	0.8	1	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1361	1	5	0.8	0.9	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1363	2	19	0.8	1.1	0.3	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1365	1	10	0.8	0.9	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1367	1	10	0.7	0.9	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1369	1	6	0.7	0.9	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1371	1	6	0.7	0.7	0	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1373	2	13	1.5	10.1	8.6	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1375	2	19	1.6	1.7	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1377	1	10	1.3	1.3	0	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1379	0.5	13	1.1	1.8	0.7	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1381	0.5	13	1.3	1.5	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1383	3	29	1.2	70.6	69.4	A	R	04/24/18	E-1	1881	63	0.8/E	Leak on packing east of T-106C
E-1385	1	19	0.9	1	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1387	0.5	10	1	0.9	0	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1389	2	10	0.7	1.3	0.6	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1391	0.5	13	0.8	0.8	0	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1393	1	25	0.7	0.8	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1395	1	25	0.7	0.7	0	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1397	1	25	0.6	0.8	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1399	1	19	0.6	0.8	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1401	2	6	0.7	1.6	0.9	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1403	2	6	0.7	0.9	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1405	1	25	0.7	1.6	0.9	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1407	2	51	1.1	21.2	20.1	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1409	1	25	2.1	3.7	1.6	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1411	1	10	2.3	2.3	0	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1413	2	51	1.7	69.4	67.7	A	R	04/24/18	E-1	1881	63	0.8/E	Leaking on bonnet, south of T-106C
E-1415	1	25	2.3	2.5	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1417	1	25	1.5	1.6	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1419	1	19	1.4	1.8	0.4	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1421	0.5	13	1.2	1.2	0	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1423	0.5	13	1.1	1.2	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1425	1	25	0.8	0.9	0.1	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1427	0.5	13	0.8	1.2	0.4	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1429	1	25	0.8	0.8	0	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1431	1	19	0.8	1	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1433	1	19	0.8	0.8	0	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1435	1	19	0.8	1.4	0.6	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1437	0.5	13	0.7	0.7	0	A	R	04/24/18	E-1	1881	63	0.8/E	NO BONNET
E-1439	0.5	13	0.6	0.6	0	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1441	1	25	0.6	0.8	0.2	A	R	04/24/18	E-1	1881	63	0.8/E	
E-1443	1	25	1.3	4.4	3.1	A	R	04/24/18	E-1	636	76	1.8/S	
E-1445	1	25	1.6	1.9	0.3	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1447	1	25	1.4	1.5	0.1	A	R	04/24/18	E-1	636	76	1.8/S	
E-1449	0.5	13	1.3	1.8	0.5	A	R	04/24/18	E-1	636	76	1.8/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1451	0.5	13	1.2	1.3	0.1	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1453	1	Unknown	1.2	1.7	0.5	A	R	04/24/18	E-1	636	76	1.8/S	
E-1455	1	19	1.1	1.3	0.2	A	R	04/24/18	E-1	636	76	1.8/S	
E-1457	1	25	1.1	1.3	0.2	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1459	0.5	13	1.1	1.4	0.3	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1461	1	25	1.1	1.4	0.3	A	R	04/24/18	E-1	636	76	1.8/S	
E-1463	0.5	13	1.2	1.2	0	A	R	04/24/18	E-1	636	76	1.8/S	
E-1465	1	25	1	1.6	0.6	A	R	04/24/18	E-1	636	76	1.8/S	
E-1467	0.5	13	1	1.5	0.5	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1469	0.5	13	1.2	1.2	0	A	R	04/24/18	E-1	636	76	1.8/S	
E-1471	0.5	13	0.8	0.9	0.1	A	R	04/24/18	E-1	636	76	1.8/S	
E-1473	0.5	13	1.1	1.5	0.4	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1475	1	25	1.8	1.9	0.1	A	R	04/24/18	E-1	636	76	1.8/S	
E-1477	1	25	1.1	2	0.9	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1479	0.5	13	1	1.1	0.1	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1481	0.5	13	0.7	0.9	0.2	A	R	04/24/18	E-1	636	76	1.8/S	
E-1483	1	25	0.8	2.6	1.8	A	R	04/24/18	E-1	636	76	1.8/S	
E-1485	1	25	3.1	3.2	0.1	A	R	04/24/18	E-1	636	76	1.8/S	NO BONNET
E-1487	2	6	3.1	3.3	0.2	A	R	04/24/18	E-1	636	76	1.8/S	
E-1489	1	10	0.9	1	0.1	A	R	04/24/18	E-1	641	76	1.8/S	
E-1491	0.5	10	0.9	0.9	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1493	0.5	13	0.9	1	0.1	A	R	04/24/18	E-1	641	76	1.8/S	NO BONNET
E-1495	2	6	0.6	0.9	0.3	A	R	04/24/18	E-1	641	76	1.8/S	
E-1497	2	6	0.6	1.4	0.8	A	R	04/24/18	E-1	641	76	1.8/S	
E-1499	1	25	0.5	30.1	29.6	A	R	04/24/18	E-1	641	76	1.8/S	NO BONNET, Packing south of E-101
E-1501	1	25	1.6	156	154.4	A	R	04/24/18	E-1	641	76	1.8/S	Packing on leaks s of E-101/No Bonnet
E-1503	1	38	3.3	3.4	0.1	A	R	04/24/18	E-1	641	76	1.8/S	
E-1505	0.5	19	3.2	3.1	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1507	0.5	13	2.9	2.8	0	A	R	04/24/18	E-1	641	76	1.8/S	No Bonnet
E-1509	1	25	2.7	2.7	0	A	R	04/24/18	E-1	641	76	1.8/S	No Bonnet
E-1511	1	25	2.3	2.4	0.1	A	R	04/24/18	E-1	641	76	1.8/S	
E-1513	1	10	2.2	2.2	0	A	R	04/24/18	E-1	641	76	1.8/S	
E-1515	1	25	2	2.7	0.7	A	R	04/24/18	E-1	641	76	1.8/S	No Bonnet
E-1517	2	6	1.9	27.7	25.8	A	R	04/24/18	E-1	641	76	1.8/S	Packing on valve south of E-101
E-1519	2	6	3.1	4.1	1	A	R	04/24/18	E-1	641	76	1.8/S	
E-1521	1	25	3.4	3.7	0.3	A	R	04/24/18	E-1	641	76	1.8/S	No Bonnet
E-1523	2	6	2.8	2.9	0.1	A	R	04/24/18	E-1	641	76	1.8/S	
E-1525	2	19	1.5	58	56.5	A	R	04/24/18	E-1	641	76	1.8/S	Packing on valve west of P-133
E-1527	2	13	1.4	4.5	3.1	A	R	04/24/18	E-1	641	76	1.8/S	
E-1529	0.5	13	2.2	2.4	0.2	A	R	04/24/18	E-1	641	76	1.8/S	No Bonnet
E-2116	5	48	0.9	202	201.1	A	R	04/25/18	E-1	1881	65	1.5/S	Gate valve of E-129 on FIN FAN Deck
E-2118	9	86	3.2	43	39.8	A	R	04/25/18	E-1	1881	65	1.5/S	Flange on top of Globe E of E-129 ff Deck
E-2120	1	25	2.3	2.4	0.1	A	R	04/25/18	E-1	1881	65	1.5/S	
E-2122	2	6	1.9	2.8	0.9	A	R	04/25/18	E-1	1881	65	1.5/S	
E-2124	1	25	2	2	0	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (1 OF 20)
E-2126	1	25	1.6	1.5	0	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (2 OF 20)
E-2128	1	25	1.8	1.9	0.1	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (3 OF 20)
E-2130	1	25	1.3	1.4	0.1	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (4 OF 20)
E-2132	1	25	1.1	1.5	0.4	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (5 OF 20)
E-2134	1	25	1.4	1.4	0	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (6 OF 20)
E-2136	1	25	1.3	1.4	0.1	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (7 OF 20)
E-2138	1	25	1.3	1.4	0.1	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (8 OF 20)
E-2140	1	25	1.2	1.5	0.3	A	R	04/25/18	E-1	1881	65	1.5/S	FIN FAN PLUG (9 OF 20)
E-2142	1	25	1.3	1.3	0	A	R	04/25/18	E-1	1881	65	1.5/S	Not a Fin Fan plug
E-2144	1	25	1.2	1.3	0.1	A	R	04/25/18	E-1	1881	65	1.5/S	Not a Fin Fan plug
E-2146	4	13	1.5	83	81.5	A	R	04/25/18	E-1	1881	78	2.8/S	Gate valve below fin fan E-129
E-2148	1	25	2.6	2.7	0.1	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (10 OF 20)
E-2150	1	25	2.3	2.2	0	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (11 OF 20)
E-2152	1	25	2	2.1	0.1	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (12 OF 20)
E-2154	2	51	1.7	1.7	0	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (13 OF 20)
E-2156	1	25	1.5	1.6	0.1	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (14 OF 20)
E-2158	1	25	1.4	1.5	0.1	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (15 OF 20)
E-2160	2	51	1.3	1.5	0.2	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (16 OF 20)
E-2162	1	25	1.1	1.4	0.3	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (17 OF 20)
E-2164	1	25	1.1	1.2	0.1	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (18 OF 20)
E-2166	1	25	1.1	1.1	0	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (19 OF 20)
E-2168	1	25	1	1	0	A	R	04/25/18	E-1	1881	78	2.8/S	FIN FAN PLUG (20 OF 20)
E-2170	3	10	1	1.3	0.3	A	R	04/25/18	E-1	1881	78	2.8/S	
E-2172	3	10	1.2	1.1	0	A	R	04/25/18	E-1	1881	78	2.8/S	
E-2174	0.5	10	1	1.2	0.2	A	R	04/25/18	E-1	1881	78	2.8/S	Not a Fin Fan plug
E-2176	2	38	0.5	0.6	0.1	A	R	04/25/18	E-1	1881	76	2.6/S	No Bonnet
E-2178	4	13	0.4	0.6	0.2	A	R	04/25/18	E-1	1881	76	2.6/S	
E-2180	1	3	0.4	0.7	0.3	A	R	04/25/18	E-1	1881	76	2.6/S	
E-2182	1	19	0.5	0.6	0.1	A	R	04/25/18	E-1	1881	76	2.6/S	No Bonnet
E-2184	3	19	0.5	77	76.5	A	R	04/25/18	E-1	1881	76	2.6/S	Gate Valve east od CV-1F016, No Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-2186	3	19	2.5	60.2	57.7	A	R	04/25/18	E-1	1881	76	2.6/S	Gate Valve east od CV-1F016, No Bonnet
E-2188	5	32	1.9	11.9	10	A	R	04/25/18	E-1	1881	76	2.6/S	No Bonnet
E-2190	2	13	1.9	2	0.1	A	R	04/25/18	E-1	1881	76	2.6/S	
E-2192	2	51	0.7	0.9	0.2	A	R	04/25/18	E-1	1881	76	2.6/S	
E-2194	2	51	0.7	5.2	4.5	A	R	04/25/18	E-1	1881	76	2.6/S	
E-2196	1	25	1.6	1.2	0	A	R	04/25/18	E-1	1881	76	2.6/S	
E-2198	1	25	0.9	1.3	0.4	A	R	04/25/18	E-1	1881	76	2.6/S	No Bonnet
E-2200	2	51	0.9	1550	1549.1	A	R	04/25/18	E-1	1881	76	2.6/S	Plug on gate valve east of CV-1F016
E-2202	2	51	2.2	59.7	57.5	A	R	04/25/18	E-1	1881	76	2.6/S	gate valve east of CV-1F016
E-2204	6	76	2.9	770	767.1	A	R	04/25/18	E-1	1881	76	2.0/E	Gate Valve east of E-105A
E-2206	3	76	2.9	5.2	2.3	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2208	1	25	2.9	3	0.1	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2210	1	25	2.8	2.9	0.1	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2212	2	38	2.6	3.2	0.6	A	R	04/25/18	E-1	1881	76	2.0/E	No Bonnet
E-2214	3	14	2.5	3.2	0.7	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2216	1	25	2.4	2.4	0	A	R	04/25/18	E-1	1881	76	2.0/E	No Bonnet
E-2218	1	25	2.3	2.3	0	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2220	1	25	2.2	2.3	0.1	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2222	2	51	2	2.9	0.9	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2224	0.5	13	2.2	2.2	0	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2226	1	19	2.1	771	768.9	A	R	04/25/18	E-1	1881	76	2.0/E	Globe Valve east of E-105A/ No Bonnet
E-2228	4	13	3.7	4.2	0.5	A	R	04/25/18	E-1	1881	76	2.0/E	
E-2230	6	19	3.2	290	286.8	A	R	04/25/18	E-1	1881	76	2.0/E	Gate Valve east of E-105A
E-2232	2	51	2.5	3	0.5	A	R	04/25/18	E-1	1881	76	2.0/E	No Bonnet
E-2234	1	25	2.9	2.9	0	A	R	04/25/18	E-1	1881	74	1.4/S	
E-2236	3	10	2.5	1013	1010.5	A	R	04/25/18	E-1	1881	74	1.4/S	Gate Valve East of E-105A/ No Bonnet
E-2238	2	51	2.3	3.4	1.1	A	R	04/25/18	E-1	1881	74	1.4/S	No Bonnet
E-2240	1	25	3.1	3.9	0.8	A	R	04/25/18	E-1	1881	74	1.4/S	
E-2242	1	13	3.6	4.6	1	A	R	04/25/18	E-1	1881	74	1.4/S	
E-2244	4	51	3.5	7290	7286.5	A	R	04/25/18	E-1	1881	74	1.4/S	Globe Valve on P-107B/ No Bonnet
E-2246	2	13	0	1.7	1.7	A	R	04/25/18	E-1	638	74	1.4/S	
E-2248	4	25	0.3	4636.1	4635.8	A	R	04/25/18	E-1	638	74	1.4/S	Gate Valve North on P-107B
E-1561	1	25	0.8	31.2	30.4	P	R	04/25/18	E-1	636	65	1.5/S	Gate Valve west of P-133/ Bonnet insulated
E-1563	0.5	13	1.8	2	0.2	A	R	04/25/18	E-1	636	65	1.5/S	No Bonnet
E-1565	1	25	1.7	1.7	0	P	R	04/25/18	E-1	636	65	1.5/S	Bonnet Insulated
E-1567	1	10	1.4	1.9	0.5	A	R	04/25/18	E-1	636	65	1.5/S	
E-1569	1	25	1.3	10	8.7	A	R	04/25/18	E-1	636	65	1.5/S	No Bonnet
E-1571	0.5	19	2.6	2.6	0	A	R	04/25/18	E-1	636	65	1.5/S	
E-1573	1	25	2	2.1	0.1	A	R	04/25/18	E-1	636	65	1.5/S	No Bonnet
E-1575	1	6	1.9	1.9	0	A	R	04/25/18	E-1	636	65	1.5/S	
E-1577	1	6	1.4	1.5	0.1	A	R	04/25/18	E-1	636	65	1.5/S	
E-1579	1	25	0.9	2.1	1.2	A	R	04/25/18	E-1	636	65	1.5/S	
E-1581	1	25	1	1.4	0.4	A	R	04/25/18	E-1	636	65	1.5/S	
E-1583	2	51	1	1270	1269	A	R	04/25/18	E-1	636	65	1.5/S	Gate Valve North of P-107A/ No Bonnet
E-1585	1	38	2.9	3.6	0.7	A	R	04/25/18	E-1	636	65	1.5/S	
E-1587	1	25	2.8	3.4	0.6	A	R	04/25/18	E-1	636	65	1.5/S	
E-1589	1	25	2.8	6	3.2	A	R	04/25/18	E-1	636	65	1.5/S	
E-1591	2	51	2.8	28.2	25.4	A	R	04/25/18	E-1	636	65	1.5/S	Gate Valve on top of P-107A
E-1593	4	102	1.1	2055	2053.9	A	R	04/25/18	E-1	636	65	1.5/S	Gate Valve on top of P-107A/No Bonnet
E-1595	1	25	0.6	0.7	0.1	A	R	04/25/18	E-1	640	65	1.5/S	change TVA TO 0640
E-1597	1	25	0.5	1.4	0.9	A	R	04/25/18	E-1	640	65	1.5/S	
E-1599	1	25	1	2.4	1.4	A	R	04/25/18	E-1	640	65	1.5/S	
E-1601	2	6	1.9	2.1	0.2	A	R	04/25/18	E-1	640	65	1.5/S	
E-1603	1	3	0.8	0.8	0	A	R	04/25/18	E-1	640	65	1.5/S	
E-1605	0.5	13	1	1.1	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1607	2	51	1	30.8	29.8	A	R	04/25/18	E-1	640	65	1.5/S	Plug on valve North of P-107A
E-1609	2	19	2.8	257	254.2	A	R	04/25/18	E-1	640	65	1.5/S	Gate valve north of P-107A
E-1611	1	25	2.9	2	0	A	R	04/25/18	E-1	640	65	1.5/S	No Bonnet
E-1613	2	6	2.8	2.8	0	A	R	04/25/18	E-1	640	65	1.5/S	
E-1615	1	25	2.5	2.5	0	A	R	04/25/18	E-1	640	65	1.5/S	
E-1617	1	25	2.3	2.6	0.3	A	R	04/25/18	E-1	640	65	1.5/S	
E-1619	0.5	13	2.1	2.2	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1621	1	25	2.1	2.1	0	A	R	04/25/18	E-1	640	65	1.5/S	
E-1623	1	25	1.9	2	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1625	2	13	2	2.1	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1627	0.5	13	1.8	1.8	0	A	R	04/25/18	E-1	640	65	1.5/S	No Bonnet
E-1629	0.5	19	1.7	1.8	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1631	1	25	1.6	1.7	0.1	A	R	04/25/18	E-1	640	65	1.5/S	No Bonnet
E-1633	0.5	19	1.7	1.6	0	A	R	04/25/18	E-1	640	65	1.5/S	
E-1635	1	25	1.5	1.9	0.4	A	R	04/25/18	E-1	640	65	1.5/S	No Bonnet
E-1637	0.5	13	1.6	1.7	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1639	2	6	1.5	1.7	0.2	A	R	04/25/18	E-1	640	65	1.5/S	
E-1641	1	10	1.3	1.4	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1643	0.5	13	1.4	1.5	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1645	1	5	2.3	1.3	0	A	R	04/25/18	E-1	640	65	1.5/S	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1647	1	25	1.2	1.3	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1649	1	10	1.3	1.4	0.1	P	R	04/25/18	E-1	640	65	1.5/S	No Bonnet/Insulated
E-1651	1	25	1.3	1.4	0.1	A	R	04/25/18	E-1	640	65	1.5/S	
E-1653	1	10	1.2	1.4	0.2	A	R	04/25/18	E-1	640	65	1.5/S	
E-1655	1	25	1.3	1.3	0	A	R	04/25/18	E-1	640	65	1.5/S	No Bonnet
E-1657	0.5	13	1.2	1.2	0	A	R	04/25/18	E-1	640	65	1.5/S	
E-1659	2	6	1.2	1.4	0.2	A	R	04/25/18	E-1	640	65	1.5/S	
E-1661	0.5	13	1.1	1.1	0	A	R	04/25/18	E-1	640	65	1.5/S	No Bonnet
E-1663	1	5	1.1	1.4	0.3	A	R	04/25/18	E-1	640	65	1.5/S	
E-1665	1	25	2.5	2.6	0.1	A	R	04/25/18	E-1	636	65	1.5/S	
E-1667	1	25	2.5	2.7	0.2	A	R	04/25/18	E-1	636	65	1.5/S	
E-1669	1	25	2.5	2.8	0.3	A	R	04/25/18	E-1	636	65	1.5/S	No Bonnet
E-1671	0.5	13	2.5	2.7	0.2	A	R	04/25/18	E-1	636	65	1.5/S	
E-1673	0.5	13	2.3	2.6	0.3	A	R	04/25/18	E-1	636	65	1.5/S	
E-1675	1	25	2.3	2.5	0.2	A	R	04/25/18	E-1	636	65	1.5/S	No Bonnet
E-1677	1	25	2.2	2.5	0.3	A	R	04/25/18	E-1	636	65	1.5/S	
E-1679	1	25	2.2	2.5	0.3	A	R	04/25/18	E-1	636	66	14/E	No Bonnet
E-1681	0.5	13	2.3	2.2	0	A	R	04/25/18	E-1	636	66	14/E	
E-1683	1	25	2.3	2.5	0.2	A	R	04/25/18	E-1	636	66	14/E	
E-1685	1	25	2.1	2.3	0.2	A	R	04/25/18	E-1	636	66	14/E	
E-1687	1	25	2	2.6	0.6	A	R	04/25/18	E-1	636	66	14/E	
E-1689	1	25	2.3	1.1	0	A	R	04/25/18	E-1	636	66	14/E	
E-1691	1	25	2.3	2.6	0.3	A	R	04/25/18	E-1	636	66	14/E	
E-1693	0.5	19	2.3	2.4	0.1	A	R	04/25/18	E-1	636	66	14/E	
E-1695	1	25	2.4	2.4	0	A	R	04/25/18	E-1	636	66	14/E	
E-1697	1	25	1.8	2.6	0.8	A	R	04/25/18	E-1	636	66	14/E	
E-1699	1	25	2.4	2.6	0.2	A	R	04/25/18	E-1	636	66	14/E	No Bonnet
E-1701	0.5	13	1.9	2	0.1	A	R	04/25/18	E-1	636	66	14/E	
E-1703	0.5	13	1.8	2.1	0.3	A	R	04/25/18	E-1	636	66	14/E	No Bonnet
E-1705	1	25	2.1	3.4	1.3	A	R	04/25/18	E-1	636	66	14/E	
E-1707	1	25	2.6	2.6	0	A	R	04/25/18	E-1	636	66	14/E	
E-1709	1	25	2.4	2.6	0.2	A	R	04/25/18	E-1	636	65	15/S	
E-1711	0.5	13	1.7	1.9	0.2	A	R	04/25/18	E-1	636	65	15/S	
E-1713	0.5	13	1.9	2.9	1	A	R	04/25/18	E-1	636	65	15/S	
E-1715	1	25	1.9	2	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1717	1	38	1.8	1.9	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1719	0.5	19	1.6	1.9	0.3	A	R	04/25/18	E-1	636	65	15/S	
E-1721	1	25	1.4	1.5	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1723	0.5	13	1.4	2.5	1.1	A	R	04/25/18	E-1	636	65	15/S	
E-1725	1	38	1.4	17.1	15.7	A	R	04/25/18	E-1	636	65	15/S	
E-1727	1	38	2.9	3.2	0.3	A	R	04/25/18	E-1	636	65	15/S	
E-1729	0.5	19	2.7	3.5	0.8	A	R	04/25/18	E-1	636	65	15/S	
E-1731	0.5	19	2.7	2.9	0.2	A	R	04/25/18	E-1	636	65	15/S	
E-1733	1	38	2	2.1	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1735	0.5	19	1.6	1.7	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1737	1	38	1.5	1.6	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1739	0.5	19	1.7	1.7	0	A	R	04/25/18	E-1	636	65	15/S	
E-1741	0.5	19	1.4	1.5	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1743	2	51	1.3	18	16.7	A	R	04/25/18	E-1	636	65	15/S	
E-1745	0.5	13	2.4	2.5	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1747	1	25	1.6	1.7	0.1	A	R	04/25/18	E-1	636	65	15/S	No Bonnet
E-1749	1	25	3	3.1	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1751	1	10	2	2	0	A	R	04/25/18	E-1	636	65	15/S	
E-1753	1	10	1.8	1.9	0.1	A	R	04/25/18	E-1	636	65	15/S	
E-1755	1	10	1.3	2320	2318.7	A	R	04/25/18	E-1	641	65	15/S	Gate Valve west of CV-F161B
E-1757	3	7	2	344	342	A	R	04/25/18	E-1	640	65	15/S	Gate Valve south of P-107B
E-1759	10	255	0.5	111	110.5	A	R	04/25/18	E-1	645	65	15/S	Gate Valve southwest of P-107B/ No Bonnet
E-2340	2	51	2.6	2.8	0.2	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2342	1	38	2.7	2.8	0.1	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2344	2	51	2.9	3	0.1	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2346	1	25	2.7	2.9	0.2	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2348	1	25	2.8	3	0.2	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2350	1	25	2.8	4.3	1.5	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2352	1	25	2.6	2.8	0.2	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2354	1	25	2.4	3.6	1.2	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2356	1	25	2.4	2.6	0.2	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2358	5	127	2.9	11	8.1	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2360	2	51	2.2	8.1	5.9	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2362	1	38	3.5	3.2	0	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2364	5	127	2.6	28.2	25.6	A	R	04/26/18	E-1	1881	83	2.2/SE	Leak
E-2366	10	95	0.2	1	0.8	A	R	04/26/18	E-1	1881	83	2.2/SE	
E-2368	3	76	1	282	281	A	R	04/26/18	E-1	1881	83	2.2/SE	Leak
E-2310	1	38	0.7	0.8	0.1	A	R	04/26/18	E-1	641	82	1.5/E	
E-2312	1	38	0.7	1	0.3	A	R	04/26/18	E-1	641	82	1.5/E	
E-2314	1	38	0.8	1	0.2	A	R	04/26/18	E-1	641	82	1.5/E	

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-2316	1	38	1	0.8	0	A	R	04/26/18	E-1	641	82	1.5/E	
E-2318	1	38	0.5	1	0.5	A	R	04/26/18	E-1	641	82	1.5/E	
E-2320	1	76	0.8	0.9	0.1	A	R	04/26/18	E-1	641	82	1.5/E	
E-2322	2	153	1.5	1.3	0	A	R	04/26/18	E-1	641	82	1.5/E	
E-2324	1	76	1.1	1.3	0.2	A	R	04/26/18	E-1	641	82	1.5/E	No Bonnet
E-2326	3	29	1	3.9	2.9	A	R	04/26/18	E-1	641	82	1.5/E	
E-2328	3	29	1.6	88.9	87.3	A	R	04/26/18	E-1	641	82	1.5/E	Leak
E-2330	6	229	2.3	1.9	0	A	R	04/26/18	E-1	641	82	1.5/E	
E-2332	1	38	2.1	2.4	0.3	A	R	04/26/18	E-1	641	82	1.5/E	
E-2334	2	51	2.5	2.8	0.3	A	R	04/26/18	E-1	641	82	1.5/E	
E-2336	1	38	2.6	2.9	0.3	A	R	04/26/18	E-1	641	82	1.5/E	
E-2338	1	38	2.8	4.5	1.7	A	R	04/26/18	E-1	641	82	1.5/E	
E-2280	3	76	2	2.3	0.3	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2282	2	51	2	2	0	A	R	04/26/18	E-1	1881	68	3.1/S	No Bonnet
E-2284	1	25	1.9	2	0.1	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2286	1	25	1.9	2	0.1	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2288	1	25	1.9	2.2	0.3	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2290	1	25	2.2	2.2	0	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2292	5	127	1.7	2.7	1	A	R	04/26/18	E-1	1881	68	3.1/S	No Bonnet
E-2294	1	25	2.3	2.4	0.1	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2296	1	25	2.2	5.3	3.1	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2298	2	51	2.7	4.5	1.8	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2300	1	25	3.1	2.9	0	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2302	1	25	2.7	2.5	0	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2304	2	51	2.2	2.4	0.2	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2306	1	25	2.4	2.2	0	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2308	2	76	2.7	2.9	0.2	A	R	04/26/18	E-1	1881	68	3.1/S	
E-2250	2	51	1.6	4.2	2.6	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2252	2	51	2.5	7.8	5.3	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2254	3	14	2.8	2.9	0.1	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2256	1	25	1.9	7.2	5.3	A	R	04/26/18	E-1	1881	67	2.5/NA	No Bonnet
E-2258	1	25	2.7	2.4	0	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2260	3	76	1.9	17	15.1	A	R	04/26/18	E-1	1881	67	2.5/NA	No Bonnet
E-2262	3	14	2.9	3.1	0.2	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2264	1	25	2.1	2.2	0.1	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2266	1	25	2	2.3	0.3	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2268	2	51	2	4	2	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2270	2	51	2.8	3	0.2	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2272	1	25	2.3	2.5	0.2	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2274	3	76	1.9	3.3	1.4	A	R	04/26/18	E-1	1881	67	2.5/NA	No Bonnet
E-2276	1	25	2.3	3.4	1.1	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-2278	1	25	1.9	2.2	0.3	A	R	04/26/18	E-1	1881	67	2.5/NA	
E-1851	1	10	0.8	0.8	0	A	R	04/26/18	E-1	636	63	14/W	1F018
E-1853	0.5	13	0.7	2.3	1.6	A	R	04/26/18	E-1	636	63	14/W	
E-1855	0.5	13	1.5	1.5	0	A	R	04/26/18	E-1	636	63	14/W	
E-1857	1	19	1.7	2.3	0.6	A	R	04/26/18	E-1	636	63	14/W	No Bonnet
E-1859	1	19	1.7	2	0.3	A	R	04/26/18	E-1	636	63	14/W	
E-1861	1	19	1.9	1.9	0	A	R	04/26/18	E-1	636	63	14/W	No Bonnet
E-1863	1	25	2.2	2.3	0.1	A	R	04/26/18	E-1	636	63	14/W	
E-1821	2	6	2.5	57.2	54.7	A	R	04/26/18	E-1	636	59	14/W	Leak at Packing/Gate Valve east of P-108B
E-1823	1	25	1.4	1.7	0.3	A	R	04/26/18	E-1	636	59	14/W	
E-1825	1	25	2.1	2.1	0	A	R	04/26/18	E-1	636	59	14/W	
E-1827	1	25	2.1	2.2	0.1	A	R	04/26/18	E-1	636	59	14/W	
E-1829	1	25	2	3.2	1.2	A	R	04/26/18	E-1	636	59	14/W	
E-1831	2	10	2.1	47.3	45.2	A	R	04/26/18	E-1	636	59	14/W	Leak at Packing/Gate Valve westside P-108B
E-1833	1	25	2.9	7.2	4.3	A	R	04/26/18	E-1	636	59	14/W	
E-1835	0.5	13	2.8	2.9	0.1	A	R	04/26/18	E-1	636	59	14/W	
E-1837	1	5	2.4	3	0.6	A	R	04/26/18	E-1	636	59	14/W	
E-1839	1	25	2.8	3.7	0.9	A	R	04/26/18	E-1	636	59	14/W	
E-1841	1	6	2.9	15.4	12.5	A	R	04/26/18	E-1	636	59	14/W	
E-1843	2	51	2.9	30.1	27.2	A	R	04/26/18	E-1	636	59	14/W	Leak at Stem/Gate Valve westside P-108B
E-1845	1	25	3	6.3	3.3	A	R	04/26/18	E-1	636	59	14/W	
E-1847	0.5	13	3.2	8.1	4.9	A	R	04/26/18	E-1	636	59	14/W	FLG NSD P-108B
E-1849	0.5	13	2.9	3.4	0.5	A	R	04/26/18	E-1	636	59	14/W	
E-1761	3	115	0.9	29.4	28.5	A	R	04/26/18	E-1	636	56	11/W	Gate Valve west of P-108A
E-1763	1	6	2.9	11.1	8.2	A	R	04/26/18	E-1	636	56	11/W	
E-1765	1	6	3.5	3.6	0.1	A	R	04/26/18	E-1	636	56	11/W	
E-1767	1	25	3.5	3.8	0.3	A	R	04/26/18	E-1	636	56	11/W	No Bonnet
E-1769	1	25	3.6	4	0.4	A	R	04/26/18	E-1	636	56	11/W	
E-1771	2	13	3.7	3.9	0.2	A	R	04/26/18	E-1	636	56	11/W	
E-1773	1	25	3.7	4	0.3	A	R	04/26/18	E-1	636	56	11/W	
E-1775	1	25	3.8	4.1	0.3	A	R	04/26/18	E-1	636	56	11/W	
E-1777	1	25	3.8	4.2	0.4	A	R	04/26/18	E-1	636	56	11/W	No Bonnet
E-1779	1	25	3.7	3.8	0.1	A	R	04/26/18	E-1	636	56	11/W	
E-1781	1	25	3.7	137	133.3	P	R	04/26/18	E-1	636	56	11/W	Gate Valve west of P-108A/Bonnet insulated

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1783	2	10	3.2	134	130.8	A	R	04/26/18	E-1	636	56	11/W	Gate Valve west of P-108A
E-1785	1	25	0.2	0.5	0.3	A	R	04/26/18	E-1	636	56	11/W	No Bonnet
E-1787	1	10	0.3	0.3	0	A	R	04/26/18	E-1	636	56	11/W	
E-1789	0.5	13	0.2	0.5	0.3	A	R	04/26/18	E-1	636	56	11/W	
E-1791	1	25	0.5	6.9	6.4	P	R	04/26/18	E-1	636	59	14/W	Bonnet Insulated
E-1793	1	25	2.4	3.6	1.2	A	R	04/26/18	E-1	636	59	14/W	
E-1795	1	38	2.5	2.6	0.1	A	R	04/26/18	E-1	636	59	14/W	
E-1797	1	25	2.6	48.5	45.9	A	R	04/26/18	E-1	636	59	14/W	Packing east of P-108A
E-1799	1	38	3.3	5.4	2.1	A	R	04/26/18	E-1	636	59	14/W	
E-1801	2	6	3	111	108	A	R	04/26/18	E-1	636	59	14/W	Packing east of P-108A
E-1803	1	25	2.9	11.1	8.2	A	R	04/26/18	E-1	636	59	14/W	No Bonnet
E-1805	1	6	1.2	2.1	0.9	A	R	04/26/18	E-1	636	59	14/W	
E-1807	1	6	1.9	2.3	0.4	A	R	04/26/18	E-1	636	59	14/W	
E-1809	1	25	2	2.3	0.3	A	R	04/26/18	E-1	636	59	14/W	No Bonnet
E-1811	0.5	13	2.1	2.1	0	A	R	04/26/18	E-1	636	59	14/W	No Bonnet
E-1813	0.5	13	1.9	2	0.1	A	R	04/26/18	E-1	636	59	14/W	
E-1815	2	13	1.8	2.3	0.5	A	R	04/26/18	E-1	636	59	14/W	
E-1817	1	25	1.6	1.7	0.1	A	R	04/26/18	E-1	636	59	14/W	
E-1819	1	25	1.6	2.3	0.7	A	R	04/26/18	E-1	636	59	14/W	
E-1761	3	57	1.7	2	0.3	A	R	05/15/18	E-1	638	57.9	11/ENE	
E-1763	4	102	1.8	7.4	5.6	A	R	05/15/18	E-1	638	57.9	11/ENE	No Bonnet
E-1765	2	51	2.5	2.5	0	A	R	05/15/18	E-1	638	57.9	11/ENE	TC ABV GT BCW PRD
E-1767	3	76	2.3	3.3	1	A	R	05/15/18	E-1	638	57.9	11/ENE	
E-1769	2	38	2.6	3	0.4	A	R	05/15/18	E-1	638	57.9	11/ENE	No Bonnet
E-1771	2	13	2.5	3	0.5	A	R	05/15/18	E-1	638	57.9	11/ENE	
E-1773	4	25	2.6	57.4	54.8	A	R	05/15/18	E-1	638	57.9	11/ENE	Packing leak end of TK
E-1775	3	57	0.3	19.7	196.7	A	R	05/15/18	E-1	645	57.9	11/ENE	
E-1777	2	51	2.6	2.4	0	A	R	05/15/18	E-1	645	57.9	11/ENE	
E-1779	3	19	1.5	1.9	0.4	A	R	05/15/18	E-1	645	57.9	11/ENE	
E-1781	6	6	0.8	129	128.2	A	R	05/15/18	E-1	645	57.9	11/ENE	Packing leak swsd of TK
E-1783	7	7	3.6	50.3	46.7	A	R	05/15/18	E-1	638	57.9	11/ENE	Packing leak swsd of TK
E-1785	3	5	3.2	2.8	0	A	R	05/15/18	E-1	638	57.9	11/ENE	
E-1787	1	25	3.9	3.8	0	A	R	05/15/18	E-1	638	57.9	11/ENE	No Bonnet
E-1789	3	76	3.6	3.6	0	A	R	05/15/18	E-1	638	57.9	11/ENE	
E-1791	1	25	3.4	3.4	0	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1793	1	19	3.1	49.2	46.1	A	R	05/15/18	E-1	638	56.6	12/ENE	Packing leak NWSD TANK
E-1795	2	51	3.5	34.5	31	A	R	05/15/18	E-1	638	56.6	12/ENE	STEM LEAK NWSD TANK
E-1797	1	25	3.3	3.5	0.2	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1799	2	13	2.9	3.6	0.7	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1801	2	6	2.6	3.9	1.3	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1803	1	25	2.5	3.2	0.7	A	R	05/15/18	E-1	638	56.6	12/ENE	No Bonnet
E-1805	3	3	2.7	2.5	0	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1807	3	3	2.5	2.6	0.1	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1809	1	19	2	3.7	1.7	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1811	2	19	2.3	2.5	0.2	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1813	2	51	2.2	114	111.8	A	R	05/15/18	E-1	638	56.6	12/ENE	PACKING LEAK SWSD TANK
E-1815	2	51	3.3	3.9	0.6	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1817	3	76	3.2	8.2	5	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1819	3	10	3.5	4.3	0.8	A	R	05/15/18	E-1	638	56.6	12/ENE	
E-1821	3	10	3.6	10.3	6.7	A	R	05/15/18	E-1	638	60	20/ENE	
E-1823	2	6	3.6	3.6	0	A	R	05/15/18	E-1	638	60	20/ENE	
E-1825	3	57	0.9	11.5	10.6	A	R	05/15/18	E-1	638	60	20/ENE	
E-1827	3	3	2.3	2.6	0.3	A	R	05/15/18	E-1	638	60	20/ENE	
E-1829	1	25	2.4	2.9	0.5	A	R	05/15/18	E-1	638	60	20/ENE	
E-1831	1	25	2.6	2.6	0	A	R	05/15/18	E-1	638	60	20/ENE	
E-1833	1	19	2.5	2.5	0	A	R	05/15/18	E-1	638	60	20/ENE	
E-1835	2	6	2.5	2.4	0	A	R	05/15/18	E-1	638	60	20/ENE	
E-1837	1	3	2.1	2.5	0.4	A	R	05/15/18	E-1	638	60	20/ENE	
E-1839	2	38	2.4	2.5	0.1	A	R	05/15/18	E-1	638	60	20/ENE	
E-1841	1	25	2.3	2.4	0.1	A	R	05/15/18	E-1	638	60	20/ENE	No Bonnet
E-1843	1	25	2.3	3.6	1.3	A	R	05/15/18	E-1	638	60	20/ENE	
E-1845	4	102	2.3	7.9	5.6	A	R	05/15/18	E-1	638	60	20/ENE	
E-1847	2	51	1.5	1.9	0.4	A	R	05/15/18	E-1	638	60	20/ENE	
E-1849	1	25	1.3	1.4	0.1	A	R	05/15/18	E-1	638	60	20/ENE	No Bonnet
E-1851	5	6	1.3	1.5	0.2	A	R	05/15/18	E-1	638	64	16/NE	
E-1853	1	25	1.1	1.2	0.1	A	R	05/15/18	E-1	638	64	16/NE	No Bonnet
E-1855	3	10	0.9	49.6	48.7	A	R	05/15/18	E-1	638	64	16/NE	Packing leak SWSD TANK
E-1857	2	19	2.7	3.4	0.7	A	R	05/15/18	E-1	638	64	16/NE	
E-1859	1	25	2.9	3.3	0.4	A	R	05/15/18	E-1	638	64	16/NE	No Bonnet
E-1861	2	13	2.8	5.2	2.4	A	R	05/15/18	E-1	638	64	16/NE	
E-1863	2	13	0.2	3	2.8	A	R	05/15/18	E-1	645	64	16/NE	
E-1865	2	19	1	1	0	A	R	05/15/18	E-1	645	64	16/NE	
E-1867	2	6	0.2	1.1	0.9	A	R	05/15/18	E-1	645	64	16/NE	
E-1869	1	5	0	0	0	A	R	05/15/18	E-1	645	64	16/NE	
E-1871	3	3	0.1	30.5	30.4	A	R	05/15/18	E-1	645	64	16/NE	No Access to Bonnet

Data Point ID	Screening Time (mins)	Screening Pace (sec/inch)	Background (ppmv)	Max Reading (ppmv)	Net Reading (ppmv)	Screening Status (All,Partial,Unknown)	Screening Team (District/Refinery)	Date	Screening Person	TVA #	Ambient Temperature (deg F)	Windspeed/ Direction (MPH)	Field Sheet Comments
E-1873	6	29	0	214	214	A	R	05/15/18	E-1	645	64	16/NE	Stem leaks SESD TANK
E-1875	2	6	1.5	2.5	1	A	R	05/15/18	E-1	638	64	16/NE	
E-1877	2	38	1.6	1.6	0	A	R	05/15/18	E-1	638	64	16/NE	
E-1879	3	10	1.4	91.5	90.1	A	R	05/15/18	E-1	638	64	16/NE	Stem leaks SESD TANK
E-1881	2	51	2.8	2.5	0	A	R	05/15/18	E-1	638	64	15/NE	No Bonnet
E-1883	2	13	2.1	2.4	0.3	A	R	05/15/18	E-1	638	64	15/NE	
E-1885	1	38	1.7	1.7	0	A	R	05/15/18	E-1	638	64	15/NE	No Bonnet
E-1887	1	38	1.4	1.5	0.1	A	R	05/15/18	E-1	638	64	15/NE	No Bonnet
E-1889	1	25	1.3	1.6	0.3	A	R	05/15/18	E-1	638	64	15/NE	No Bonnet
E-1891	1	5	1.2	1.3	0.1	A	R	05/15/18	E-1	638	64	15/NE	
E-1893	3	14	1.1	1.2	0.1	A	R	05/15/18	E-1	638	64	15/NE	
E-1895	1	38	0.8	0.8	0	A	R	05/15/18	E-1	638	64	15/NE	
E-1897	1	38	0.9	0.8	0	A	R	05/15/18	E-1	638	64	15/NE	
E-1899	2	51	0.8	40.5	39.7	A	R	05/15/18	E-1	638	64	15/NE	Reducer leak SSD TANK/ No Bonnet
E-1901	4	102	2.1	22.8	20.7	A	R	05/15/18	E-1	638	64	15/NE	
E-1903	1	25	2.9	3.2	0.3	A	R	05/15/18	E-1	638	64	15/NE	
E-1905	1	19	0	0	0	A	R	05/15/18	E-1	638	64	15/NE	
E-1907	3	6	0	0	0	A	R	05/15/18	E-1	638	64	15/NE	
E-1909	1	19	0.1	0.3	0.2	P	R	05/15/18	E-1	638	64	15/NE	Bonnet Covered
E-1911	2	10	0	0	0	A	R	05/15/18	E-1	638	65	18/E	
E-1913	1	25	0.1	0	0	A	R	05/15/18	E-1	638	65	18/E	No Bonnet
E-1915	1	25	0.1	0	0	A	R	05/15/18	E-1	638	65	18/E	
E-1917	1	6	0	0	0	A	R	05/15/18	E-1	638	65	18/E	
E-1919	1	25	0.1	0	0	A	R	05/15/18	E-1	638	65	18/E	No Bonnet
E-1921	1	25	0	0	0	A	R	05/15/18	E-1	638	65	18/E	No Bonnet
E-1923	1	25	0.1	0.1	0	A	R	05/15/18	E-1	638	65	18/E	
E-1925	2	4	0.1	0.2	0.1	A	R	05/15/18	E-1	638	65	18/E	
E-1927	2	10	0.2	0.2	0	A	R	05/15/18	E-1	638	65	18/E	
E-1929	1	19	0.1	0.1	0	A	R	05/15/18	E-1	638	65	18/E	
E-1931	2	4	-1	-1.2	0	A	R	05/15/18	E-1	645	65	18/E	
E-1933	2	10	-1.1	-1.3	0	A	R	05/15/18	E-1	645	65	18/E	
E-1935	2	5	-1.2	-1.3	0	A	R	05/15/18	E-1	645	65	18/E	
E-1937	0.5	13	-1.2	-1.1	0.1	A	R	05/15/18	E-1	645	65	18/E	No Bonnet
E-1939	0.5	13	-1.3	-1.1	0.2	A	R	05/15/18	E-1	645	65	18/E	
E-1941	2	1	-1.2	-1.2	0	A	R	05/15/18	E-1	645	62	18/E	
E-1943	2	2	-1.1	-1.4	0	A	R	05/15/18	E-1	645	62	18/E	
E-1945	1	3	-1.3	-1.4	0	A	R	05/15/18	E-1	645	62	18/E	
E-1947	1	25	-1.3	-1.4	0	A	R	05/15/18	E-1	645	62	18/E	
E-1949	0.5	13	-1.4	-1.4	0	A	R	05/15/18	E-1	645	62	18/E	
E-1951	0.5	13	-1.4	-1.5	0	A	R	05/15/18	E-1	645	62	18/E	
E-1953	2	2	-1.4	-1.5	0	A	R	05/15/18	E-1	645	62	18/E	
E-1955	0.5	13	-1.3	-1.6	0	A	R	05/15/18	E-1	645	62	18/E	
E-1957	0.5	13	-1.4	-1.3	0.1	A	R	05/15/18	E-1	645	62	18/E	
E-1959	0.5	13	-1.4	-1.6	0	A	R	05/15/18	E-1	645	62	18/E	

APPENDIX B-2
Mass Emissions Data

Refinery	TRICORD/BAAQMD Sample ID	Field Component ID	Process Unit/Area	Generalized Process Unit/Area	Sub Area	Component Type	Component Sub Type	Size (inches)	Listed Stream (Field Data)	Listed Stream (Bag Data)	Generalized Stream	Run A THC ER (kg/hr)	Run B THC ER (kg/hr)	Average THC ER (kg/hr)	Run Configuration	Background (ppmv)	Pre-Bag ppmv$_i$ (8 sec)	Pre-Bag ppmv$_f$ (total dwell)	Pre-Bag Net (ppmv)	Pre-Bag Dwell (mins)	Pre-Bag Screening Pace (sec/inch)	Post-Test M21 ppmv$_i$ (8 sec)	Post-Test M21 ppmv$_f$ (total dwell)	Bag Date	Temperature of Component During Bagging	Corrected Temperature of Component During Bagging
E	E001	E-542	HCU	Hydrocracker	E-406A	V	CONTROL	8	LAGO	LAGO Mixed Feed to D-401 Direct	Gas Oil	1.78E-04	1.99E-04	1.88E-04	Parallel	5	140	2,428	2,423	5.0	11.9	356	3711	06-Aug-18	155	155
E	E003	E-33	HCU	Hydrocracker	P-504	C	Reducing Union	0.75	Frac Bottoms	Frac Bottoms Discharge P504	Diesel	6.72E-05	7.22E-05	6.97E-05	Parallel	-2	Blank	1,002	1,004	4.0	101.9	516	1216	06-Aug-18	233	233
E	E005	E-269	HCU	Hydrocracker	T-502	V	GATE	10	DSL	DSL	Diesel	5.97E-04	6.67E-04	6.32E-04	Parallel	5	97	887	882	5.0	9.5	64	1080	07-Aug-18	410	410
E	E007	E-2110	JHT	Hydrotreater	E-107	V	GATE	0.75	JET	Jet	Jet	2.28E-04	2.33E-04	2.31E-04	Parallel	-2	402	1,084	1,086	2.0	50.9	780	2115	07-Aug-18	174	174
E	E010	E-2226	JHT	Hydrotreater	E-105A	V	GLOBE	1	JET	Jet JHJF	Jet	8.23E-05	8.28E-05	8.26E-05	Parallel	6	86	702	696	2.5	47.7	451	953	08-Aug-18	150	150
E	E013	E-2244	JHT	Hydrotreater	P-107B	V	GLOBE	1.5	JET	Jet	Jet	1.17E-03	1.26E-03	1.22E-03	Parallel	-12	3,175	4,142	4,154	4.0	50.9	4120	5231	08-Aug-18	212	212
E	E016	E-295	HCU	Hydrocracker	T-507	V	GATE	3	DSL	DSL	Diesel	2.38E-04	2.34E-04	2.36E-04	Parallel	7	58	967	960	2.0	12.7	288	881	09-Aug-18	170	170
E	E018	E-2114	JHT	Hydrotreater	E-107	V	GATE	4	JET	Jet	Jet	1.06E-03	1.05E-03	1.05E-03	Parallel	14	932	1,601	1,587	3.5	16.7	1886	2672	09-Aug-18	278	278
E	E021	E-2204	JHT	Hydrotreater	E-105A	V	GATE	1.5	JET	JFHF Jet Fuel Hydrofiner	Jet	2.07E-05	6.17E-06	1.34E-05	Parallel	5	11	15	10	5.0	63.7	16	30	20-Aug-18	152	152
E	E023	E-2248	JHT	Hydrotreater	P-107B	V	GATE	3	JET	Jet	Jet	3.20E-05	2.97E-05	3.09E-05	Parallel	-15	38	617	632	4.0	25.5	326	704	20-Aug-18	118	118
E	E025	E-1755	JHT	Hydrotreater	CV-F161B	V	GATE	2	JET	Jet low Flow Recycle	Jet	7.95E-05	7.80E-05	7.87E-05	Parallel	-15	114	2,303	2,318	4.0	38.2	804	1817	20-Aug-18	87	87
E	E027	E-2236	JHT	Hydrotreater	E-105A	V	GATE	6	JET	Jet to HP	Jet	2.71E-04	8.62E-05	1.79E-04	Parallel	0	342	1,071	1,071	2.5	8.0	378	1124	21-Aug-18	280	280
E	E030	E-2200	JHT	Hydrotreater	E-107	C	BULL PLUG	0.75	JET	Jet	Jet	1.75E-04	1.84E-04	1.79E-04	Parallel	-5	166	864	869	3.0	76.4	374	814	21-Aug-18	97	97
E	E033	E-331	PSU	Crude Unit	P-107A	P	SEAL	6	JET	Jet	Jet	4.17E-03	3.86E-03	4.01E-03	Parallel	6	243	372	366	1.0	Unknown	177	822	22-Aug-18	207	207
E	E036	E-1583	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet Low Flow Recycle	Jet	1.55E-04	1.55E-04	1.55E-04	Parallel	0	188	922	922	2.0	50.9	442	1171	23-Aug-18	110	110
E	E038	E-1593	JHT	Hydrotreater	P-107A	V	GATE	0.75	JET	Jet	Jet	4.19E-04	4.25E-04	4.22E-04	Parallel	-2	672	1,832	1,834	2.0	50.9	573	1907	23-Aug-18	174	174
E	E040	E-591	BAP	Asphalt Plant	TK-4603	C	SP	0.75	ASPHALT	Asphalt	Asphalt	2.36E-06	2.44E-06	2.40E-06	Parallel	-6	0	0	6	3.0	76.4	0	0	24-Aug-18	67	67
E	E042	E-551	BAP	Asphalt Plant	P-4536A	C	SP	0.75	ASPHALT	Asphalt	Asphalt	3.55E-06	2.07E-06	2.81E-06	Parallel	3	0	0	0	3.0	76.4	0	1	04-Sep-18	67	67
E	E044	E-451	MRU	Reformulation	P-4410B	C	Pump Housing	16	HCN	HCN	Gas Oil	6.44E-04	6.92E-04	6.68E-04	Parallel	-4	26	2,308	2,312	4.0	4.8	186	2184	04-Sep-18	Blank	329
E	E046	E-1845	JHT	Hydrotreater	P-108B	C	PRD COUPLING	0.75	DIESEL	Diesel	Diesel	1.86E-06	2.30E-06	2.08E-06	Parallel	5	0	20	15	2.0	50.9	18	45	05-Sep-18	62	62
E	E048	E-1873	OM-13	Tank Farm	TK-1778	V	GATE	4	JET A	Jet A	Jet	3.11E-05	3.38E-05	3.24E-05	Parallel	-20	31	228	248	3.0	14.3	122	259	05-Sep-18	70	70
E	E050	E-1901	OM-13	Tank Farm	TK-1779	C	PRD Threaded Con	0.75	JET A	Jet A	Jet	3.37E-06	2.99E-06	3.18E-06	Parallel	7.4	13	46	39	1.5	38.2	29	60	06-Sep-18	Blank	79.4
E	E052	E-1781	OM-13	Tank Farm	TK-1772	V	MOV-17MV663	20	JET	Jet A	Jet	1.48E-05	2.42E-05	1.95E-05	Parallel	-2	71	164	166	2.0	50.9	104	319	06-Sep-18	Blank	60.3
E	E054	E-1783	OM-13	Tank Farm	TK-1772	V	GATE	20	JET A	Jet A	Jet	7.96E-06	1.60E-05	1.20E-05	Parallel	3	7	57	54	3.0	14.3	44	119	07-Sep-18	77	77
E	E056	E-1795	OM-13	Tank Farm	TK-1773	V	GATE	0.75	JP5	JP5 Jet Production	Jet	1.16E-05	1.00E-05	1.08E-05	Parallel	4	14	122	118	2.0	76.4	97	185	03-Oct-18	70	70
E	E058	E-1813	OM-13	Tank Farm	TK-1775	V	GATE	0.75	DIESEL	Diesel @ Tank 17	Diesel	1.72E-06	1.48E-06	1.60E-06	Parallel	13	4	33	20	4.0	101.9	12	26	03-Oct-18	78	78
E	E060	E-1855	OM-13	Tank Farm	TK-1774	V	GATE	6	DIESEL	Tank 1774 - Diesel	Diesel	2.85E-05	2.75E-05	2.80E-05	Parallel	4	23	60	56	2.0	50.9	61	145	04-Oct-18	71	71
E	E062	E-2200	JHT	Hydrotreater	E-107	C	BULL PLUG	0.75	JET	Jet	Jet	2.48E-05	2.53E-05	2.50E-05	Parallel	-2	240	778	780	3.0	76.4	565	799	04-Oct-18	128	128
E	E064	E-382	HCU	Hydrocracker	P-505B	C	ELBOW	0.75	DSL	DSL P503B	Diesel	3.81E-05	4.11E-05	3.96E-05	Parallel	6	91	361	355	3.0	76.4	46	371	05-Oct-18	69	69
E	E066	E-5	HCU	Hydrocracker	P-504	C	TC	0.75	Frac Bottoms	Frac Bottoms @ P504	Diesel	4.56E-05	4.02E-05	4.29E-05	Parallel	-11	34	1,825	1,836	1.0	25.5	320	2173	05-Oct-18	188	188
E	E068	E-16	HCU	Hydrocracker	R-402A	V	GLOBE	2	HCRF (Hydrocracker Recycle Feed)	HCRF	Gas Oil	2.64E-04	2.89E-04	2.77E-04	Parallel	0	120	233	233	2.0	19.1	98	302	08-Oct-18	364	364
E	E070	E-68	HCU	Hydrocracker	R-402B	C	BULL PLUG	1	LGO	LGO to R-402 B	Gas Oil	1.32E-04	1.56E-04	1.44E-04	Parallel	12	21	211	199	1.5	28.6	2710	3942	09-Oct-18	148	148
E	E072	E-813	COKER	Coker	E-925	V	GATE	8	MPA	MPA to T-903 from E-903	Gas Oil	1.32E-05	1.84E-05	1.58E-05	Parallel	-11	1	21	32	2.0	4.8	6	46	05-Nov-18	317	317
E	E074	E-1117	COKER	Coker	CV-9F036	V	MOV	10	SLUDGE	Sludge	Sludge	1.60E-06	1.98E-06	1.79E-06	Parallel	-1	0	24	25	5.0	9.5	11	30	05-Nov-18	94	94
E	E076	E-3	HCU	Hydrocracker	P-504	V	GATE	0.75	Frac Bottoms	Frac Bottoms P504 Suction from T502 bottoms	Diesel	1.11E-05	1.49E-05	1.30E-05	Parallel	-1	12	87	88	2.5	63.7	45	91	06-Nov-18	170	170
E	E078	E-444	HCU	Hydrocracker	E-406A	V	GATE	2	LCCO	LCCO P/S LAGO to Unit	Cycle Oil	7.54E-06	5.42E-06	6.48E-06	Parallel	1	32	140	139	2.0	19.1	50	215	06-Nov-18	136	136
E	E080	E-556	HCU	Hydrocracker	E-406A	C	Reducing Union	0.75	LCCO	LCCO to Tk 1712	Cycle Oil	8.63E-07	1.39E-06	1.13E-06	Parallel	6	6	10	4	7.0	178.3	3	11	07-Nov-18	93	93
E	E082	E-536	HCU	Hydrocracker	E-406A	V	GATE	2	LAGO	LAGO Mixed Feed to D-401 Direct	Gas Oil	3.33E-06	3.80E-06	3.56E-06	Parallel	10	12	44	34	7.0	66.8	14	47	07-Nov-18	95	95
E	E085	E-1517	JHT	Hydrotreater	E-101	V	GATE	6	DIESEL	Diesel from E101	Diesel	2.40E-06	2.38E-06	2.39E-06	Parallel	-7	16	41	48	2.0	6.4	19	46	08-Nov-18	Blank	86
E	E087	E-2230	JHT	Hydrotreater	E-105A	V	GATE	6	JET	Jet to HP	Jet	1.31E-04	1.04E-04	1.18E-04	Parallel	10	47	353	343	3.0	9.5	644	1126	08-Nov-18	280	280
E	E089	E-55	HCU	Hydrocracker	P-402A	C	BULL PLUG	0.75	HCRF (Hydrocracker Recycle Feed)	HCRF	Gas Oil	1.23E-05	1.03E-05	1.13E-05	Parallel	0	30	288	288	3.0	76.4	101	295	09-Nov-18	126	126
E	E091	E-22	HCU	Hydrocracker	R-402A	C	BULL PLUG	1	HCRF (Hydrocracker Recycle Feed)	HCRF Recycle Feed	Gas Oil	2.71E-04	2.22E-04	2.47E-04	Parallel	16	462	982	966	1.5	28.6	325	814	09-Nov-18	135	135
E	E093	E-514	HCU	Hydrocracker	E-406A	V	GATE	4	KLGO	KLGO T-96 Matanel to HCU Feed Diversion	Gas Oil	7.14E-06	4.79E-06	5.96E-06	Parallel	3	10	15	12	3.0	14.3	9	14	12-Nov-18	145	145
C	C001	C-401-21862-V	South Isomax	Hydrocracker	Tar Stripper	V	Gate	10	AS	Draw Stripper Tar	Asphalt	3.23E-06	4.49E-06	3.86E-06	Parallel	-3	14	192	195	2.0	3.8	18	222	17-May-18	267	267
C	C004	C-20448	South Isomax	Hydrocracker	SDA	V	Gate	10	Asphalt	Asphalt	Asphalt	1.13E-02	1.62E-02	1.38E-02	Parallel	-1	28,300	28,300	28,301	0.2	0.4	N/A	17,000 (Flame Out)	17-May-18	241	241
C	C007	C-21210	South Isomax	Hydrocracker	SDA	V	Gate	2	WASH OIL	DAO to NISO - Wash Oil	Wash Oil	1.50E-06	1.68E-06	1.59E-06	Parallel	4	12	55	51	2.0	19.1	24	60	18-May-18	82	82
C	C009	C-20145	0955-NO 4 Crude	Crude Unit	P-1169	P	Seal	6	Crude VAC SC6	Crude VAC SC6	Gas Oil	8.42E-06	6.07E-06	7.24E-06	Parallel	-6	12	38	44	2.0	Unknown	13	50	21-May-18	242	242
C	C011	C-20085	0110-Propylene	Other	P-673	P	Seal	4	Pentamer	Pentamer	Pentamer	8.24E-04	8.10E-04	8.17E-04	Parallel	2	6	61	59	3.5	Unknown	16	87	22-May-18	318	318
C	C013	C-20059	0110-Propylene	Other	P-670	P	Seal	4	Tetramer	Reflux and Tetramer Product	Tetramer	1.12E-04	1.19E-04	1.15E-04	Parallel	-1.7	13	37	39	2.0	Unknown	20	20	23-May-18	92	92
C	C016	C-20706	0415-LT NEU H/C	Hydrocracker	P-1269A	P	Seal	4	LNC VAC SC4	# 5 Sidecut	Lube Oil	1.87E-06	3.34E-06	2.61E-06	Parallel	-2	-2	-2	0	10.0	Unknown	-2.7	1	25-May-18	75	75
C	C018	C-20402.2	0420-LT NEU H/F	Hydrotreater		C	Flange	4	TKC VAC BTMS	TKC Vac btms	Vacuum Tower Bottoms	2.28E-05	2.93E-05	2.60E-05	Parallel	0	12	32	32	1.5	7.2	20	57	25-May-18	388	388
C	C020	C-20252	LT NEU H/F 13	Hydrotreater		C	Flange	3	Hot Oil	Hot Oil Vacuum Feed C1750	Hot Oil	1.30E-06	1.99E-06	1.65E-06	Parallel	0	1	9	9	3.0	19.1	-1	4	29-May-18	273	273
C	C022	C-21885	South Isomax	Hydrocracker	SDA	V	Gate	8	TAR	Tar	Tar	2.26E-06	2.81E-06	2.53E-06	Parallel	-7	0	7	14	3.0	7.2	4	13	29-May-18	316	316
C	C025	C-20464	South Isomax	Hydrocracker	SDA	V	Gate	0.75	Asphalt	Asphalt	Asphalt	1.12E-06	1.71E-06	1.41E-06	Parallel	0	5	6.8	7	1.5	38.2	0	0	30-May-18	138	138
C	C027	C-20522.3	South Isomax	Hydrocracker	SDA	C	Flange	0.75	Hot Oil	Blank	Hot Oil	6.67E-06	6.73E-06	6.70E-06	Parallel	-2	1	3.8	6	2.0	50.9	0	4	30-May-18	470	470
C	C029	C-21210	South Isomax	Hydrocracker	SDA	V	Gate	2	WASH OIL	Wash Oil	Wash Oil	3.33E-06	3.38E-06	3.36E-06	Parallel	0	10	243	243	1.5	14.3	60	228	30-May-18	92	92
C	C031	C-21025.3	South Isomax	Hydrocracker	SDA	C	Threaded	0.5	Charge Oil	Charge Oil Fed from SDA Rose PCC BKR IIB at P-102	Resid	1.16E-06	1.86E-06	1.51E-06	Parallel	0	0	11	11	5.0	191.0	1	3	31-May-18	87	87
C	C033	C-20772	South Isomax	Hydrocracker	SDA	V	Gate	0.75	DAO	DAO	Deasphalted Oil	7.95E-07	1.90E-06	1.35E-06	Parallel	-2	0	1	3	5.0	127.3	0	1	20-Jun-18	160	160
C	C035	C-20171	South Isomax	Hydrocracker	SDA	C	PRD Flange	1	MEA	MEA	Amine	8.76E-07	1.65E-06	1.26E-06	Parallel	-4	1	6	10	3.0	57.3	1	8	20-Jun-18	82	82
C	C037	C-20067 - P	1620-RPH-SP Hill	Tank Farm	P-3217	P	Seal	1	Diesel	Diesel	Diesel	1.04E-06	1.70E-06	1.37E-06	Parallel	2	12	21	19	3.0	Unknown	30	44	21-Jun-18	53.1	53.1
C	C040	C-20370	1620-RPH-SP Hill	Tank Farm	P-3232	P	Seal	1	Tetramer	Tetramer	Tetramer	7.50E-06	2.35E-06	4.92E-06	Parallel	-2	61	114	116	2.0	Unknown	81	128	21-Jun-18	76	76
C	C043	C-20305.6	Blending & Shipping	Tank Farm		C	Plug	1	Not Included in Field Screening	Tar	Tar	8.21E-07	1.56E-06	1.19E-06	Parallel	-5	35	41	46	1.0	19.1	10	21	22-Jun-18	85	85
C	C045	C-20305.5	Blending & Shipping	Tank Farm		C	Tube Fitting	0.5	Not Included in Field Screening	Tar	Tar	9.01E-06	1.52E-05	1.21E-05	Parallel	2	10	41	39	2.0	76.4	70	112	22-Jun-18	109	109
C	C047	C-20178-P	Blending & Shipping - 13 Plant	Tank Farm		Agitator	Seal	24	Not Included in Field Screening	Diesel	Diesel	8.45E-07	1.68E-06	1.26E-06	Parallel	-2	10	15	17	2.0	1.6	13	18	02-Jul-18	59	59
C	C049	C-20306.3	Blending & Shipping - 24 Plant	Tank Farm		C	Tubing	0.5	Not Included in Field Screening	Tar	Tar	3.48E-05	4.23E-05	3.85E-05	Parallel	0	32	230	230	2.0	76.4	112	156	02-Jul-18	92	92
C	C052	C-20758.2	South Isomax	Hydrocracker	SDA	C	Plug	0.75	Hot Oil	Hot Oil	Hot Oil	2.73E-06	2.89E-06	2.81E-06	Parallel	-5	16	51	56	1.0	25.5	3	30	03-Jul-18	144	144
C	C054	C-201822.3	SDA Hydro	Hydrocracker		C	Threaded	0.75	Not Included in Field Screening	Hot Oil	Hot Oil	5.30E-06	3.71E-06	4.50E-06	Parallel	0	8	12	12	1.0	25.5	6	10.8	06-Jul-18	240	240
C	C056	C-416-20307-V	LT NEU H/F 13	Hydrotreater		V	Control	2	LNHF VAC BTMS	Btm Circ HC LNHF Vac Btms	Vacuum Tower Bottoms	9.50E-07	1.70E-06	1.33E-06	Parallel	0	1	3.7	4	3.0	28.6	1	3.4	11-Jul-18	75	75
C	C058	C-416-20310-V	LT NEU H/F 13	Hydrotreater		V	Gate	0.75	LNHF VAC BTMS	LNHF Vac Btms	Vacuum Tower Bottoms	8.53E-07	1.58E-06	1.22E-06	Parallel	0	0	1	1	4.0	101.9	0	1	11-Jul-18	77	77
C	C060	C-420-20376	0420-LT NEU H/F	Hydrotreater		V	Gate	6	TKC VAC SC4	TKC Vac	Gas Oil	5.50E-06	5.89E-06	5.69E-06	Parallel	0	7	30	30	2.5	8.0	14	75	11-Jul-18	175	175
C	C062	C-420-20347.2	0420-LT NEU H/F	Hydrotreater		C	Plug	0.75	TKC VAC SC4	TKC Vac	Gas Oil	5.20E-06	5.75E-06	5.48E-06	Parallel	-5	6	13	18	1.0	25.5	8	12	11-Jul-18	104	104
C	C064	C-162020293-P	1620-RPH-SP Hill	Tank Farm	P-955	P	Seal	1	Tetramer	Tetramer	Tetramer	8.94E-07	1.61E-06	1.25E-06	Parallel	0	14	16	16	1.5	Unknown	23	41	12-Jul-18	77	77
D	D01	D-265	DSU	Hydrotreater	DSU S. Pipeway	C	Plug	0.5	JT	Bleeder to PIC475 (DSU to Tank 257)	Jet	9.20E-07	1.95E-06	1.44E-06	Parallel	3	3	3	0	2.0	76.4	0.5	0.5	21-Mar-18	68.4	68.4
D	D03	D-596	DSU	Hydrotreater	CV-284A	C	Swagelock	0.75	JT	Jet A Stab btms to Jet/1 Jet Blend	Jet	3.38E-04	3.44E-04	3.41E-04	Parallel	5.6	1,540	1,847	1,841	2.0	50.9	762	2420	23-Mar-18	57.9	57.9
D	D05	D-690	DSU	Hydrotreater	V-287	C	Union	0.75	JT	STAB Bottoms@ Sample Station	Jet	1.52E-04	1.64E-04	1.58E-04	Parallel	8	256	306	298	2.0	50.9	408	556	23-Mar-18	75.38	75.38
D	D07	D-711	DSU	Hydrotreater	P-2947	C	Flange	8	JT	V-752 Product to Unit	Jet	1.22E-03	1.59E-03	1.40E-03	Parallel	4.5	670	1,722	1,718	2.0	6.4	346	1092	23-Mar-18	353	353
D	D09	D-599	DSU	Hydrotreater	V-758	V	GT	0.5	JT	Jet	Jet	4.27E-04	6.14E-04	5.20E-04	Parallel	2	1,422	2,222	2,220	1.3	50.8	3300	5512	26-Mar-18	57	57
D	D011	D-601	DSU	Hydrotreater	V-758	V	GT	2	JT	Jet	Jet	2.59E-03	2.12E-03	2.36E-03	Parallel	0.2	2,350	8,542	8,542	3.5	33.4	8400	15200	26-Mar-18	80.1	80.1
D	D015	D-796	DSU	Hydrotreater	CV-168	V	Plug	6	JT	HPHT Tops to Flare	Jet	5.69E-04	3.57E-04	4.63E-04	Parallel	0	822	1,395	1,395	3.0	9.5	1277	1509	27-Mar-18	58	58
D	D017	D-713	DSU	Hydrotreater	P-2947	V	GT	6	JT	V-752 Inventory Product to Unit/Stab Btms Product	Jet	5.72E-03	4.21E-03	4.97E-03	Parallel	12	8,490	8,922	8,910	2.5	8.0	9742	11400	27-Mar-18	311	311
D	D019	D-965	DSU	Hydrotreater	P-2945	V	GT	0.75	JT	Jet V-752 Inventory Product to Unit	Jet	2.82E-05	2.04E-05	2.43E-05	Parallel	8	58	76	68	1.0	25.5	25	54	28-Mar-18	392	392
D	D021	D-969	DSU	Hydrotreater	P-2945	V	GT	4	JT	Reboil from Pump P2945	Jet	2.17E-03	1.33E-03	1.75E-03	Parallel	10	1,024	3,051	3,041	1.8	8.4	2296	3022	28-Mar-18	307	307
D	D023	D-979	DSU	Hydrotreater	P-2945	V	GT	6	JT	Reboil Pump 2945	Jet	3.00E-03	3.35E-03	3.17E-03	Parallel	11	2,240	5,986	5,975	2.7	8.5	5208	7272	28-Mar-18	315	315
D	D025	D-915	DSU	Hydrotreater	V-754	C	PI	2	JT	Jet-top of V-754 HPHT Sep	Jet	7.63E-06	7.13E-06	7.38E-06	Parallel	2	58	63	61	1.0	9.5	90	97	29-Mar-18	Blank	60
D	D027	D-810	DSU	Hydrotreater	V-752	V	GT	0.5	JT	Stabilizer Reboiler Surge Drum	Jet	3.70E-03	4.32E-03	4.01E-03	Parallel	0	10,400	12,400	12,400	1.0	38.2	8250	12000	29-Mar-18	314	314
D	D029	D-192	DSU	Hydrotreater	V-751	V	GT	6	JT	Top of V-751	Jet	3.34E-06	2.28E-06	2.81E-06	Parallel	2	8	14	12	3.0	9.5	32	40	02-Apr-18	73.1	73.1
D	D032	D-499	DSU	Hydrotreater	V-758	V	GT	0.75	JT	Top of V-758	Jet	2.45E-03	1.65E-03	2.05E-03	Parallel	-5	1,200	4,050	4,055	0.3	7.6	2100	4100	02-Apr-18	72.7	72.7
D	D034	D-596	DSU	Hydrotreater	CV-284A	C	Swagelock	0.75	JT	Jet A Stab btms to Jet/1 Jet Blend	Jet	4.82E-04	6.55E-04	5.69E-04	Parallel	30	2,110	3,352	3,322	1.5	38.2	1106	4417	02-Apr-18	75.1	75.1
D	D036	D-856	DSU	Hydrotreater	E-16194	C		2	JT	Jet to V-16217 RX4	Jet	1.40E-03	1.76E-03	1.58E-03	Parallel	-7	10	1,346	1,353	1.8	16.7	577	1620	03-Apr-18	323	323
D	D038	D-899	DSU	Hydrotreater	F-30	V	GT	3	JT	Reboiler Htr Jet	Jet	4.80E-04	3.04E-04	3.92E-04	Parallel	16	698	1,170	1,154	1.5	9.5	1036	1588	03-Apr-18	107	107
D	D040	D-1017	DSU	Hydrotreater	P-2947	P	C	1.5	JT	V-752 Inventory to Product to Unit/Stab btms Product	Jet	2.54E-03	3.22E-03	2.88E-03	Parallel	4	847	1,772	1,768	2.0	25.5	1407	2014	04-Apr-18	160	160
D	D043	D-952	DSU	Hydrotreater	P-2946	V	GT	0.75	JT	Stab Reboil Circ @ P-2946	Jet	5.23E-04	8.18E-04	6.70E-04	Parallel	0	1,407	3,522	3,522	2.5	63.7	3102	3722	04-Apr-18	157	157
D	D045	D-1016	DSU	Hydrotreater	P-2946	P	C	2	JT	P2946 Stab Reboil Circ/ P-2946 Reb Htr Chg	Jet	2.24E-02	2.36E-02	2.30E-02	Parallel	9	1,916	3,622	3,613	2.0	19.1	2015	3940	05-Apr-18	252	252
D	D047	D-872	DSU	Hydrotreater	V-752	V	GT	2	JT	Jet	Jet	9.75E-04	7.30E-04	8.53E-04	Parallel	-1	655	3,383	3,384	3.3	31.0	2566	5205	05-Apr-18	175	175
D	D050	D-1367	CCU	Fluidized Catalytic Cracking	P-2238	C	Pump Housing	1	HGO	Intermediate Reflux Heavy Gas Oil	Gas Oil	1.35E-03	1.39E-03	1.37E-03	Parallel	-1	190	711	712	2.0	2.1	117	171	06-Apr-18	489	489
D	D052	D-1334	CCU	Fluidized Catalytic Cracking	P-12627	C	Pump Housing	24	AS	Slurry Under Flow from P12627 CV 1216	Resid	4.66E-05	7.41E-05	6.03E-05	Parallel	0	4	21	21	3.0	2.4	10.4	21.6	09-Apr-18	417	417
D	D055	D-1218	SR4	Sulfur Recovery	P-14654	P	C	2	RS	P-14654 Reflux to Scot Stripper	Resid	1.14E-06	2.29E-06	1.71E-06	Parallel	-7	-7	31	38	5.0	47.7	14	46	10-Apr-18	75	75
D	D058	D-1919	LOG	Tank Farm	P-2576	P	C	2	DSL	P2576 310/375 Ex Tk 257	Diesel	9.49E-07	1.68E-06	1.31E-06	Parallel	0	40	45	45	3.0	28.6	47	62	11-Apr-18	59	59
D	D060	D-1925	LOG	Tank Farm	P-2709	P	C	3	DSL	P2709 BAPL #3 Diesel	Diesel	8.81E-06	5.82E-06	7.32E-06	Parallel	6	30	44	38	1.5	9.5	35	56	11-Apr-18	63	63
D	D062	D-1915	LOG	Tank Farm	P-2577	P	C	2	DSL	P2577 Gas Oil	Diesel	8.63E-07	1.70E-06	1.28E-06	Parallel	3	8	14	11	5.0	47.7	12	15	12-Apr-18	49	49
D	D064	D-680	DSU	Hydrotreater	E-15106	C	BP	0.75	JT	Circ Line @ CV 284-B-Jet	Jet	8.62E-07	1.72E-06	1.29E-06	Parallel	4	6	34	30	2.0	50.9	22	45	13-Apr-18	69.6	69.6
D	D066	D-1013	DSU	Hydrotreater	P-2944	P	C	3	JT	P-2944 Aux Lube Oil	Jet	4.69E-05	4.99E-05	4.84E-05	Parallel	0	13	65	65	3.0	19.1	64	122	13-Apr-18	96	96
D	D068	D-1011	DSU	Hydrotreater	P-2944	P	C	3	JT	Jet P2948 Aux Lube Oil	Jet	3.32E-05	2.73E-05	3.03E-05	Parallel	3	12	43	40	2.0	12.7	34	110	16-Apr-18	57.9	57.9
D	D070	D-97	DSU	Hydrotreater	Syn Jet Manifold	V	GT	3	JT	Jet	Jet	1.52E-03	1.28E-03	1.40E-03	Parallel	5	932	3,710	3,705	1.5	9.5	8862	10300	14-Nov-18	Blank	77.6
D	D073	D-878	DSU	Hydrotreater	V-752	C	Union	0.75	JT	Jet	Jet	3.35E-05	2.59E-05	2.97E-05	Parallel	9	50	163	154	2.0	50.9	98	187	15-Nov-18	117	117
D	D075	D-27	DSU	Hydrotreater	Syn Jet Manifold	C	Bushing	0.75	JT	Syn Jet Manifold Syn Jet HCU Btms to Jet A Rundown	Jet	4.21E-05	3.81E-05	4.01E-05	Parallel	0	76	457	457	3.0	76.4	65	322	15-Nov-18	Blank	47.6
D	D077	D-1883	LOG	Tank Farm	P-13196	P	C	1	RS	RS Transmix (0:1)	Resid	8.02E-06	6.28E-06	7.15E-06	Parallel	7	5	110	103	5.0	95.5	55	125	19-Nov-18	Blank	104.2
D	D079	D-628	DSU	Hydrotreater	E-15106	C	Swagelock	0.5	JT	Diesel - Stab Btms to Carb	Jet	1.78E-03	1.61E-03	1.69E-03	Parallel	5	1,936	2,885	2,880	1.5	57.3	1844	3109	19-Nov-18	75	75
D	D081	D-2269	DHT	Hydrotreater	C13910	C	Flange	4	GO	Gas Oil	Gas Oil	1.23E-05	8.34E-06	1.03E-05	Parallel	2	29	528	526	2.0	9.5	37	548	20-Nov-18	215	215
D	D083	D-862	DSU	Hydrotreater	E-16194	C	BP	0.75	JT	Jet	Jet	1.71E-05	1.36E-05	1.53E-05	Parallel	10	39	338	328	2.0	50.9	80	388	20-Nov-18	89	89
D	D085	D-4	DSU	Hydrotreater	P16189	C	BP	0.75	JT	Jet Feed Charge	Jet	7.17E-05	6.02E-05	6.60E-05	Parallel	3	190	519	516	1.5	38.2	313	707	27-Nov-18	81	81
D	D087	D-348	DSU	Hydrotreater	E-932A	C	BP	1	JT	Jet	Jet	4.76E-04	4.80E-04	4.78E-04	Parallel	4	224	2,169	2,165	1.5	28.6	1119	2574	28-Nov-18	143	143
D	D089	D-1669	CFH	Hydrotreater	PS-22	V	CU	10	HGO	HGO CFH Product Stripper Bottoms from Pumps	Gas Oil	7.83E-07	1.54E-06	1.16E-06	Parallel	5	11	22	17	2.0	3.8	11	19	30-Nov-18	219	219
B	B01	B-218	246	Hydrocracker	Heavy DSL return from E-8	C	Bull Plug	1	DSL	Heavy Diesel Return	Diesel	2.35E-06	2.44E-06	2.40E-06	Parallel	1.6	28	26.7	25	2.8	54.0	10.2	25.4	19-Jul-17	95	95
B	B03	B-164	246	Hydrocracker	Line after E-836	V	GT	10	DSL	Diesel	Diesel	4.22E-05	4.23E-05	4.23E-05	Parallel	Blank	16.2	154	154	2.9	5.5	98	307	19-Jul-17	345	345
B	B05	B-313	246	Hydrocracker	Pump area	P	Seal	8	Vacuum Column Bottoms	From 8D-804 Bottoms Vacuum	Gas Oil	2.18E-06	3.05E-06	2.62E-06	Parallel	0.9	6.1	9.8	9	1.1	Unknown	4.8	50	20-Jul-17	367	367
B	B07	B-1124	Coker	Coker		V	GT	6	SCTGO	SCTGO	Gas Oil	2.28E-05	2.53E-05	2.40E-05	Parallel	0	16	42	42	2.0	6.4	26	104	21-Jul-17	484	484
B	B09A	B-1124	Coker	Coker		V	GT	6	SCTGO	SCTGO	Gas Oil	4.61E-05	N/A	4.61E-05	Parallel	0	16	42	42	2.0	6.4	26	104	21-Jul-17	484	484
B	B010	B-1318	250	Hydrotreater	E701	C	Bull plug	1.5	diesel	Diesel Product Feed Thru E701	Diesel	1.17E-04	1.12E-04	1.14E-04	Parallel	4	330	1095	1,091	3.0	38.2	214	614	21-Jul-17	98.9	98.9
B	B012	B-632	76	Blending / Tank Farm	Blank	C	Plug on pump body	8	Light Diesel	Wet Diesel	Diesel	4.67E-05	3.43E-05	4.05E-05	Parallel	0	94	367	367	1.5	Unknown	370	475	24-Jul-17	95	95
B	B014A	B-632	76	Blending / Tank Farm	Blank	C	Plug on pump body	8	Light Diesel	Wet Diesel	Diesel	4.59E-05	N/A	4.59E-05	Parallel	0	94	367	367	1.5	Unknown	370	475	24-Jul-17	95	95
B	B015	B-1314	250	Hydrotreater	E701	C	Flange	8	Diesel	Dry Diesel	Diesel	3.42E-05	3.10E-05	3.26E-05	Parallel	3	47	103	100	2.2	5.2	24	102	25-Jul-17	217.5	217.5
B	B017	B-322	246	Hydrocracker	P-11-008	C	Bull Plug	2	HUK	Slop Oil	Gas Oil	1.74E-05	1.88E-05	1.81E-05	Parallel	2	48	193	191	2.5	23.9	91	225	25-Jul-17	97	97
B	B019	B-286	246	Hydrocracker	P-11-006	C	Bull Plug	2	HUK	HUK Pump Down - (HUK = Heavy Unicrackate)	Gas Oil	9.42E-06	9.84E-06	9.63E-06	Parallel	1	71	136	135	4.0	38.2	154	215	26-Jul-17	94	94
B	B021	B-636	76	Blending / Tank Farm	Blank	P	Seal	10	DSL	Diesel Transfer	Diesel	2.83E-06	3.56E-06	3.20E-06	Parallel	12	30	115	103	2.5	Unknown	57	116	26-Jul-17	Blank	90
B	B023	B-551	240	Hydrocracker	Pumps	P	Seal	6	Lean Sponge Oil	Lean Sponge Oil	Slop Oil	7.92E-04	6.19E-04	7.05E-04	Parallel	2	330	755	753	2.3	Unknown	355	760	27-Jul-17	141	141
B	B025A	B-551	240	Hydrocracker	Pumps	P	Seal	6	Lean Sponge Oil	Lean Sponge Oil	Slop Oil	8.36E-04	N/A	8.36E-04	Parallel	2	330	755	753	2.3	Unknown	355	760	27-Jul-17	141	141
B	B026	B-270	246	Hydrocracker	P-11-006	C	Bull Plug	1	HUK	HUK Pump Down	Gas Oil	2.51E-05	2.56E-05	2.54E-05	Parallel	Blank	68	80	80	2.0	38.2	65	70	27-Jul-17	151	151
B	B029	B-1326	250	Hydrotreater	E701	V	Globe	6	Diesel	Diesel Prod./Feed Thru E-701	Diesel	4.17E-06	2.90E-06	3.54E-06	Parallel	0	6	16	16	4.0	12.7	12	39	18-Apr-18	111	111
B	B031	B-1466	250	Hydrotreater	Tank 721	C	Plug	0.75	Cetane Improver	Cetane Improver	Cetane Improver	2.28E-06	2.91E-06	2.59E-06	Parallel	-1	12	34	35	3.0	76.4	12	29	18-Apr-18	86.2	86.2
B	B033	B-1396	250	Hydrotreater	South Side	C	Tube Fitting	0.25	DSL	Non-blended diesel prod. To U76	Diesel	8.54E-06	5.44E-06	6.99E-06	Parallel	-3	20	90	93	2.0	152.8	12	69	19-Apr-18	85.5	85.5
B	B036	B-1099	250	Hydrotreater	G-721B	C	Cap	0.75	Diesel	Diesel - G721 B Cetane Improver	Cetane Improver	2.15E-06	2.85E-06	2.50E-06	Parallel	2	12	29.7	28	2.0	4.8	17	55	20-Apr-18	63.3	63.3

Refinery	TRICORD/BAAQMD Sample ID	Field Component ID	Process Unit/Area	Generalized Process Unit/Area	Sub Area	Component Type	Component Sub Type	Size (inches)	Listed Stream (Field Data)	Listed Stream (Bag Data)	Generalized Stream	Run A THC ER (kg/hr)	Run B THC ER (kg/hr)	Average THC ER (kg/hr)	Run Configuration	Background (ppmv)	Pre-Bag ppmv$_i$ (8 sec)	Pre-Bag ppmv$_f$ (total dwell)	Pre-Bag Net (ppmv)	Pre-Bag Dwell (mins)	Pre-Bag Screening Pace (sec/inch)	Post-Test M21 ppmv$_i$ (8 sec)	Post-Test M21 ppmv$_f$ (total dwell)	Bag Date	Temperature of Component During Bagging	Corrected Temperature of Component During Bagging
B	B039	B-1306	250	Hydrotreater	E701	V	Globe	8	Diesel	Diesel to production thru preheat E-701	Diesel	1.27E-06	1.84E-06	1.56E-06	Parallel	2	3	10	8	3.0	7.2	12	34	20-Apr-18	150	150
B	B041	B-1137	MP-30	Hydrotreater	B-103	V	Bleed	2	Reboil Oil	Reboil Oil @ B103	Reboil Oil	1.04E-04	8.20E-05	9.30E-05	Parallel	-2	7	54	56	3.0	28.6	18	35	30-Apr-18	265	265
B	B043	B-1329	MP-30	Hydrotreater	D-303	C	Plug	1	Reboil Oil	Reboil Oil	Reboil Oil	6.44E-06	2.20E-06	4.32E-06	Parallel	-3	2	12	15	3.5	66.8	9	11	30-Apr-18	271	271
B	B045	B-278	246	Hydrocracker	P-11-006	C	Flange	4	HUK	HUK Heavy Unicrackate	Gas Oil	6.57E-06	4.75E-06	5.66E-06	Parallel	-3	2	27	30	4.0	19.1	10	26	01-May-18	217	217
B	B047	B-818	Coker	Coker	E-207B	C	BP	1	LCGO	LCGO	Gas Oil	4.34E-06	2.00E-06	3.17E-06	Parallel	-2	5	61	63	4.0	76.4	9	34	01-May-18	84	84
B	B049	B-670	Coker	Crude Unit / Coker	Blank	P	Seal	6	Tank 201 resid	Tank 201 Resid Pump	Resid	2.03E-06	1.79E-06	1.91E-06	Parallel	1	6	16	15	2.0	Unknown	9	23	02-May-18	105	105
B	B052	B-539	248	Aromatic Saturation	Pumps	P	G-605A	6	Turbine Fuel	Turbine Fuel G605-A	Turbine Fuel	2.20E-06	1.58E-06	1.89E-06	Parallel	-12	3	35	47	4.0	12.7	20	31	02-May-18	67	67
B	B054	B-285	246	Hydrocracker	Pump area	P	G-809	8	TPA/HUK	TPA/HUK	Gas Oil	2.28E-05	1.44E-05	1.86E-05	Parallel	3	3	12	9	3.0	Unknown	7	15	03-May-18	229	229
B	B056	B-818	Coker	Coker	E-207B	C	Bull Plug	1	LCGO	LCGO	Gas Oil	2.78E-06	1.79E-06	2.29E-06	Parallel	3	2	8	5	4.0	76.4	7	10.2	04-May-18	79	79
B	B058	B-547	240	Hydrocracker	Pumps	P	G-311	6	HUK	HUK Product	Gas Oil	1.70E-03	1.54E-03	1.62E-03	Parallel	0	162	531	531	4.0	Unknown	170	542	04-May-18	263	263
B	B060	B-2040	Unit 40	Tank Farm	G-407	P	Centrifugal	10	Mid Barrel (Diesel range material)	Mid Barrel	Diesel	5.71E-05	6.26E-05	5.98E-05	Parallel	-14	31	116	130	2.0	Unknown	148	255	07-May-18	62	62
B	B062	B-2036	Unit 40	Tank Farm	G-407	P	Centrifugal	10	Mid Barrel (Diesel range material)	Mid Barrel	Diesel	4.14E-05	2.68E-05	3.41E-05	Parallel	-5	42	110	115	3.0	Unknown	60	115	07-May-18	85	85
B	B064	B-807	200 coker	Coker	GM-222	V	GT	1	LCGO	LCGO @ Pump GM-222	Gas Oil	7.79E-07	1.56E-06	1.17E-06	Parallel	3	11	20	17	2.0	38.2	15	31	08-May-18	69	69
B	B066	B-2042	Unit 40	Tank Farm	G-591	P	Centrifugal	6	DSL Blend	Diesel Blend Pump CP-591	Diesel	3.40E-04	2.74E-04	3.07E-04	Parallel	0	160	810	810	12.0	Unknown	412	991	08-May-18	85	85
B	B068	B-668	200	Crude Unit / Coker	Blank	P	Seal	6		Combined Gas Oil	Gas Oil	1.88E-05	8.79E-06	1.38E-05	Parallel	1	7	22	21	5.5	Unknown	11	21	09-May-18	227	227
A	A01	A-486	FCC	Fluidized Catalytic Cracking	-	C	BP	1	LGO	P8888 Outlet South LGO Pumparound Spare	Gas Oil	9.18E-05	4.61E-05	6.90E-05	Sequential	1.3	Unknown	258	257	7.0	133.7	Unknown	170	22-Feb-17	Blank	305
A	A03	A-470	FCC	Fluidized Catalytic Cracking	-	V	GT	4	LGO	LGO PA Min Flow B/P	Gas Oil	2.11E-03	1.58E-03	1.85E-03	Sequential	2.2	Unknown	749	747	7.0	33.4	Unknown	749	22-Feb-17	Blank	310
A	A04	A-464	FCC	Fluidized Catalytic Cracking	-	V	GT	4	LGO	LGO Min Flow	Gas Oil	5.73E-04	7.85E-04	6.79E-04	Sequential	4.0	Unknown	251	247	5.0	23.9	Unknown	267	23-Feb-17	Blank	310
A	A05	A-325	FCC	Fluidized Catalytic Cracking	LGO line	V	CV-2398	3	LGO	LGO Product	Gas Oil	2.59E-04	1.45E-04	2.02E-04	Sequential	1.9	Unknown	192	190	4.0	25.5	Unknown	226	23-Feb-17	Blank	250
A	A06	A-1259	3HDS	Hydrotreater		V	GT	6	diesel	Diesel	Diesel	6.67E-05	7.02E-05	6.85E-05	Sequential	1.5	Unknown	193	192	4.0	12.7	Unknown	130	24-Feb-17	Blank	460
A	A07	A-1245	3HDS	Hydrotreater		V	GT	6	diesel	Diesel	Diesel	1.71E-03	1.80E-03	1.76E-03	Sequential	0.9	Unknown	980	979	9.0	28.6	Unknown	552	24-Feb-17	Blank	455
A	A08	A-1241	3HDS	Hydrotreater		V	GT	4	diesel	Diesel	Diesel	1.76E-03	8.20E-04	1.29E-03	Sequential	3.0	Unknown	260	257	8.0	38.2	Unknown	111	27-Feb-17	Blank	415
A	A09	A-1239	3HDS	Hydrotreater		C	Flange	4	diesel	Diesel	Diesel	1.75E-03	3.57E-05	8.91E-04	Sequential	0.4	Unknown	1,089	1,089	8.0	38.2	Unknown	942	27-Feb-17	Blank	375
A	A011	A-1259	3HDS	Hydrotreater		V	GT	6	diesel	Diesel to the Diesel Stripper	Diesel	6.30E-05	4.25E-05	5.27E-05	Sequential	0.9	Unknown	58	57	11.0	35.0	Unknown	401	28-Feb-17	Blank	460
A	A012	A-1305	3HDS	Hydrotreater		V	GT	4	Diesel	Diesel	Diesel	4.05E-03	3.27E-03	3.66E-03	Sequential	1.5	Unknown	784	783	14.0	66.8	Unknown	171	28-Feb-17	Blank	425
A	A013	A-901	HDS	Hydrotreater	Diesel stripper	C	Hatch	24	diesel	Diesel	Diesel	5.12E-04	4.13E-04	4.63E-04	Sequential	1.3	Unknown	141	140	16.0	12.7	Unknown	223	01-Mar-17	Blank	395
A	A015	A-1038	50 Crude	Crude Unit	Exchange platform	C	Union	1	KS	HE 4637 Kerosene Tubeside Inlet	Kerosene	1.36E-03	1.19E-03	1.27E-03	Sequential	1.7	Unknown	2,505	2,503	11.0	210.1	Unknown	3,389	02-Mar-17	317	317
A	A017	A-1050	50 Crude	Crude Unit	Exchange platform	C	Bull plug	1	KS	HE 4637 Kerosene Tubeside Inlet	Kerosene	3.86E-04	1.37E-03	8.75E-04	Sequential	0.9	Unknown	3,138	3,137	1.0	19.1	Unknown	2,538	02-Mar-17	330	330
A	A018	A-1014	50 Crude	Crude Unit	Exchange platform	V	GT	4	KS	HE 4149 Kerosene Shell Side Outlet	Kerosene	5.02E-05	5.51E-05	5.26E-05	Sequential	1.4	Unknown	1,080	1,079	7.0	33.4	Unknown	2,267	06-Mar-17	Blank	80
A	A019	A-1050	50 Crude	Crude Unit	Exchange platform	C	Bull plug	1	KS	HE 4637 Kerosene Tubeside Inlet	Kerosene	1.10E-03	9.66E-04	1.03E-03	Sequential	1.0	Unknown	2,906	2,905	15.0	286.5	Unknown	2,334	06-Mar-17	330	330
A	A020	A-1444	50 Crude	Crude Unit	FF	V	GT	6	MPA	Diesel Mid Pump Around	Kerosene	1.34E-03	1.78E-03	1.56E-03	Sequential	1.3	Unknown	592	591	6.0	19.1	Unknown	733	07-Mar-17	Blank	285
A	A022	A-1008	50 Crude	Crude Unit	Exchange platform	V	GT	4	KS	HE 4149 Kerosene Shell Side Inlet	Kerosene	9.51E-05	9.60E-05	9.55E-05	Sequential	3.0	Unknown	367	364	5.0	23.9	Unknown	628	08-Mar-17	Blank	190
A	A025	A-1722	2HDS	Hydrotreater	Pumps	C	P3942	6	Diesel	Depentanizer Bottoms	Diesel	3.10E-04	2.08E-04	2.59E-04	Sequential	3.0	Unknown	115	112	5.0	15.9	Unknown	154	08-Mar-17	Blank	340
A	A027	A-1728	1HDA	Hydrotreater	Pumps	P	P9668	4	Diesel	M-5239 P-9668 Feed Charge Pump	Diesel	4.98E-04	5.39E-04	5.18E-04	Sequential	2.0	Unknown	604	602	20.0	95.5	Unknown	675	09-Mar-17	170	180
A	A029	A-1730	1HDA	Hydrotreater	Pumps	P	P9669	4	Diesel	M-5240-P9669 Feed Charge Pump	Diesel	4.76E-04	6.98E-04	5.87E-04	Sequential	2.5	Unknown	2,641	2,639	29.0	138.5	Unknown	2,730	09-Mar-17	Blank	150
A	A030	A-1050	50 Crude	Crude Unit	Exchange platform	C	Bull plug	1	KS	HE 4637 Kerosene Tube side Inlet	Kerosene	2.16E-03	2.09E-03	2.13E-03	Sequential	2.0	Unknown	6,727	6,725	3.0	57.3	Unknown	5,120	10-Mar-17	310	310
A	A032	A-28	FCC	Fluidized Catalytic Cracking		V	GT	10	RGO	E4256 Recycled Gas Oil	Gas Oil	3.83E-04	3.37E-04	3.60E-04	Sequential	4.1	Unknown	225	221	4.0	7.6	Unknown	438	14-Mar-17	Blank	390
A	A034	A-415	FCC	Fluidized Catalytic Cracking	LGO	V	GT	1	LGO	Light Gas Oil P/A to #4 Gas	Gas Oil	6.67E-05	6.19E-05	6.43E-05	Sequential	2.7	Unknown	121	118	5.0	95.5	Unknown	107	14-Mar-17	Blank	300
A	AD-1	A-39	FCC	Fluidized Catalytic Cracking	pumps	V	Gate	8	LGO/HGO	LGO/HGO	Gas Oil	1.85E-04	2.54E-04	2.19E-04	Sequential	-0.1	Unknown	332.8	333	Unknown	Unknown	Unknown	189.0	17-Jan-17		Unknown
A	AD-2	A-22	FCC	Fluidized Catalytic Cracking		V	GT	10	RGO	RGO	Gas Oil	2.68E-04	1.39E-04	2.04E-04	Sequential	0.3	Unknown	1,600.0	1,600	6.0	11.5	Unknown	1072.0	17-Jan-17		390
A	AD-3	A-1083	3HDS	Hydrotreater	Diesel	C		8	Frac btms	Frac Bottoms	Diesel	4.63E-05	8.57E-06	2.74E-05	Sequential	1.9	Unknown	17.6	16	13.0	31.0	Unknown	33.4	15-Feb-17		540
A	AD-4	A-901	HDS	Hydrotreater	Diesel stripper	C	Hatch	24	diesel	Diesel	Diesel	1.40E-04	1.21E-04	1.30E-04	Sequential	0.2	Unknown	493.3	493	21.0	16.7	Unknown	122.9	15-Feb-17		395
A	AD-5	A-1050	50 Crude	Crude Unit	Exchange platform	C	Bull plug	1	KS	Kerosene	Kerosene	1.08E-04	1.38E-04	1.23E-04	Sequential	1.9	Unknown	2,046	2,044	5.0	95.5	Unknown	2770	27-Feb-17		152
A	AD-6	A-1730	1HDA	Hydrotreater	Pumps	P	P9669	4	Diesel	Diesel	Diesel	2.10E-05	1.35E-05	1.72E-05	Sequential	3.0	Unknown	664	661	13.0	62.1	Unknown	597	01-Mar-17		150
A	AD-7	A-1742	HCU-1	Hydrocracker	Pumps	P	P9627	6	STG-1 Feed	Stg 1 Feed	Gas Oil	1.20E-04	1.78E-04	1.49E-04	Sequential	2.0	Unknown	210	208	11.0	35.0	Unknown	202	01-Mar-17		140
A	AD-8	A-573	50 Crude	Crude Unit	Pumps	C	TC P-9281	0.75	Kerosene	Kerosene	Kerosene	2.77E-05	2.55E-05	2.66E-05	Sequential	1.9	Unknown	370.1	368	6.0	152.8	Unknown	203	01-Mar-17		300

Refinery A Sample Results

												Roots Meter Stream					MFC-01 Tube Stream			MFC-02 Spike Stream						
ST Bag #	Screening Pt ID	Date	Time	Facility	Operators	Stream	Sample Type	Pre-Bagging Screening Value (ppmv)	Post-Bagging Screening Value (ppmv)	Bag Vacuum (in H_2O)	Time (min)	Volume (ft^3)	Temperature (°C)	Barometric Pressure (in Hg)	Line Pressure (in H_2O)	Corr. Volume (SL)	Volume (SL at 25°C)	Corr. Volume (SL at 21°C)	Tube Mass (ug)[1]	Volume (SL at 25°C)	Corr. Volume (SL at 21°C)	Total Volume (SL at 21°C)	Total Mass C5+ (µg/min)	Condensate THC (µg/min)	Total Mass C5+ (kg/hour)	Notes
N/A	N/A	1/17/2017	1120	Refinery A	EK/GB/MH/MW	N/A	Background	N/A	N/A	N/A	16	2.850	11.1	30.18	0.087	83.53	12.030	11.869	85.05			95.39	42.7		2.56E-06	Collected near AD-1
AD-1	A-39	1/17/2017	1206	Refinery A	EK/GB/MH/MW	LGO/HGO	Primary	332.8	189.0	-0.07	16	2.544	13.3	30.17	0.045	73.99	12.000	11.839	5964.88	12.000	11.839	97.67	3075.5	6795.6	1.85E-04	Collected condensate during primary and replicate runs, included pre-existing mass on exterior. Not added to total.
AD-1	A-39	1/17/2017	1245	Refinery A	EK/GB/MH/MW	LGO/HGO	Replicate	332.8	189.0	-0.07	16	2.560	13.7	30.15	0.050	74.34	12.000	11.839	8919.49			89.98	4236.9		2.54E-04	Canister pulled during replicate run. Collected condensate included pre-existing mass on exterior. Not added to total.
AD-2	A-22	1/17/2017	1436	Refinery A	EK/GB/MH/MW	RGO	Primary	1600.0	1072.0	-0.02	16	2.656	28.0	30.13	0.062	73.47	12.003	11.842	9934.48			85.31	4473.0	1751.9	2.68E-04	Collected condensate during primary and replicate runs, included pre-existing mass on exterior. Not added to total.
AD-2	A-22	1/17/2017	1500	Refinery A	EK/GB/MH/MW	RGO	Replicate	1600.0	1072.0	-0.02	16	2.658	28.1	30.12	0.075	73.52	12.000	11.839	4909.57			89.15	2310.7		1.39E-04	Canister pulled during replicate run. Collected condensate included pre-existing mass on exterior. Not added to total.
N/A	N/A	2/15/2017	1025	Refinery A	EK/GB/MH/MW	N/A	Background	N/A	N/A	N/A	16	2.730	15.3	30.13	0.006	78.83	12.000	11.839	1550.04			90.67	741.9		4.45E-05	Collected near AD-3
AD-3	A-1083	2/15/2017	1127	Refinery A	EK/GB/MH/MW	Frac Bottoms	Primary	17.6	33.4	-0.013	16	2.658	17.5	30.12	0.006	76.67	12.000	11.839	1652.60			88.51	772.2		4.63E-05	
AD-3	A-1083	2/15/2017	1147	Refinery A	EK/GB/MH/MW	Frac Bottoms	Replicate	17.6	33.4	-0.013	16	2.667	18.8	30.11	0.009	76.56	12.000	11.839	305.90			88.40	142.8		8.57E-06	Canister pulled after replicate run.
AD-4	A-901	2/15/2017	1451	Refinery A	EK/GB/MH/MW	Diesel	Primary	493.3	122.9	-0.001	16	4.341	19.2	30.02	0.040	124.11	12.000	11.839	3247.37			135.95	2330.6		1.40E-04	Bag T = 106 degrees Celsius, increased roots meter flow due to larger bag volume.
AD-4	A-901	2/15/2017	1512	Refinery A	EK/GB/MH/MW	Diesel	Replicate	493.3	122.9	-0.001	16	4.336	19.4	30.00	0.039	123.81	12.000	11.839	2819.24			135.65	2018.8		1.21E-04	Canister pulled after replicate run. Increased roots meter flow due to larger bag volume.
AD-5	A-1050	2/27/2017	1106	Refinery A	EK/GB/MH/MW	Kerosene	Primary	2046	2770	-0.935	16	2.429	14.1	29.98	0.060	70.59	12.000	11.839	4143.05			82.43	1802.8		1.08E-04	Kerosene, component already part of tagged LDAR program.
AD-5	A-1050	2/27/2017	1136	Refinery A	EK/GB/MH/MW	Kerosene	Replicate	2046	2770	-0.935	16	2.417	14.2	29.98	0.059	70.21	12.006	11.845	5309.74			82.05	2298.8		1.38E-04	Kerosene, component already part of tagged LDAR program.
N/A	N/A	2/27/2017	1208	Refinery A	EK/GB/MH/MW	N/A	Background	N/A	N/A	N/A	16	2.336	15.2	29.98	0.005	67.62	11.998	11.837	44.25			79.46	18.6		1.11E-06	Collected near AD-8
N/A	N/A	3/1/2017	944	Refinery A	EK/GB/MH/MW	N/A	Background	N/A	N/A	N/A	16	2.621	20.0	30.42	0.020	75.73	12.001	11.840	37.47			87.57	17.3		1.04E-06	Work being performed approximately 8' away. Open sewer line and excavated pavement. Collected near AD-6.
AD-6	A-1730	3/1/2017	1119	Refinery A	EK/GB/MH/MW	Diesel	Primary	664	597	-0.02	16	2.675	35.7	30.42	0.068	73.37	12.004	11.843	777.40			85.21	349.6		2.10E-05	Work being performed approximately 8' away. Open sewer line and excavated pavement.
AD-6	A-1730	3/1/2017	1143	Refinery A	EK/GB/MH/MW	Diesel	Replicate	664	597	-0.02	16	2.676	37.7	30.41	0.069	72.89	12.001	11.840	502.28			84.73	224.7		1.35E-05	Work being performed approximately 8' away. Open sewer line and excavated pavement.
N/A	N/A	3/1/2017	1305	Refinery A	EK/GB/MH/MW	N/A	Background	N/A	N/A	N/A	16	2.691	22.9	30.38	0.018	76.89	12.004	11.843	145.65			88.73	68.2		4.09E-06	Collected near AD-7
AD-7	A-1742	3/1/2017	1346	Refinery A	EK/GB/MH/MW	Stg 1 Feed	Primary	210	202	-0.025	16	2.601	32.5	30.37	0.056	71.96	12.013	11.852	3951.94	12.013	11.852	95.66	1993.6		1.20E-04	
AD-7	A-1742	3/1/2017	1408	Refinery A	EK/GB/MH/MW	Stg 1 Feed	Replicate	210	202	-0.025	16	2.802	37.5	30.36	0.065	76.25	11.998	11.837	6378.20			88.08	2966.4		1.78E-04	
AD-8	A-573	3/1/2017	1532	Refinery A	EK/GB/MH/MW	Kerosene	Primary	370.1	203	-0.023	16	2.652	26.2	30.34	0.0654	74.84	12.003	11.842	1010.20			86.68	462.2		2.77E-05	
AD-8	A-573	3/1/2017	1551	Refinery A	EK/GB/MH/MW	Kerosene	Replicate	370.1	203	-0.023	16	2.628	25.7	30.34	0.065	74.28	11.998	11.837	934.83			86.12	425.1		2.55E-05	

[1] ND values representated as 1/2 MDL. Mass corrected by available trip and field blanks.

Sample Name	Trip Blank			Field Blank			AD-1 (1)						AD-1 (2)						AD-1-X-Spike	
Compound	Catch Weight (ug)		ND=0	Catch Weight (ug)		ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)	
n-Pentane (C5)	8.89	ND	0.00	5.92	ND	0.00	5.92	ND	0.00	0.00	2.96	2.96	8.89	ND	0.00	0.00	4.44	4.44	49.8	
C5 as Pentane	8.89	ND	0.00	5.92	ND	0.00	5.92	ND	0.00	0.00	2.96	2.96	8.89	ND	0.00	0.00	4.44	4.44	6.60	J
n-Hexane (C6)	9.71	ND	0.00	6.47	ND	0.00	6.47	ND	0.00	0.00	3.24	3.24	9.71	ND	0.00	0.00	4.85	4.85	55.1	
C6 as Hexane	9.71	ND	0.00	6.47	ND	0.00	6.47	ND	0.00	0.00	3.24	3.24	9.71	ND	0.00	0.00	4.85	4.85	2.92	ND
n-Heptane (C7)	10.1	ND	0.00	6.71	ND	0.00	6.71	ND	0.00	0.00	3.35	3.35	10.1	ND	0.00	0.00	5.03	5.03	52.7	
C7 as Heptane	10.1	ND	0.00	6.71	ND	0.00	20.0	J	20.04	20.04	20.04	20.04	10.8	J	10.80	10.80	10.80	10.80	15.9	J
n-Octane (C8)	2.97	ND	0.00	1.98	ND	0.00	13.5	J	13.54	13.54	13.54	13.54	11.5	J	11.48	11.48	11.48	11.48	68.6	
C8 as Octane	2.97	ND	0.00	1.98	ND	0.00	43.3		43.31	43.31	43.31	43.31	67.0		67.02	67.02	67.02	67.02	77.2	
n-Nonane (C9)	2.99	ND	0.00	1.99	ND	0.00	17.0	J	17.04	17.04	17.04	17.04	9.91	J	9.91	9.91	9.91	9.91	71.8	
C9 as Nonane	2.99	ND	0.00	1.99	ND	0.00	280		279.81	279.81	279.81	279.81	401		400.71	400.71	400.71	400.71	453	
n-Decane (C10)	3.02	ND	0.00	2.01	ND	0.00	15.2	J	15.21	15.21	15.21	15.21	21.0		21.01	21.01	21.01	21.01	81.6	
C10 as Decane	3.02	ND	0.00	2.01	ND	0.00	1,242		1241.88	1241.88	1241.88	1241.88	1,747		1746.99	1746.99	1746.99	1746.99	1,949	
n-Undecane (C11)	3.01	ND	0.00	2.01	ND	0.00	132		132.40	132.40	132.40	132.40	203		203.27	203.27	203.27	203.27	264	
C11 as Undecane	3.01	ND	0.00	2.01	ND	0.00	1,716		1715.54	1715.54	1715.54	1715.54	2,611		2611.44	2611.44	2611.44	2611.44	2,588	
n-Dodecane (C12)	2.99	ND	0.00	1.99	ND	0.00	71.2		71.15	71.15	71.15	71.15	104		103.84	103.84	103.84	103.84	169	
C12 as Dodecane	2.99	ND	0.00	1.99	ND	0.00	1,590		1590.29	1590.29	1590.29	1590.29	2,381		2381.29	2381.29	2381.29	2381.29	2,469	
n-Tridecane (C13)	3.00	ND	0.00	2.00	ND	0.00	36.0		35.98	35.98	35.98	35.98	58.7		58.68	58.68	58.68	58.68	113	
C13 as Tridecane	3.00	ND	0.00	2.00	ND	0.00	667		666.92	666.92	666.92	666.92	1,063		1062.95	1062.95	1062.95	1062.95	1,114	
n-Tetradecane (C14)	2.99	ND	0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.49	J	2.49	2.49	2.49	2.49	57.6	
C14 as Tetradecane	2.99	ND	0.00	2.00	ND	0.00	74.9		74.92	74.92	74.92	74.92	152		152.17	152.17	152.17	152.17	130	
n-Pentadecane (C15)	3.01	ND	0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	2.67	J	2.67	2.67	2.67	2.67	55.0	
C15 as Pentadecane	3.01	ND	0.00	2.01	ND	0.00	2.43	J	2.43	2.43	2.43	2.43	9.17	J	9.17	9.17	9.17	9.17	6.71	J
n-Hexadecane (C16)	2.99	ND	0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50	53.9	
C16 as Hexadecane	2.99	ND	0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50	2.99	ND
n-Heptadecane (C17)	2.96	ND	0.00	1.97	ND	0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48	52.3	
C17 as Heptadecane	2.96	ND	0.00	1.97	ND	0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48	2.96	ND
n-Octadecane (C18)	2.99	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50	51.9	
C18 as Octadecane	2.99	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50	2.99	ND
n-Nonadecane (C19)	3.00	ND	0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50	50.7	
C19 as Nonadecane	3.00	ND	0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50	3.00	ND
n-Eicosane (C20)	2.99	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49	49.4	
C20 as Eicosane	2.99	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49	2.99	ND
n-Heneicosane (C21)	3.02	ND	0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51	48.8	
C21 as Heneicosane	3.02	ND	0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51	3.02	ND
n-Docosane (C22)	2.98	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49	46.7	
C22 as Docosane	2.98	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49	2.98	ND
n-Tricosane (C23)	2.98	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49	45.4	
C23 as Tricosane	2.98	ND	0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49	2.98	ND
n-Tetracosane (C24)	3.00	ND	0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50	43.8	
C24 as Tetracosane	3.00	ND	0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50	3.00	ND
n-Pentacosane (C25)	3.01	ND	0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50	42.1	
C25 as Pentacosane	3.01	ND	0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50	3.00	ND
n-Hexacosane (C26)	3.38	ND	0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69	39.8	
C26 as Hexacosane	3.38	ND	0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69	3.00	ND
n-Heptacosane (C27)	3.10	ND	0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55	38.3	
C27 as Heptacosane	3.10	ND	0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55	3.00	ND
n-Octacosane (C28)	3.62	ND	0.00	3.11	J	3.11	2.41	ND	0.00	-3.11	1.21	0.00	3.62	ND	0.00	-3.11	1.81	0.00	35.8	
C28 as Octacosane	3.62	ND	0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81	3.00	ND
n-Nonacosane (C29)	3.82	J	3.82	5.21	J	5.21	2.37	ND	0.00	-5.21	1.18	0.00	3.55	ND	0.00	-5.21	1.78	0.00	33.9	
C29 as Nonacosane	3.55	ND	0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78	3.55	ND
n-Triacotane (C30)	4.87	ND	0.00	7.77	J	7.77	2.94	J	2.94	-4.82	2.94	0.00	3.92	ND	0.00	-7.77	1.96	0.00	31.6	
C30 as Triacontane	37.7	J	37.70	69.0		68.96	16.0	J	16.04	-52.92	16.04	0.00	7.01	J	7.01	-61.95	7.01	0.00	7.79	J
SUM			41.52			85.05			5,939.45	5,854.40	5,986.25	5,964.88			8,862.88	8,777.84	8,932.04	8,919.49		

Sample Name	Trip Blank			Field Blank		AD-2 (1)						AD-2 (2)					
Compound	Catch Weight (ug)		ND=0	Catch Weight (ug)	ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr
n-Pentane (C5)	8.89	ND	0.00		0.00	4.65	J	4.65	4.65	4.65	4.65	8.89	ND	0.00	0.00	4.44	4.44
C5 as Pentane	8.89	ND	0.00		0.00	6.60	J	6.60	6.60	6.60	6.60	8.89	ND	0.00	0.00	4.44	4.44
n-Hexane (C6)	9.71	ND	0.00		0.00	4.85	ND	0.00	0.00	2.43	2.43	9.71	ND	0.00	0.00	4.85	4.85
C6 as Hexane	9.71	ND	0.00		0.00	64.3		64.26	64.26	64.26	64.26	18.44	J	18.44	18.44	18.44	18.44
n-Heptane (C7)	10.1	ND	0.00		0.00	20.5		20.55	20.55	20.55	20.55	18.7	ND	0.00	0.00	9.36	9.36
C7 as Heptane	10.1	ND	0.00		0.00	147		146.98	146.98	146.98	146.98	48.7		48.69	48.69	48.69	48.69
n-Octane (C8)	2.97	ND	0.00		0.00	28.6		28.55	28.55	28.55	28.55	14.8	J	14.76	14.76	14.76	14.76
C8 as Octane	2.97	ND	0.00		0.00	123		123.30	123.30	123.30	123.30	65.7		65.74	65.74	65.74	65.74
n-Nonane (C9)	2.99	ND	0.00		0.00	13.7	J	13.65	13.65	13.65	13.65	7.06	J	7.06	7.06	7.06	7.06
C9 as Nonane	2.99	ND	0.00		0.00	520		520.48	520.48	520.48	520.48	303		303.18	303.18	303.18	303.18
n-Decane (C10)	3.02	ND	0.00		0.00	15.7	J	15.73	15.73	15.73	15.73	8.8	J	8.81	8.81	8.81	8.81
C10 as Decane	3.02	ND	0.00		0.00	1,341		1340.68	1340.68	1340.68	1340.68	845		845.09	845.09	845.09	845.09
n-Undecane (C11)	3.01	ND	0.00		0.00	123		123.49	123.49	123.49	123.49	81		81.07	81.07	81.07	81.07
C11 as Undecane	3.01	ND	0.00		0.00	1,607		1606.66	1606.66	1606.66	1606.66	1,108		1108.45	1108.45	1108.45	1108.45
n-Dodecane (C12)	2.99	ND	0.00		0.00	95.0		94.98	94.98	94.98	94.98	47		46.89	46.89	46.89	46.89
C12 as Dodecane	2.99	ND	0.00		0.00	2,247		2247.04	2247.04	2247.04	2247.04	1,196		1195.79	1195.79	1195.79	1195.79
n-Tridecane (C13)	3.00	ND	0.00		0.00	132		131.79	131.79	131.79	131.79	40.1		40.07	40.07	40.07	40.07
C13 as Tridecane	3.00	ND	0.00		0.00	2,324		2323.67	2323.67	2323.67	2323.67	739		738.58	738.58	738.58	738.58
n-Tetradecane (C14)	2.99	ND	0.00		0.00	20.5		20.48	20.48	20.48	20.48	4.35	J	4.35	4.35	4.35	4.35
C14 as Tetradecane	2.99	ND	0.00		0.00	928		927.73	927.73	927.73	927.73	284		284.08	284.08	284.08	284.08
n-Pentadecane (C15)	3.01	ND	0.00		0.00	16.2	J	16.16	16.16	16.16	16.16	5.07	J	5.07	5.07	5.07	5.07
C15 as Pentadecane	3.01	ND	0.00		0.00	102		101.63	101.63	101.63	101.63	22.86		22.86	22.86	22.86	22.86
n-Hexadecane (C16)	2.99	ND	0.00		0.00	5.41	J	5.41	5.41	5.41	5.41	2.99	ND	0.00	0.00	1.50	1.50
C16 as Hexadecane	2.99	ND	0.00		0.00	10.6	J	10.56	10.56	10.56	10.56	2.99	ND	0.00	0.00	1.50	1.50
n-Heptadecane (C17)	2.96	ND	0.00		0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48
C17 as Heptadecane	2.96	ND	0.00		0.00	3.23	J	3.23	3.23	3.23	3.23	2.96	ND	0.00	0.00	1.48	1.48
n-Octadecane (C18)	2.99	ND	0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C18 as Octadecane	2.99	ND	0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
n-Nonadecane (C19)	3.00	ND	0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C19 as Nonadecane	3.00	ND	0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Eicosane (C20)	2.99	ND	0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
C20 as Eicosane	2.99	ND	0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
n-Heneicosane (C21)	3.02	ND	0.00		0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
C21 as Heneicosane	3.02	ND	0.00		0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
n-Docosane (C22)	2.98	ND	0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C22 as Docosane	2.98	ND	0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tricosane (C23)	2.98	ND	0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C23 as Tricosane	2.98	ND	0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tetracosane (C24)	3.00	ND	0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C24 as Tetracosane	3.00	ND	0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Pentacosane (C25)	3.01	ND	0.00		0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
C25 as Pentacosane	3.01	ND	0.00		0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
n-Hexacosane (C26)	3.38	ND	0.00		0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
C26 as Hexacosane	3.38	ND	0.00		0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
n-Heptacosane (C27)	3.10	ND	0.00		0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
C27 as Heptacosane	3.10	ND	0.00		0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
n-Octacosane (C28)	3.62	ND	0.00		0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
C28 as Octacosane	3.62	ND	0.00		0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
n-Nonacosane (C29)	3.82	J	3.82		0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
C29 as Nonacosane	3.55	ND	0.00		0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
n-Triacotane (C30)	4.87	ND	0.00		0.00	2.61	J	2.61	2.61	2.61	2.61	3.92	ND	0.00	0.00	1.96	1.96
C30 as Triacontane	37.7	J	37.70		0.00	5.11	J	5.11	5.11	5.11	5.11	3.92	ND	0.00	0.00	1.96	1.96
SUM			41.52		0.00			9905.99	9905.99	9934.48	9934.48			4838.97	4838.97	4909.57	4909.57

Sample Name	Trip Blank		Field Blank			AD-3 (1)						AD-3 (2)					
Compound	Catch Weight (ug)	ND=0	Catch Weight (ug)		ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr
n-Pentane (C5)		0.00	1.87	ND	0.00	1.87	ND	0.00	0.00	0.94	0.94	2.81	ND	0.00	0.00	1.40	1.40
C5 as Pentane		0.00	1.87	ND	0.00	2.65	J	2.65	2.65	2.65	2.65	2.81	ND	0.00	0.00	1.40	1.40
n-Hexane (C6)		0.00	1.95	ND	0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
C6 as Hexane		0.00	1.95	ND	0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
n-Heptane (C7)		0.00	2.03	ND	0.00	2.03	ND	0.00	0.00	1.02	1.02	3.0	ND	0.00	0.00	1.52	1.52
C7 as Heptane		0.00	36.10	J	36.10	2.0	ND	0.00	-36.10	1.02	0.00	109.7		109.69	73.59	109.69	73.59
n-Octane (C8)		0.00	1.98	ND	0.00	2.0	ND	0.00	0.00	0.99	0.99	3.0	ND	0.00	0.00	1.48	1.48
C8 as Octane		0.00	1.98	ND	0.00	6.9	J	6.85	6.85	6.85	6.85	2.8	J	2.76	2.76	2.76	2.76
n-Nonane (C9)		0.00	1.99	ND	0.00	2.0	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C9 as Nonane		0.00	1.99	ND	0.00	3	J	2.82	2.82	2.82	2.82	3	J	2.51	2.51	2.51	2.51
n-Decane (C10)		0.00	2.01	ND	0.00	2.0	ND	0.00	0.00	1.01	1.01	3.0	ND	0.00	0.00	1.51	1.51
C10 as Decane		0.00	23.38		23.38	12		12.30	-11.08	12.30	0.00	5	J	4.68	-18.70	4.68	0.00
n-Undecane (C11)		0.00	10.90	J	10.90	6	J	6.21	-4.68	6.21	0.00	2	J	2.34	-8.56	2.34	0.00
C11 as Undecane		0.00	162.50		162.50	94		93.80	-68.69	93.80	0.00	39		38.55	-123.94	38.55	0.00
n-Dodecane (C12)		0.00	17.34	J	17.34	13.9	J	13.89	-3.45	13.89	0.00	6	J	5.56	-11.78	5.56	0.00
C12 as Dodecane		0.00	400.91		400.91	306		306.16	-94.75	306.16	0.00	124		124.11	-276.80	124.11	0.00
n-Tridecane (C13)		0.00	31.53		31.53	47.9		47.91	16.38	47.91	16.38	21.3		21.34	-10.19	21.34	0.00
C13 as Tridecane		0.00	542.80		542.80	698		697.93	155.13	697.93	155.13	250		249.57	-293.23	249.57	0.00
n-Tetradecane (C14)		0.00	6.47	J	6.47	30.11		30.11	23.64	30.11	23.64	8.03	J	8.03	1.56	8.03	1.56
C14 as Tetradecane		0.00	251.31		251.31	1006.7		1006.74	755.44	1006.74	755.44	271		270.55	19.25	270.55	19.25
n-Pentadecane (C15)		0.00	6.05	J	6.05	70.34		70.34	64.29	70.34	64.29	25.63		25.63	19.58	25.63	19.58
C15 as Pentadecane		0.00	45.71		45.71	397.94		397.94	352.23	397.94	352.23	109.04		109.04	63.33	109.04	63.33
n-Hexadecane (C16)		0.00	2.00	ND	0.00	44.89		44.89	44.89	44.89	44.89	9.10	J	9.10	9.10	9.10	9.10
C16 as Hexadecane		0.00	2.90	J	2.90	136.94		136.94	134.04	136.94	134.04	27.06		27.06	24.16	27.06	24.16
n-Heptadecane (C17)		0.00	1.97	ND	0.00	11.57	J	11.57	11.57	11.57	11.57	4.75	J	4.75	4.75	4.75	4.75
C17 as Heptadecane		0.00	1.97	ND	0.00	33.78		33.78	33.78	33.78	33.78	12.18	J	12.18	12.18	12.18	12.18
n-Octadecane (C18)		0.00	1.99	ND	0.00	4.14	J	4.14	4.14	4.14	4.14	2.53	J	2.53	2.53	2.53	2.53
C18 as Octadecane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.08	J	2.08	2.08	2.08	2.08
n-Nonadecane (C19)		0.00	2.00	ND	0.00	4.94	J	4.94	4.94	4.94	4.94	3.31	J	3.31	3.31	3.31	3.31
C19 as Nonadecane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.84	J	2.84	2.84	2.84	2.84
n-Eicosane (C20)		0.00	1.99	ND	0.00	3.85	J	3.85	3.85	3.85	3.85	2.92	J	2.92	2.92	2.92	2.92
C20 as Eicosane		0.00	1.99	ND	0.00	2.60	J	2.60	2.60	2.60	2.60	2.25	J	2.25	2.25	2.25	2.25
n-Heneicosane (C21)		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.01	1.01	2.83	J	2.83	2.83	2.83	2.83
C21 as Heneicosane		0.00	2.01	ND	0.00	2.60	J	2.60	2.60	2.60	2.60	3.81	J	3.81	3.81	3.81	3.81
n-Docosane (C22)		0.00	1.99	ND	0.00	2.32	J	2.32	2.32	2.32	2.32	3.01	J	3.01	3.01	3.01	3.01
C22 as Docosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tricosane (C23)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.36	J	2.36	2.36	2.36	2.36
C23 as Tricosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tetracosane (C24)		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.33	J	2.33	2.33	2.33	2.33
C24 as Tetracosane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Pentacosane (C25)		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	2.50	J	2.50	2.50	2.50	2.50
C25 as Pentacosane		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
n-Hexacosane (C26)		0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
C26 as Hexacosane		0.00	2.25	ND	0.00	2.27	J	2.27	2.27	2.27	2.27	3.38	ND	0.00	0.00	1.69	1.69
n-Heptacosane (C27)		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	2.17	J	2.17	2.17	2.17	2.17
C27 as Heptacosane		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
n-Octacosane (C28)		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	2.42	J	2.42	2.42	2.42	2.42
C28 as Octacosane		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
n-Nonacosane (C29)		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
C29 as Nonacosane		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
n-Triacotane (C30)		0.00	2.61	ND	0.00	2.61	ND	0.00	0.00	1.31	1.31	3.92	ND	0.00	0.00	1.96	1.96
C30 as Triacontane		0.00	12.2	J	12.16	10.2	J	10.25	-1.91	10.25	0.00	17.93	J	17.93	5.77	17.93	5.77
SUM		0.00			1,550.04			2,955.81	1,405.77	2,982.98	1,652.60			1,082.76	-467.27	1,112.74	305.90

Sample Name	Trip Blank		Field Blank		AD-4 (1)						AD-4 (2)					
Compound	Catch Weight (ug)	ND=0	Catch Weight (ug)	ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr
n-Pentane (C5)		0.00		0.00	1.87	ND	0.00	0.00	0.94	0.94	2.81	ND	0.00	0.00	1.40	1.40
C5 as Pentane		0.00		0.00	1.87	ND	0.00	0.00	0.94	0.94	2.81	ND	0.00	0.00	1.40	1.40
n-Hexane (C6)		0.00		0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
C6 as Hexane		0.00		0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
n-Heptane (C7)		0.00		0.00	2.03	ND	0.00	0.00	1.02	1.02	3.0	ND	0.00	0.00	1.52	1.52
C7 as Heptane		0.00		0.00	2.3	J	2.32	2.32	2.32	2.32	90.3		90.32	90.32	90.32	90.32
n-Octane (C8)		0.00		0.00	13.2	J	13.17	13.17	13.17	13.17	3.0	J	3.03	3.03	3.03	3.03
C8 as Octane		0.00		0.00	2.0	ND	0.00	0.00	0.99	0.99	5.5	J	5.45	5.45	5.45	5.45
n-Nonane (C9)		0.00		0.00	6.3	J	6.30	6.30	6.30	6.30	5.75	J	5.75	5.75	5.75	5.75
C9 as Nonane		0.00		0.00	2	ND	0.00	0.00	1.00	1.00	35		35.09	35.09	35.09	35.09
n-Decane (C10)		0.00		0.00	46.2		46.22	46.22	46.22	46.22	41.0		41.03	41.03	41.03	41.03
C10 as Decane		0.00		0.00	391		391.23	391.23	391.23	391.23	338		338.36	338.36	338.36	338.36
n-Undecane (C11)		0.00		0.00	69		68.63	68.63	68.63	68.63	60		60.07	60.07	60.07	60.07
C11 as Undecane		0.00		0.00	448		448.16	448.16	448.16	448.16	388		387.60	387.60	387.60	387.60
n-Dodecane (C12)		0.00		0.00	105.5		105.48	105.48	105.48	105.48	91		91.22	91.22	91.22	91.22
C12 as Dodecane		0.00		0.00	676		675.77	675.77	675.77	675.77	573		572.95	572.95	572.95	572.95
n-Tridecane (C13)		0.00		0.00	154.6		154.63	154.63	154.63	154.63	124.6		124.64	124.64	124.64	124.64
C13 as Tridecane		0.00		0.00	572		572.08	572.08	572.08	572.08	461		460.91	460.91	460.91	460.91
n-Tetradecane (C14)		0.00		0.00	90.72		90.72	90.72	90.72	90.72	70.15		70.15	70.15	70.15	70.15
C14 as Tetradecane		0.00		0.00	349.8		349.79	349.79	349.79	349.79	269		269.28	269.28	269.28	269.28
n-Pentadecane (C15)		0.00		0.00	41.11		41.11	41.11	41.11	41.11	33.67		33.67	33.67	33.67	33.67
C15 as Pentadecane		0.00		0.00	169.98		169.98	169.98	169.98	169.98	123.63		123.63	123.63	123.63	123.63
n-Hexadecane (C16)		0.00		0.00	16.63	J	16.63	16.63	16.63	16.63	10.91	J	10.91	10.91	10.91	10.91
C16 as Hexadecane		0.00		0.00	37.00		37.00	37.00	37.00	37.00	24.74		24.74	24.74	24.74	24.74
n-Heptadecane (C17)		0.00		0.00	5.70	J	5.70	5.70	5.70	5.70	3.21	J	3.21	3.21	3.21	3.21
C17 as Heptadecane		0.00		0.00	4.71	J	4.71	4.71	4.71	4.71	3.19	J	3.19	3.19	3.19	3.19
n-Octadecane (C18)		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C18 as Octadecane		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
n-Nonadecane (C19)		0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C19 as Nonadecane		0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.51	J	3.51	3.51	3.51	3.51
n-Eicosane (C20)		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
C20 as Eicosane		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
n-Heneicosane (C21)		0.00		0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
C21 as Heneicosane		0.00		0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
n-Docosane (C22)		0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C22 as Docosane		0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tricosane (C23)		0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C23 as Tricosane		0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tetracosane (C24)		0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C24 as Tetracosane		0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Pentacosane (C25)		0.00		0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
C25 as Pentacosane		0.00		0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
n-Hexacosane (C26)		0.00		0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
C26 as Hexacosane		0.00		0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
n-Heptacosane (C27)		0.00		0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
C27 as Heptacosane		0.00		0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
n-Octacosane (C28)		0.00		0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
C28 as Octacosane		0.00		0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
n-Nonacosane (C29)		0.00		0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
C29 as Nonacosane		0.00		0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
n-Triacotane (C30)		0.00		0.00	2.61	ND	0.00	0.00	1.31	1.31	3.92	ND	0.00	0.00	1.96	1.96
C30 as Triacontane		0.00		0.00	14.5	J	14.54	14.54	14.54	14.54	15.19	J	15.19	15.19	15.19	15.19
SUM		0.00		0.00			3,214.16	3,214.16	3,247.37	3,247.37			2,773.90	2,773.90	2,819.24	2,819.24

Sample Name	Trip Blank		Field Blank			AD-5 (1)						AD-5 (2)					
Compound	Catch Weight (ug)	ND=0	Catch Weight (ug)		ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr
n-Pentane (C5)		0.00	1.87	ND	0.00	4.16	J	4.16	4.16	4.16	4.16	2.64	J	2.64	2.64	2.64	2.64
C5 as Pentane		0.00	2.79	J	2.79	1.87	ND	0.00	-2.79	0.94	0.00	2.81	ND	0.00	-2.79	1.40	0.00
n-Hexane (C6)		0.00	1.95	ND	0.00	22.22		22.22	22.22	22.22	22.22	26.88		26.88	26.88	26.88	26.88
C6 as Hexane		0.00	1.95	ND	0.00	38.62		38.62	38.62	38.62	38.62	45.77		45.77	45.77	45.77	45.77
n-Heptane (C7)		0.00	2.03	ND	0.00	115.29		115.29	115.29	115.29	115.29	146.1		146.08	146.08	146.08	146.08
C7 as Heptane		0.00	21.72	J	21.72	189.6		189.55	167.83	189.55	167.83	306.7		306.71	284.99	306.71	284.99
n-Octane (C8)		0.00	1.98	ND	0.00	106.9		106.86	106.86	106.86	106.86	133.7		133.72	133.72	133.72	133.72
C8 as Octane		0.00	1.98	ND	0.00	271.3		271.32	271.32	271.32	271.32	452.9		452.91	452.91	452.91	452.91
n-Nonane (C9)		0.00	1.99	ND	0.00	233.6		233.55	233.55	233.55	233.55	293.13		293.13	293.13	293.13	293.13
C9 as Nonane		0.00	1.99	ND	0.00	875		875.32	875.32	875.32	875.32	992		991.65	991.65	991.65	991.65
n-Decane (C10)		0.00	2.01	ND	0.00	244.4		244.43	244.43	244.43	244.43	304.2		304.24	304.24	304.24	304.24
C10 as Decane		0.00	2.01	ND	0.00	1,283		1283.31	1283.31	1283.31	1283.31	1,598		1598.47	1598.47	1598.47	1598.47
n-Undecane (C11)		0.00	2.01	ND	0.00	108		107.52	107.52	107.52	107.52	142		141.82	141.82	141.82	141.82
C11 as Undecane		0.00	2.01	ND	0.00	403		402.75	402.75	402.75	402.75	524		523.55	523.55	523.55	523.55
n-Dodecane (C12)		0.00	1.99	ND	0.00	47.6		47.65	47.65	47.65	47.65	53		52.86	52.86	52.86	52.86
C12 as Dodecane		0.00	1.99	ND	0.00	137		137.33	137.33	137.33	137.33	195		194.52	194.52	194.52	194.52
n-Tridecane (C13)		0.00	2.00	ND	0.00	9.9	J	9.89	9.89	9.89	9.89	13.7	J	13.67	13.67	13.67	13.67
C13 as Tridecane		0.00	2.00	ND	0.00	30		30.32	30.32	30.32	30.32	39		38.54	38.54	38.54	38.54
n-Tetradecane (C14)		0.00	2.00	ND	0.00	5.25	J	5.25	5.25	5.25	5.25	6.69	J	6.69	6.69	6.69	6.69
C14 as Tetradecane		0.00	2.00	ND	0.00	6.0	J	5.98	5.98	5.98	5.98	9	J	8.67	8.67	8.67	8.67
n-Pentadecane (C15)		0.00	2.01	ND	0.00	2.08	J	2.08	2.08	2.08	2.08	2.39	J	2.39	2.39	2.39	2.39
C15 as Pentadecane		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	2.01	ND	0.00	0.00	1.00	1.00
n-Hexadecane (C16)		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C16 as Hexadecane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
n-Heptadecane (C17)		0.00	1.97	ND	0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48
C17 as Heptadecane		0.00	1.97	ND	0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48
n-Octadecane (C18)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C18 as Octadecane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
n-Nonadecane (C19)		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C19 as Nonadecane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Eicosane (C20)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
C20 as Eicosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
n-Heneicosane (C21)		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
C21 as Heneicosane		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
n-Docosane (C22)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C22 as Docosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tricosane (C23)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C23 as Tricosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tetracosane (C24)		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C24 as Tetracosane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Pentacosane (C25)		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
C25 as Pentacosane		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
n-Hexacosane (C26)		0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
C26 as Hexacosane		0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
n-Heptacosane (C27)		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
C27 as Heptacosane		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
n-Octacosane (C28)		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
C28 as Octacosane		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
n-Nonacosane (C29)		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
C29 as Nonacosane		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
n-Triacotane (C30)		0.00	2.61	ND	0.00	2.61	ND	0.00	0.00	1.31	1.31	3.92	ND	0.00	0.00	1.96	1.96
C30 as Triacontane		0.00	19.7	J	19.74	18.4	J	18.43	-1.31	18.43	0.00	8.52	J	8.52	-11.23	8.52	0.00
SUM		0.00			44.25			4,151.84	4,107.58	4,184.13	4,143.05			5,293.44	5,249.18	5,341.38	5,309.74

Sample Name	Trip Blank		Field Blank			AD-6 (1)						AD-6 (2)					
Compound	Catch Weight (ug)	ND=0	Catch Weight (ug)		ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr
n-Pentane (C5)		0.00	1.87	ND	0.00	1.87	ND	0.00	0.00	0.94	0.94	2.81	ND	0.00	0.00	1.40	1.40
C5 as Pentane		0.00	21.55	J	21.55	17.59	J	17.59	-3.96	17.59	0.00	2.81	ND	0.00	-21.55	1.40	0.00
n-Hexane (C6)		0.00	1.95	ND	0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
C6 as Hexane		0.00	1.95	ND	0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
n-Heptane (C7)		0.00	2.03	ND	0.00	2.03	ND	0.00	0.00	1.02	1.02	3.0	ND	0.00	0.00	1.52	1.52
C7 as Heptane		0.00	2.03	ND	0.00	54.4		54.40	54.40	54.40	54.40	39.4	J	39.43	39.43	39.43	39.43
n-Octane (C8)		0.00	1.98	ND	0.00	2.0	ND	0.00	0.00	0.99	0.99	3.0	ND	0.00	0.00	1.48	1.48
C8 as Octane		0.00	1.98	ND	0.00	2.0	ND	0.00	0.00	0.99	0.99	3.0	ND	0.00	0.00	1.48	1.48
n-Nonane (C9)		0.00	1.99	ND	0.00	2.0	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C9 as Nonane		0.00	1.99	ND	0.00	2	ND	0.00	0.00	1.00	1.00	3	ND	0.00	0.00	1.50	1.50
n-Decane (C10)		0.00	2.01	ND	0.00	2.0	ND	0.00	0.00	1.01	1.01	3.0	ND	0.00	0.00	1.51	1.51
C10 as Decane		0.00	2.01	ND	0.00	6	J	6.18	6.18	6.18	6.18	3	J	2.57	2.57	2.57	2.57
n-Undecane (C11)		0.00	2.01	ND	0.00	7	J	7.37	7.37	7.37	7.37	3	J	2.73	2.73	2.73	2.73
C11 as Undecane		0.00	2.01	ND	0.00	55		54.91	54.91	54.91	54.91	15	J	14.77	14.77	14.77	14.77
n-Dodecane (C12)		0.00	1.99	ND	0.00	25.3		25.30	25.30	25.30	25.30	8	J	8.46	8.46	8.46	8.46
C12 as Dodecane		0.00	1.99	ND	0.00	160		160.44	160.44	160.44	160.44	48		48.31	48.31	48.31	48.31
n-Tridecane (C13)		0.00	2.00	ND	0.00	58.8		58.81	58.81	58.81	58.81	34.7		34.66	34.66	34.66	34.66
C13 as Tridecane		0.00	2.00	ND	0.00	166		165.79	165.79	165.79	165.79	91		91.30	91.30	91.30	91.30
n-Tetradecane (C14)		0.00	2.00	ND	0.00	36.99		36.99	36.99	36.99	36.99	39.51		39.51	39.51	39.51	39.51
C14 as Tetradecane		0.00	2.00	ND	0.00	107.3		107.26	107.26	107.26	107.26	101		101.13	101.13	101.13	101.13
n-Pentadecane (C15)		0.00	2.01	ND	0.00	17.72	J	17.72	17.72	17.72	17.72	24.58		24.58	24.58	24.58	24.58
C15 as Pentadecane		0.00	2.01	ND	0.00	22.14		22.14	22.14	22.14	22.14	29.00		29.00	29.00	29.00	29.00
n-Hexadecane (C16)		0.00	2.00	ND	0.00	3.05	J	3.05	3.05	3.05	3.05	6.35	J	6.35	6.35	6.35	6.35
C16 as Hexadecane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.64	J	3.64	3.64	3.64	3.64
n-Heptadecane (C17)		0.00	1.97	ND	0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48
C17 as Heptadecane		0.00	1.97	ND	0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48
n-Octadecane (C18)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C18 as Octadecane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
n-Nonadecane (C19)		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C19 as Nonadecane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Eicosane (C20)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
C20 as Eicosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
n-Heneicosane (C21)		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
C21 as Heneicosane		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
n-Docosane (C22)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C22 as Docosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tricosane (C23)		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C23 as Tricosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tetracosane (C24)		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C24 as Tetracosane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Pentacosane (C25)		0.00	2.01	ND	0.00	19.81		19.81	19.81	19.81	19.81	3.01	ND	0.00	0.00	1.50	1.50
C25 as Pentacosane		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
n-Hexacosane (C26)		0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
C26 as Hexacosane		0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
n-Heptacosane (C27)		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
C27 as Heptacosane		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
n-Octacosane (C28)		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
C28 as Octacosane		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
n-Nonacosane (C29)		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
C29 as Nonacosane		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
n-Triacotane (C30)		0.00	2.61	ND	0.00	2.61	ND	0.00	0.00	1.31	1.31	3.92	ND	0.00	0.00	1.96	1.96
C30 as Triacontane		0.00	15.9	J	15.91	11.1	J	11.14	-4.77	11.14	0.00	13.46	J	13.46	-2.45	13.46	0.00
SUM		0.00			37.47			768.90	731.44	806.13	777.40			459.88	422.42	517.14	502.28

Sample Name	Trip Blank		Field Blank			AD-7 (1)						AD-7 (2)						AD-7-SP	
Compound	Catch Weight (ug)	ND=0	Catch Weight (ug)		ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)	
n-Pentane (C5)		0.00	1.87	ND	0.00	1.87	ND	0.00	0.00	0.94	0.94	2.81	ND	0.00	0.00	1.40	1.40	47.6	
C5 as Pentane		0.00	31.78		31.78	1.87	ND	0.00	-31.78	0.94	0.00	2.81	ND	0.00	-31.78	1.40	0.00	541	
n-Hexane (C6)		0.00	2.27	J	2.27	2.14	J	2.14	-0.13	2.14	0.00	3.38	J	3.38	1.12	3.38	1.12	58.6	
C6 as Hexane		0.00	1.95	ND	0.00	2.61	J	2.61	2.61	2.61	2.61	7.20	J	7.20	7.20	7.20	7.20	3.02	J
n-Heptane (C7)		0.00	2.03	ND	0.00	11.63	J	11.63	11.63	11.63	11.63	18.3	J	18.26	18.26	18.26	18.26	72.0	
C7 as Heptane		0.00	2.03	ND	0.00	106.0		105.96	105.96	105.96	105.96	74.4		74.38	74.38	74.38	74.38	18.3	J
n-Octane (C8)		0.00	1.98	ND	0.00	10.8	J	10.77	10.77	10.77	10.77	13.1	J	13.08	13.08	13.08	13.08	65.7	
C8 as Octane		0.00	1.98	ND	0.00	35.8		35.82	35.82	35.82	35.82	109.8		109.82	109.82	109.82	109.82	58.8	
n-Nonane (C9)		0.00	1.99	ND	0.00	47.8		47.85	47.85	47.85	47.85	69.39		69.39	69.39	69.39	69.39	98.3	
C9 as Nonane		0.00	1.99	ND	0.00	202		202.30	202.30	202.30	202.30	246		245.95	245.95	245.95	245.95	144	
n-Decane (C10)		0.00	2.01	ND	0.00	122.7		122.67	122.67	122.67	122.67	131.7		131.74	131.74	131.74	131.74	147	
C10 as Decane		0.00	2.01	ND	0.00	837		837.25	837.25	837.25	837.25	1,154		1153.51	1153.51	1153.51	1153.51	729	
n-Undecane (C11)		0.00	2.01	ND	0.00	139		139.42	139.42	139.42	139.42	191		191.33	191.33	191.33	191.33	178	
C11 as Undecane		0.00	2.01	ND	0.00	802		802.14	802.14	802.14	802.14	1,135		1134.72	1134.72	1134.72	1134.72	674	
n-Dodecane (C12)		0.00	1.99	ND	0.00	104.2		104.21	104.21	104.21	104.21	161		161.06	161.06	161.06	161.06	146	
C12 as Dodecane		0.00	1.99	ND	0.00	695		694.91	694.91	694.91	694.91	1,110		1110.30	1110.30	1110.30	1110.30	575	
n-Tridecane (C13)		0.00	2.09	J	2.09	64.3		64.28	62.20	64.28	62.20	115.9		115.89	113.80	115.89	113.80	109	
C13 as Tridecane		0.00	3.20	J	3.20	401		401.26	398.06	401.26	398.06	764		764.21	761.01	764.21	761.01	320	
n-Tetradecane (C14)		0.00	9.72	J	9.72	41.18		41.18	31.46	41.18	31.46	85.18		85.18	75.47	85.18	75.47	90.6	
C14 as Tetradecane		0.00	10.90	J	10.90	197.5		197.53	186.64	197.53	186.64	495		495.01	484.11	495.01	484.11	159	
n-Pentadecane (C15)		0.00	20.41		20.41	26.67		26.67	6.26	26.67	6.26	45.69		45.69	25.28	45.69	25.28	76.8	
C15 as Pentadecane		0.00	20.45		20.45	80.39		80.39	59.94	80.39	59.94	244.36		244.36	223.91	244.36	223.91	61.7	
n-Hexadecane (C16)		0.00	7.71	J	7.71	15.41	J	15.41	7.70	15.41	7.70	25.58		25.58	17.87	25.58	17.87	70.3	
C16 as Hexadecane		0.00	6.90	J	6.90	22.12		22.12	15.22	22.12	15.22	124.77		124.77	117.87	124.77	117.87	18.1	J
n-Heptadecane (C17)		0.00	1.97	ND	0.00	10.21	J	10.21	10.21	10.21	10.21	13.66	J	13.66	13.66	13.66	13.66	64.3	
C17 as Heptadecane		0.00	1.97	ND	0.00	11.75	J	11.75	11.75	11.75	11.75	46.87		46.87	46.87	46.87	46.87	8.90	J
n-Octadecane (C18)		0.00	1.99	ND	0.00	3.50	J	3.50	3.50	3.50	3.50	4.55	J	4.55	4.55	4.55	4.55	59.4	
C18 as Octadecane		0.00	1.99	ND	0.00	2.65	J	2.65	2.65	2.65	2.65	5.12	J	5.12	5.12	5.12	5.12	2.99	ND
n-Nonadecane (C19)		0.00	2.00	ND	0.00	2.93	J	2.93	2.93	2.93	2.93	5.16	J	5.16	5.16	5.16	5.16	57.6	
C19 as Nonadecane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	2.68	J	2.68	2.68	2.68	2.68	3.00	ND
n-Eicosane (C20)		0.00	1.99	ND	0.00	3.02	J	3.02	3.02	3.02	3.02	4.90	J	4.90	4.90	4.90	4.90	57.4	
C20 as Eicosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	1.00	1.00	2.61	J	2.61	2.61	2.61	2.61	2.99	ND
n-Heneicosane (C21)		0.00	2.01	ND	0.00	3.80	J	3.80	3.80	3.80	3.80	3.02	ND	0.00	0.00	1.51	1.51	55.6	
C21 as Heneicosane		0.00	2.01	ND	0.00	2.02	J	2.02	2.02	2.02	2.02	10.13	J	10.13	10.13	10.13	10.13	3.02	ND
n-Docosane (C22)		0.00	1.99	ND	0.00	3.75	J	3.75	3.75	3.75	3.75	6.01	J	6.01	6.01	6.01	6.01	53.9	
C22 as Docosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	3.82	J	3.82	3.82	3.82	3.82	2.98	ND
n-Tricosane (C23)		0.00	1.99	ND	0.00	3.29	J	3.29	3.29	3.29	3.29	4.73	J	4.73	4.73	4.73	4.73	51.6	
C23 as Tricosane		0.00	1.99	ND	0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49	2.98	ND
n-Tetracosane (C24)		0.00	2.00	ND	0.00	2.67	J	2.67	2.67	2.67	2.67	3.76	J	3.76	3.76	3.76	3.76	49.6	
C24 as Tetracosane		0.00	2.00	ND	0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50	3.00	ND
n-Pentacosane (C25)		0.00	7.30	J	7.30	2.13	J	2.13	-5.17	2.13	0.00	2.87	J	2.87	-4.43	2.87	0.00	44.9	
C25 as Pentacosane		0.00	2.01	ND	0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50	3.01	ND
n-Hexacosane (C26)		0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69	42.0	
C26 as Hexacosane		0.00	2.25	ND	0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69	3.38	ND
n-Heptacosane (C27)		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55	39.9	
C27 as Heptacosane		0.00	2.06	ND	0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55	3.10	ND
n-Octacosane (C28)		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81	36.7	
C28 as Octacosane		0.00	2.41	ND	0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81	3.62	ND
n-Nonacosane (C29)		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78	33.8	
C29 as Nonacosane		0.00	2.37	ND	0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78	3.55	ND
n-Triacotane (C30)		0.00	2.61	ND	0.00	2.61	ND	0.00	0.00	1.31	1.31	3.92	ND	0.00	0.00	1.96	1.96	31.1	
C30 as Triacontane		0.00	22.9	J	22.93	11.3	J	11.29	-11.64	11.29	0.00	15.66	J	15.66	-7.27	15.66	0.00	24.4	J
SUM		0.00			145.65			4,031.54	3,885.89	4,049.80	3,951.94			6,457.34	6,311.70	6,481.77	6,378.20		

Sample Name	Trip Blank		Field Blank		AD-8 (1)						AD-8 (2)					
Compound	Catch Weight (ug)	ND=0	Catch Weight (ug)	ND=0	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr	Catch Weight (ug)		ND=0	ND=0 Corr	ND=1/2 MDL	ND=1/2 MDL Corr
n-Pentane (C5)		0.00		0.00	1.87	ND	0.00	0.00	0.94	0.94	2.81	ND	0.00	0.00	1.40	1.40
C5 as Pentane		0.00		0.00	1.87	ND	0.00	0.00	0.94	0.94	2.81	ND	0.00	0.00	1.40	1.40
n-Hexane (C6)		0.00		0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
C6 as Hexane		0.00		0.00	1.95	ND	0.00	0.00	0.97	0.97	2.92	ND	0.00	0.00	1.46	1.46
n-Heptane (C7)		0.00		0.00	2.13	J	2.13	2.13	2.13	2.13	2.2	J	2.24	2.24	2.24	2.24
C7 as Heptane		0.00		0.00	14.2	J	14.18	14.18	14.18	14.18	47.6		47.61	47.61	47.61	47.61
n-Octane (C8)		0.00		0.00	7.0	J	6.97	6.97	6.97	6.97	6.2	J	6.18	6.18	6.18	6.18
C8 as Octane		0.00		0.00	25.4		25.44	25.44	25.44	25.44	22.6		22.57	22.57	22.57	22.57
n-Nonane (C9)		0.00		0.00	18.2	J	18.23	18.23	18.23	18.23	16.54	J	16.54	16.54	16.54	16.54
C9 as Nonane		0.00		0.00	56		55.59	55.59	55.59	55.59	51		50.57	50.57	50.57	50.57
n-Decane (C10)		0.00		0.00	46.3		46.27	46.27	46.27	46.27	43.1		43.11	43.11	43.11	43.11
C10 as Decane		0.00		0.00	204		204.16	204.16	204.16	204.16	188		188.13	188.13	188.13	188.13
n-Undecane (C11)		0.00		0.00	42		42.22	42.22	42.22	42.22	41		40.57	40.57	40.57	40.57
C11 as Undecane		0.00		0.00	143		142.91	142.91	142.91	142.91	135		135.40	135.40	135.40	135.40
n-Dodecane (C12)		0.00		0.00	46.6		46.63	46.63	46.63	46.63	44		44.25	44.25	44.25	44.25
C12 as Dodecane		0.00		0.00	126		125.51	125.51	125.51	125.51	118		117.54	117.54	117.54	117.54
n-Tridecane (C13)		0.00		0.00	27.3		27.32	27.32	27.32	27.32	25.8		25.81	25.81	25.81	25.81
C13 as Tridecane		0.00		0.00	95		95.17	95.17	95.17	95.17	79		79.01	79.01	79.01	79.01
n-Tetradecane (C14)		0.00		0.00	16.54	J	16.54	16.54	16.54	16.54	11.83	J	11.83	11.83	11.83	11.83
C14 as Tetradecane		0.00		0.00	48.9		48.87	48.87	48.87	48.87	27		26.83	26.83	26.83	26.83
n-Pentadecane (C15)		0.00		0.00	8.38	J	8.38	8.38	8.38	8.38	4.26	J	4.26	4.26	4.26	4.26
C15 as Pentadecane		0.00		0.00	20.95		20.95	20.95	20.95	20.95	6.41	J	6.41	6.41	6.41	6.41
n-Hexadecane (C16)		0.00		0.00	3.73	J	3.73	3.73	3.73	3.73	4.18	J	4.18	4.18	4.18	4.18
C16 as Hexadecane		0.00		0.00	2.96	J	2.96	2.96	2.96	2.96	2.11	J	2.11	2.11	2.11	2.11
n-Heptadecane (C17)		0.00		0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48
C17 as Heptadecane		0.00		0.00	1.97	ND	0.00	0.00	0.99	0.99	2.96	ND	0.00	0.00	1.48	1.48
n-Octadecane (C18)		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
C18 as Octadecane		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.50	1.50
n-Nonadecane (C19)		0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C19 as Nonadecane		0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
n-Eicosane (C20)		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
C20 as Eicosane		0.00		0.00	1.99	ND	0.00	0.00	1.00	1.00	2.99	ND	0.00	0.00	1.49	1.49
n-Heneicosane (C21)		0.00		0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
C21 as Heneicosane		0.00		0.00	2.01	ND	0.00	0.00	1.01	1.01	3.02	ND	0.00	0.00	1.51	1.51
n-Docosane (C22)		0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C22 as Docosane		0.00		0.00	1.49	J	1.49	1.49	1.49	1.49	2.98	ND	0.00	0.00	1.49	1.49
n-Tricosane (C23)		0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
C23 as Tricosane		0.00		0.00	1.99	ND	0.00	0.00	0.99	0.99	2.98	ND	0.00	0.00	1.49	1.49
n-Tetracosane (C24)		0.00		0.00	2.00	ND	0.00	0.00	1.00	1.00	3.00	ND	0.00	0.00	1.50	1.50
C24 as Tetracosane		0.00		0.00	1.57	J	1.57	1.57	1.57	1.57	3.00	ND	0.00	0.00	1.50	1.50
n-Pentacosane (C25)		0.00		0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
C25 as Pentacosane		0.00		0.00	2.01	ND	0.00	0.00	1.00	1.00	3.01	ND	0.00	0.00	1.50	1.50
n-Hexacosane (C26)		0.00		0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
C26 as Hexacosane		0.00		0.00	2.25	ND	0.00	0.00	1.13	1.13	3.38	ND	0.00	0.00	1.69	1.69
n-Heptacosane (C27)		0.00		0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
C27 as Heptacosane		0.00		0.00	2.06	ND	0.00	0.00	1.03	1.03	3.10	ND	0.00	0.00	1.55	1.55
n-Octacosane (C28)		0.00		0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
C28 as Octacosane		0.00		0.00	2.41	ND	0.00	0.00	1.21	1.21	3.62	ND	0.00	0.00	1.81	1.81
n-Nonacosane (C29)		0.00		0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
C29 as Nonacosane		0.00		0.00	2.37	ND	0.00	0.00	1.18	1.18	3.55	ND	0.00	0.00	1.78	1.78
n-Triacotane (C30)		0.00		0.00	2.61	ND	0.00	0.00	1.31	1.31	3.92	ND	0.00	0.00	1.96	1.96
C30 as Triacontane		0.00		0.00	22.8	J	22.78	22.78	22.78	22.78	11.42	J	11.42	11.42	11.42	11.42
SUM		0.00		0.00			980.02	980.02	1010.20	1010.20			886.56	886.56	934.83	934.83

Totals do not include ND data.

AD Cannister Sample - Component A-39

	Canister (µg/m3) TO-14A/M18 for CH4	Canister (µg/m3) TO-15	Canister Background TO-14A/M18 (µg/m3)	Canister Background TO-15(µg/m3)	Corr Canister TO-14A (µg/m3)	Corr Canister TO-15 (µg/m3)	Primary Tube (µg/m3)	Replicate Tube (µg/m3)	Tube Background (µg/m3)	Corr Ave Tube (µg/m3)
C1	1,227	43.4	1,313	5.8	0	37.6	N/A	N/A	N/A	N/A
C2	30.7	0	26.6	9.1	4.13	0	N/A	N/A	N/A	N/A
C3	17.2	188	10.5	17.1	6.73	171	N/A	N/A	N/A	N/A
C4	36.0	0	9.23	1.80	26.81	0	N/A	N/A	N/A	N/A
C5	174	0	13.4	0	160.628	0	0	0	0	0
C6	433	127	7.00	4.93	425.896	122	0	0	0	0
C7	N/A	2,821	N/A	9.8	N/A	2,811	1,693	913	0	1,303
C8	N/A	18,433	N/A	30.9	N/A	18,402	4,802	6,631	0	5,717
C9	N/A	36,659	N/A	37.9	N/A	36,621	25,074	34,684	0	29,879
C10	N/A	25,148	N/A	5.75	N/A	25,142	106,181	149,336	0	127,759
C11	N/A	N/A	N/A	N/A	N/A	N/A	156,089	237,749	0	196,919
C12	N/A	N/A	N/A	N/A	N/A	N/A	140,336	209,910	0	175,123
C13	N/A	N/A	N/A	N/A	N/A	N/A	59,372	94,740	0	77,056
C14	N/A	N/A	N/A	N/A	N/A	N/A	6,329	13,064	0	9,697
C15	N/A	N/A	N/A	N/A	N/A	N/A	205	999	0	602
C16	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C17	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C18	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C19	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C20	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C21	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C22	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C23	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C24	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C25	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C26	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C27	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C28	N/A	N/A	N/A	N/A	N/A	N/A	0	0	262	0
C29	N/A	N/A	N/A	N/A	N/A	N/A	0	0	439	0
C30	N/A	N/A	N/A	N/A	N/A	N/A	1,604	592	6,464	0
SUM	1,918	83,419	1,380	123	624	83,307	501,685	748,618	7,165	624,054

AD Cannister Sample - Component A-22

	Canister (µg/m3) TO-14A/M18 for CH4	Canister (µg/m3) TO-15	Canister Background TO-14A/M18 (µg/m3)	Canister Background TO-15(µg/m3)	Corr Canister TO-14A (µg/m3)	Corr Canister TO-15 (µg/m3)	Primary Tube (µg/m3)	Replicate Tube (µg/m3)	Tube Background (µg/m3)	Ave Tube (µg/m3)
C1	1,280	50.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C2	140	76.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C3	880	1224	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C4	2,077	43.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C5	3,142	0	N/A	N/A	N/A	N/A	950	0	N/A	475
C6	3,222	785	N/A	N/A	N/A	N/A	5,427	1,557	N/A	3,492
C7	N/A	5,184	N/A	N/A	N/A	N/A	14,147	4,113	N/A	9,130
C8	N/A	19,976	N/A	N/A	N/A	N/A	12,823	6,799	N/A	9,811
C9	N/A	27,233	N/A	N/A	N/A	N/A	45,106	26,205	N/A	35,656
C10	N/A	25,951	N/A	N/A	N/A	N/A	114,542	72,126	N/A	93,334
C11	N/A	N/A	N/A	N/A	N/A	N/A	146,103	100,475	N/A	123,289
C12	N/A	N/A	N/A	N/A	N/A	N/A	197,773	104,965	N/A	151,369
C13	N/A	N/A	N/A	N/A	N/A	N/A	207,353	65,769	N/A	136,561
C14	N/A	N/A	N/A	N/A	N/A	N/A	80,072	24,363	N/A	52,218
C15	N/A	N/A	N/A	N/A	N/A	N/A	9,947	2,359	N/A	6,153
C16	N/A	N/A	N/A	N/A	N/A	N/A	1,348	0	N/A	674
C17	N/A	N/A	N/A	N/A	N/A	N/A	273	0	N/A	137
C18	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C19	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C20	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C21	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C22	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C23	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C24	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C25	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C26	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C27	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C28	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C29	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C30	N/A	N/A	N/A	N/A	N/A	N/A	652	0	N/A	326
SUM	10,741	80,523	N/A	N/A	N/A	N/A	836,516	408,731	N/A	622,624

AD Cannister Sample - Component A-1083

	Canister (µg/m3) TO-14A/M18 for CH4	Canister (µg/m3) TO-15	Canister Background TO-14A/M18 (µg/m3)	Canister Background TO-15(µg/m3)	Corr Canister TO-14A (µg/m3)	Corr Canister TO-15 (µg/m3)	Primary Tube (µg/m3)	Replicate Tube (µg/m3)	Tube Background (µg/m3)	Corr Ave Tube (µg/m3)
C1	2,633	54.3	1,672	6.36	962	47.9	N/A	N/A	N/A	N/A
C2	130	57.6	15.6	18.6	114	39.0	N/A	N/A	N/A	N/A
C3	356	1,027	18.1	25.3	338	1,001	N/A	N/A	N/A	N/A
C4	140	151	21.3	16.8	118	134	N/A	N/A	N/A	N/A
C5	358	0	32.6	0.00	325	0	224	0	0	112
C6	86	49.1	43.1	15.4	43	33.7	0	0	0	0
C7	N/A	67	N/A	29.7	N/A	37.3	0	9266	3049	1,584
C8	N/A	0	N/A	20.1	N/A	0	579	233	0	406
C9	N/A	61.9	N/A	3.90	N/A	58.0	238	212	0	225
C10	N/A	2,465	N/A	0.60	N/A	2,464	1039	395	1975	0
C11	N/A	N/A	N/A	N/A	N/A	N/A	8448	3454	14645	0
C12	N/A	N/A	N/A	N/A	N/A	N/A	27033	10953	35327	0
C13	N/A	N/A	N/A	N/A	N/A	N/A	62999	22882	48511	0
C14	N/A	N/A	N/A	N/A	N/A	N/A	87579	23531	21773	33,782
C15	N/A	N/A	N/A	N/A	N/A	N/A	39555	11375	4372	21,093
C16	N/A	N/A	N/A	N/A	N/A	N/A	15359	3055	245	8,962
C17	N/A	N/A	N/A	N/A	N/A	N/A	3830	1431	0	2,631
C18	N/A	N/A	N/A	N/A	N/A	N/A	349	390	0	370
C19	N/A	N/A	N/A	N/A	N/A	N/A	418	520	0	469
C20	N/A	N/A	N/A	N/A	N/A	N/A	546	437	0	492
C21	N/A	N/A	N/A	N/A	N/A	N/A	220	561	0	391
C22	N/A	N/A	N/A	N/A	N/A	N/A	196	254	0	225
C23	N/A	N/A	N/A	N/A	N/A	N/A	0	200	0	100
C24	N/A	N/A	N/A	N/A	N/A	N/A	0	197	0	99
C25	N/A	N/A	N/A	N/A	N/A	N/A	0	211	0	106
C26	N/A	N/A	N/A	N/A	N/A	N/A	192	0	0	96
C27	N/A	N/A	N/A	N/A	N/A	N/A	0	183	0	92
C28	N/A	N/A	N/A	N/A	N/A	N/A	0	204	0	102
C29	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0
C30	N/A	N/A	N/A	N/A	N/A	N/A	866	1515	1027	164
SUM	3,703	3,932	1,802	137	1,901	3,816	249,670	91,459	130,924	71,497

AD Cannister Sample - Component A-901

	Canister (µg/m3) TO-14A/M18 for CH4	Canister (µg/m3) TO-15	Canister Background TO-14A/M18 (µg/m3)	Canister Background TO-15(µg/m3)	Corr Canister TO-14A (µg/m3)	Corr Canister TO-15 (µg/m3)	Primary Tube (µg/m3)	Replicate Tube (µg/m3)	Tube Background (µg/m3)	Corr Ave Tube (µg/m3)
C1	1,818	46.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C2	96.2	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C3	188	1,328	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C4	188	128.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C5	138	0	N/A	N/A	N/A	N/A	0	0	N/A	0
C6	641	323	N/A	N/A	N/A	N/A	0	0	N/A	0
C7	N/A	65.9	N/A	N/A	N/A	N/A	196	7629	N/A	3,913
C8	N/A	335	N/A	N/A	N/A	N/A	1113	716	N/A	915
C9	N/A	2,335	N/A	N/A	N/A	N/A	532	3449	N/A	1,991
C10	N/A	361	N/A	N/A	N/A	N/A	36950	32046	N/A	34,498
C11	N/A	N/A	N/A	N/A	N/A	N/A	43651	37813	N/A	40,732
C12	N/A	N/A	N/A	N/A	N/A	N/A	65989	56100	N/A	61,045
C13	N/A	N/A	N/A	N/A	N/A	N/A	61383	49459	N/A	55,421
C14	N/A	N/A	N/A	N/A	N/A	N/A	37209	28670	N/A	32,940
C15	N/A	N/A	N/A	N/A	N/A	N/A	17829	13286	N/A	15,558
C16	N/A	N/A	N/A	N/A	N/A	N/A	4529	3012	N/A	3,771
C17	N/A	N/A	N/A	N/A	N/A	N/A	879	540	N/A	710
C18	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C19	N/A	N/A	N/A	N/A	N/A	N/A	0	297	N/A	149
C20	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C21	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C22	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C23	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C24	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C25	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C26	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C27	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C28	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C29	N/A	N/A	N/A	N/A	N/A	N/A	0	0	N/A	0
C30	N/A	N/A	N/A	N/A	N/A	N/A	1228	1283	N/A	1,256
SUM	3,069	5,023	N/A	N/A	N/A	N/A	271,488	234,300	N/A	252,894

Bagging Data Form	**Vacuum Method**		**Sample Id**	**A01 A/B**
Equipment type:	Connector		**Component ID:**	**A-486**
Equipment Subtype:	Bull Plug		**Plant ID:**	Refinery A
Line Size:	1 *inches*		**Date:**	22-Feb-17
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR
Barometric pressure	30.25 *inHg*	768.4 *mmHg*	**Sample Pump ID**	BU51791
Ambient Temperature:	62.4 *°F*	16.9 *°C*	**TVA ID**	9509
Stream Temperature:	*°F*	-17.8 *°C*	**Stream pressure:**	50 *psig*
Stream Description:	*P8888 Outlet South LGO Pumparound Spare*			

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A01A

Time	**Bagging Test Measurement Data**									
10:25	Pre-Test M21	258	*ppmv*		Background		*ppmv*	Pre-Test $M21_{Corr}$	258	*ppmv*
11:03	Volume Start	12.1	*Liters*							
11:10	DGM_{10L} Time	01:15.9	*min:sec.frac*	DGM Time	1.267	DGM Flow	7.89	DGM $Flow_{STP}$	7.97	*liters/minute*
10:46	Vacuum check	0.075	*inches H2O*							
11:03	DGM_T	68	*°F*	20.0	°C	DGM_P	2 *inches H2O vacuum*		764.6	*mmHg*
11:01	Bag $Conc_{ppm}$	26	*ppmv*							
11:43	Volume Stop	24.3	*Liters*	Total Vol	12.2	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.305	*L/min*	Sorbent $Flow_{STP}$	0.308	*L/min*
	Sorbent Vol_{STP}	12.32	*Liters*	DGM Vol_{STP}	318.95	*Liters*	Total Run Vol_{STP}	331.28	*Liters*	

A01B

Time	**Bagging Test Measurement Data**									
11:48	Volume Start	24.3	*Liters*							
11:50	DGM_{10L} Time	01:21.2	*min:sec.frac*	DGM Time	1.350	DGM Flow	7.41	DGM $Flow_{STP}$	7.49	*liters/minute*
11:50	Vacuum check	0.055	*inches H2O*							
12:04	DGM_T	68	*°F*	20.0	°C	DGM_P	1.8	*inches H2O vacuum*	765.0	*mmHg*
12:21	Bag $Conc_{ppm}$	13	*ppmv*							
12:28	Volume Stop	36.6	*Liters*	Total Vol	12.3	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.308	*L/min*	Sorbent $Flow_{STP}$	0.311	*L/min*
	Sorbent Vol_{STP}	12.43	*Liters*	DGM Vol_{STP}	299.41	*Liters*	Total Run Vol_{STP}	311.84	*Liters*	

12:39	**Final Screening (ppmv) - equipment**	170 *ppmv*	**background**	*ppmv*	
Condensate accumulation: starting time		Final time	1		1
Organic condensate collected	*ml*				
Density of organic condensate	*g/ml*				

Average THC emissions =	6.90E-05 kg/hr
Percent difference THC ER =	66%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	6.36E-08
C5 as Pentane	1.00E-06
n-Hexane	3.32E-07
C6 as Hexane	2.31E-07
n-Heptane	1.80E-07
C7 as Heptane	7.70E-07
n-Octane	1.09E-07
C8 as Octane	3.20E-07
n-Nonane	1.03E-07
C9 as Nonane	2.47E-06
n-Decane	3.28E-07
C10 as Decane	4.86E-06
n-Undecane	8.17E-07
C11 as Undecane	1.01E-05
n-Dodecane	4.97E-07
C12 as Dodecane	1.09E-05
n-Tridecane	5.56E-07
C13 as Tridecane	1.36E-05
n-Tetradecane	1.12E-06
C14 as tetradecane	1.07E-05
n-Pentadecane	8.78E-07
C15 as Pentadecane	5.03E-06
n-Hexadecane	1.99E-07
C16 as Hexadecane	2.85E-06
n-Heptadecane	0.00E+00
C17 as Heptadecane	7.71E-08
n-Octadecane	6.77E-08
C18 as Octodecane	9.07E-08
n-Nonadecane	6.78E-08
C19 as Nonadecane	0.00E+00
n-Eicosane	6.77E-08
C20 as Eicosane	0.00E+00
n-Heneicosane	6.83E-08
C21 as Heneicosane	0.00E+00
n-Docosane	6.75E-08
C22 as Docosane	6.75E-08
n-Tricosane	6.75E-08
C23 as Tricosane	6.75E-08
n-Tetracosane	6.80E-08
C24 as Tetracosane	6.80E-08
Total Hydrocarbon	6.90E-05

THC:	**3.65E-03**	**lbs/day**	**6.66E-04 tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A01A	#A01A		ND Adj	#A02A		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	153	ND	77	378	ND	0	920	ND	0	77	0.08	25	38	3.81E-08			0	0	0.00E+00	3.81E-08
C5 as Pentane	1,487		1,487	378	ND	0	920	ND	0	1,487	1.49	493	739	7.39E-07			0	0	0.00E+00	7.39E-07
n-Hexane	725	J	725	392	ND	0	973	ND	0	725	0.73	240	360	3.60E-07			0	0	0.00E+00	3.60E-07
C6 as Hexane	742	J	742	392	ND	0	973	ND	0	742	0.74	246	369	3.69E-07			0	0	0.00E+00	3.69E-07
n-Heptane	531	J	531	410	ND	0	1018	ND	0	531	0.53	176	264	2.64E-07			0	0	0.00E+00	2.64E-07
C7 as Heptane	1,839		1,839	410	ND	0	1018	ND	0	1,839	1.84	609	914	9.14E-07			0	0	0.00E+00	9.14E-07
n-Octane	249	J	249	399	ND	0	407	ND	0	249	0.25	82	124	1.24E-07			0	0	0.00E+00	1.24E-07
C8 as Octane	1,100	J	1,100	399	ND	0	407	ND	0	1,100	1.10	364	547	5.47E-07			0	0	0.00E+00	5.47E-07
n-Nonane	222	J	222	402	ND	0	410	ND	0	222	0.22	74	110	1.10E-07			0	0	0.00E+00	1.10E-07
C9 as Nonane	7,292		7,292	402	ND	0	410	ND	0	7,292	7.29	2416	3623	3.62E-06			0	0	0.00E+00	3.62E-06
n-Decane	632	J	632	406	ND	0	414	ND	0	632	0.63	209	314	3.14E-07			0	0	0.00E+00	3.14E-07
C10 as Decane	12,352		12,352	406	ND	0	414	ND	0	12,352	12.35	4092	6138	6.14E-06			0	0	0.00E+00	6.14E-06
n-Undecane	2,042		2,042	405	ND	0	413	ND	0	2,042	2.04	676	1015	1.01E-06			0	0	0.00E+00	1.01E-06
C11 as Undecane	28,514		28,514	778	J	778	413	ND	0	27,737	27.74	9188	13783	1.38E-05			0	0	0.00E+00	1.38E-05
n-Dodecane	1,165	J	1,165	402	ND	0	410	ND	0	1,165	1.16	386	579	5.79E-07			0	0	0.00E+00	5.79E-07
C12 as Dodecane	29,482		29,482	402	ND	0	410	ND	0	29,482	29.48	9767	14650	1.47E-05			0	0	0.00E+00	1.47E-05
n-Tridecane	1,175	J	1,175	403	ND	0	411	ND	0	1,175	1.18	389	584	5.84E-07			0	0	0.00E+00	5.84E-07
C13 as Tridecane	36,926		36,926	550	J	550	411	ND	0	36,376	36.38	12051	18076	1.81E-05			0	0	0.00E+00	1.81E-05
n-Tetradecane	4,334		4,334	402	ND	0	411	ND	0	4,334	4.33	1436	2154	2.15E-06			0	0	0.00E+00	2.15E-06
C14 as tetradecane	28,628		28,628	845	J	845	411	ND	0	27,783	27.78	9204	13806	1.38E-05			0	0	0.00E+00	1.38E-05
n-Pentadecane	3,210		3,210	467	J	467	413	ND	0	2,743	2.74	909	1363	1.36E-06			0	0	0.00E+00	1.36E-06
C15 as Pentadecane	15,423		15,423	1577	J	1,577	413	ND	0	13,847	13.85	4587	6881	6.88E-06			0	0	0.00E+00	6.88E-06
n-Hexadecane	1,072	J	1,072	587	J	587	411	ND	0	485	0.49	161	241	2.41E-07			0	0	0.00E+00	2.41E-07
C16 as Hexadecane	10,677		10,677	1646	J	1,646	411	ND	0	9,031	9.03	2992	4487	4.49E-06			0	0	0.00E+00	4.49E-06
n-Heptadecane	465	J	465	686	J	686	406	ND	0	-221	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	2,776		2,776	2466	J	2,466	406	ND	0	310	0.31	103	154	1.54E-07			0	0	0.00E+00	1.54E-07
n-Octadecane	163	ND	82	402	ND	0	410	ND	0	82	0.08	27	41	4.06E-08			0	0	0.00E+00	4.06E-08
C18 as Octodecane	174	J	174	402	ND	0	410	ND	0	174	0.17	58	87	8.67E-08			0	0	0.00E+00	8.67E-08
n-Nonadecane	164	ND	82	403	ND	0	411	ND	0	82	0.08	27	41	4.07E-08			0	0	0.00E+00	4.07E-08
C19 as Nonadecane	193	J	193	584	J	584	411	ND	0	-391	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Eicosane	163	ND	82	402	ND	0	410	ND	0	82	0.08	27	41	4.06E-08			0	0	0.00E+00	4.06E-08
C20 as Eicosane	163	ND	82	427	J	427	410	ND	0	-345	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heneicosane	165	ND	82	406	ND	0	414	ND	0	82	0.08	27	41	4.10E-08			0	0	0.00E+00	4.10E-08
C21 as Heneicosane	136	J	136	452	J	452	414	ND	0	-316	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	163	ND	82	401	ND	0	409	ND	0	82	0.08	27	41	4.05E-08			0	0	0.00E+00	4.05E-08
C22 as Docosane	163	ND	82	401	ND	0	409	ND	0	82	0.08	27	41	4.05E-08			0	0	0.00E+00	4.05E-08
n-Tricosane	163	ND	82	401	ND	0	409	ND	0	82	0.08	27	41	4.05E-08			0	0	0.00E+00	4.05E-08
C23 as Tricosane	163	ND	82	401	ND	0	409	ND	0	82	0.08	27	41	4.05E-08			0	0	0.00E+00	4.05E-08
n-Tetracosane	164	ND	82	404	ND	0	412	ND	0	82	0.08	27	41	4.08E-08			0	0	0.00E+00	4.08E-08
C24 as Tetracosane	164	ND	82	404	ND	0	412	ND	0	82	0.08	27	41	4.08E-08			0	0	0.00E+00	4.08E-08
Total Hydrocarbon	195,516		194,540	22276		11,064			0		184.75	61203	91,804	9.18E-05	0		0	0	0.00E+00	9.18E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A01B	#A01B		ND Adj	#A02A		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	381	ND	190	378	ND	0	920	ND	0	190	0.19	59	89	8.90E-08			0	0	0.00E+00	8.90E-08
C5 as Pentane	2,705	J	2,705	378	ND	0	920	ND	0	2,705	2.70	843	1265	1.27E-06			0	0	0.00E+00	1.27E-06
n-Hexane	649	J	649	392	ND	0	973	ND	0	649	0.65	202	304	3.04E-07			0	0	0.00E+00	3.04E-07
C6 as Hexane	395	ND	198	392	ND	0	973	ND	0	198	0.20	62	92	9.25E-08			0	0	0.00E+00	9.25E-08
n-Heptane	413	ND	207	410	ND	0	1018	ND	0	207	0.21	64	97	9.66E-08			0	0	0.00E+00	9.66E-08
C7 as Heptane	1,337	J	1,337	410	ND	0	1018	ND	0	1,337	1.34	417	625	6.25E-07			0	0	0.00E+00	6.25E-07
n-Octane	402	ND	201	399	ND	0	407	ND	0	201	0.20	63	94	9.41E-08			0	0	0.00E+00	9.41E-08
C8 as Octane	402	ND	201	399	ND	0	407	ND	0	201	0.20	63	94	9.41E-08			0	0	0.00E+00	9.41E-08
n-Nonane	405	ND	203	402	ND	0	410	ND	0	203	0.20	63	95	9.48E-08			0	0	0.00E+00	9.48E-08
C9 as Nonane	2,832	J	2,832	402	ND	0	410	ND	0	2,832	2.83	883	1325	1.32E-06			0	0	0.00E+00	1.32E-06
n-Decane	732	J	732	406	ND	0	414	ND	0	732	0.73	228	343	3.43E-07			0	0	0.00E+00	3.43E-07
C10 as Decane	7,655		7,655	406	ND	0	414	ND	0	7,655	7.65	2387	3581	3.58E-06			0	0	0.00E+00	3.58E-06
n-Undecane	1,323	J	1,323	405	ND	0	413	ND	0	1,323	1.32	413	619	6.19E-07			0	0	0.00E+00	6.19E-07
C11 as Undecane	14,580		14,580	778	J	778	413	ND	0	13,802	13.80	4304	6456	6.46E-06			0	0	0.00E+00	6.46E-06
n-Dodecane	890	J	890	402	ND	0	410	ND	0	890	0.89	277	416	4.16E-07			0	0	0.00E+00	4.16E-07
C12 as Dodecane	15,267		15,267	402	ND	0	410	ND	0	15,267	15.27	4761	7142	7.14E-06			0	0	0.00E+00	7.14E-06
n-Tridecane	1,130	J	1,130	403	ND	0	411	ND	0	1,130	1.13	352	529	5.29E-07			0	0	0.00E+00	5.29E-07
C13 as Tridecane	20,194		20,194	550	J	550	411	ND	0	19,644	19.64	6126	9189	9.19E-06			0	0	0.00E+00	9.19E-06
n-Tetradecane	406	ND	203	402	ND	0	411	ND	0	203	0.20	63	95	9.49E-08			0	0	0.00E+00	9.49E-08
C14 as tetradecane	17,225		17,225	845	J	845	411	ND	0	16,380	16.38	5108	7662	7.66E-06			0	0	0.00E+00	7.66E-06
n-Pentadecane	1,310	J	1,310	467	J	467	413	ND	0	842	0.84	263	394	3.94E-07			0	0	0.00E+00	3.94E-07
C15 as Pentadecane	8,388		8,388	1577	J	1,577	413	ND	0	6,811	6.81	2124	3186	3.19E-06			0	0	0.00E+00	3.19E-06
n-Hexadecane	922	J	922	587	J	587	411	ND	0	335	0.34	105	157	1.57E-07			0	0	0.00E+00	1.57E-07
C16 as Hexadecane	4,245		4,245	1646	J	1,646	411	ND	0	2,599	2.60	810	1216	1.22E-06			0	0	0.00E+00	1.22E-06
n-Heptadecane	401	ND	200	686	J	686	406	ND	0	-486	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	401	ND	200	2466	J	2,466	406	ND	0	-2,266	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Octadecane	405	ND	203	402	ND	0	410	ND	0	203	0.20	63	95	9.48E-08			0	0	0.00E+00	9.48E-08
C18 as Octodecane	405	ND	203	402	ND	0	410	ND	0	203	0.20	63	95	9.48E-08			0	0	0.00E+00	9.48E-08
n-Nonadecane	406	ND	203	403	ND	0	411	ND	0	203	0.20	63	95	9.50E-08			0	0	0.00E+00	9.50E-08
C19 as Nonadecane	406	ND	203	584	J	584	411	ND	0	-381	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Eicosane	405	ND	203	402	ND	0	410	ND	0	203	0.20	63	95	9.48E-08			0	0	0.00E+00	9.48E-08
C20 as Eicosane	405	ND	203	427	J	427	410	ND	0	-224	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heneicosane	409	ND	204	406	ND	0	414	ND	0	204	0.20	64	96	9.56E-08			0	0	0.00E+00	9.56E-08
C21 as Heneicosane	409	ND	204	452	J	452	414	ND	0	-247	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	404	ND	202	401	ND	0	409	ND	0	202	0.20	63	95	9.46E-08			0	0	0.00E+00	9.46E-08
C22 as Docosane	404	ND	202	401	ND	0	409	ND	0	202	0.20	63	95	9.46E-08			0	0	0.00E+00	9.46E-08
n-Tricosane	404	ND	202	401	ND	0	409	ND	0	202	0.20	63	95	9.46E-08			0	0	0.00E+00	9.46E-08
C23 as Tricosane	404	ND	202	401	ND	0	409	ND	0	202	0.20	63	95	9.46E-08			0	0	0.00E+00	9.46E-08
n-Tetracosane	407	ND	204	404	ND	0	412	ND	0	204	0.20	63	95	9.52E-08			0	0	0.00E+00	9.52E-08
C24 as Tetracosane	407	ND	204	404	ND	0	412	ND	0	204	0.20	63	95	9.52E-08			0	0	0.00E+00	9.52E-08
Total Hydrocarbon	110,671		106,027			11,064			0		98.57	32653	46,106	4.61E-05	0		0	0	0.00E+00	4.61E-05

Bagging Data Form	Vacuum Method			Sample Id	A03 A/B
Equipment type:	Valve			Component ID:	A-470
Equipment Subtype:	Gate			Plant ID:	Refinery A
Line Size:	4	inches		Date:	22-Feb-17
Phase (G, LL, HL):	HL			Analysis team:	EG/DR
Barometric pressure	30.18 inHg	766.6	mmHg	Sample Pump ID	BU51791
Ambient Temperature:	69.7 °F	20.9	°C	TVA ID	9509
Stream Temperature:	°F	-17.8	°C	Stream pressure:	psig
Stream Description:	LGO PA Min Flow B/P				

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A03A

Time	Bagging Test Measurement Data									
13:35	Pre-Test M21	749	ppmv	Background		ppmv	Pre-Test $M21_{Corr}$	749	ppmv	
14:20	Volume Start	49.1	Liters							
14:40	DGM_{10L} Time	01:25.9	min:sec.frac	DGM Time	1.433	DGM Flow	6.98	$DGM Flow_{STP}$	7.03	liters/minute
14:40	Vacuum check	0.015	inches H2O							
14:43	DGM_T	68	°F	20.0	°C	DGM_P	1.8	inches H2O vacuum	763.2	mmHg
14:58	Bag $Conc_{ppm}$	255	ppmv							
15:00	Volume Stop	61.7	Liters	Total Vol	12.6	Liters				
	Sorbent Run Time	40	Minutes		Sorbent Flow	0.315	L/min	$Sorbent Flow_{STP}$	0.318	L/min
	$Sorbent Vol_{STP}$	12.70	Liters	$DGM Vol_{STP}$	281.35	Liters	Total Run Vol_{STP}	294.05	Liters	

A03B

Time	Bagging Test Measurement Data									
15:04	Volume Start	61.7	Liters							
15:09	DGM_{10L} Time	01:34.3	min:sec.frac	DGM Time	1.567	DGM Flow	6.38	$DGM Flow_{STP}$	6.44	liters/minute
15:09	Vacuum check	0.015	inches H2O							
15:40	DGM_T	68	°F	20.0	°C	DGM_P	1.8	inches H2O vacuum	763.2	mmHg
15:44	Bag $Conc_{ppm}$	211	ppmv							
15:45	Volume Stop	74.2	Liters	Total Vol	12.5	Liters				
	Sorbent Run Time	41	Minutes		Sorbent Flow	0.305	L/min	$Sorbent Flow_{STP}$	0.307	L/min
	$Sorbent Vol_{STP}$	12.60	Liters	$DGM Vol_{STP}$	263.84	Liters	Total Run Vol_{STP}	276.44	Liters	
15:57	Final Screening (ppmv) - equipment			749	ppmv	background		ppmv		

Condensate accumulation: starting time		Final time		0
Organic condensate collected	ml			
Density of organic condensate	g/ml			

Average THC emissions =	1.85E-03 kg/hr
Percent difference THC ER =	29%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.28E-07
C5 as Pentane	6.09E-06
n-Hexane	9.72E-07
C6 as Hexane	1.18E-05
n-Heptane	2.52E-06
C7 as Heptane	1.71E-05
n-Octane	3.04E-06
C8 as Octane	1.50E-05
n-Nonane	2.66E-06
C9 as Nonane	7.92E-05
n-Decane	8.30E-06
C10 as Decane	1.50E-04
n-Undecane	2.11E-05
C11 as Undecane	2.74E-04
n-Dodecane	1.80E-05
C12 as Dodecane	2.95E-04
n-Tridecane	1.60E-05
C13 as Tridecane	2.85E-04
n-Tetradecane	1.59E-05
C14 as tetradecane	1.82E-04
n-Pentadecane	1.10E-05
C15 as Pentadecane	9.15E-05
n-Hexadecane	1.02E-05
C16 as Hexadecane	6.61E-05
n-Heptadecane	8.52E-06
C17 as Heptadecane	4.01E-05
n-Octadecane	4.99E-06
C18 as Octodecane	4.56E-05
n-Nonadecane	5.20E-06
C19 as Nonadecane	3.39E-05
n-Eicosane	4.72E-06
C20 as Eicosane	3.77E-05
n-Heneicosane	5.54E-06
C21 as Heneicosane	2.27E-05
n-Docosane	4.30E-06
C22 as Docosane	1.53E-05
n-Tricosane	2.73E-06
C23 as Tricosane	1.34E-05
n-Tetracosane	2.13E-06
C24 as Tetracosane	1.85E-05
Total Hydrocarbon	1.85E-03

THC:	9.78E-02	lbs/day	1.78E-02	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A03A	#A03A		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	1,296		1,296	0		0	920	ND	0	1,296	1.30	381	572	5.72E-07	12	ND	6	0.07	4.13E-09	5.76E-07
C5 as Pentane	16,705		16,705	0		0	920	ND	0	16,705	16.70	4912	7368	7.37E-06	12	ND	6	0.07	4.13E-09	7.37E-06
n-Hexane	2,736		2,736	0		0	973	ND	0	2,736	2.74	804	1207	1.21E-06	12	ND	6	0.07	4.29E-09	1.21E-06
C6 as Hexane	33,366		33,366	0		0	973	ND	0	33,366	33.37	9811	14717	1.47E-05	12	ND	6	0.07	4.29E-09	1.47E-05
n-Heptane	7,845		7,845	0		0	1018	ND	0	7,845	7.84	2307	3460	3.46E-06	13	ND	6	0.07	4.48E-09	3.46E-06
C7 as Heptane	49,533		49,533	0		0	1018	ND	0	49,533	49.53	14565	21848	2.18E-05	13	ND	6	0.07	4.48E-09	2.19E-05
n-Octane	10,307		10,307	0		0	407	ND	0	10,307	10.31	3031	4546	4.55E-06	63	ND	31	0.37	2.22E-08	4.57E-06
C8 as Octane	50,947		50,947	0		0	407	ND	0	50,947	50.95	14981	22471	2.25E-05	63	ND	31	0.37	2.22E-08	2.25E-05
n-Nonane	8,474		8,474	0		0	410	ND	0	8,474	8.47	2492	3738	3.74E-06	62	ND	31	0.36	2.19E-08	3.76E-06
C9 as Nonane	233,811		233,811	0		0	410	ND	0	233,811	233.81	68752	103129	1.03E-04	62	ND	31	0.36	2.19E-08	1.03E-04
n-Decane	10,455		10,455	0		0	414	ND	0	10,455	10.46	3074	4612	4.61E-06	62	ND	31	0.36	2.19E-08	4.63E-06
C10 as Decane	402,329		402,329	0		0	414	ND	0	402,329	402.33	118305	177458	1.77E-04	62	ND	31	0.36	2.19E-08	1.77E-04
n-Undecane	54,475		54,475	0		0	413	ND	0	54,475	54.47	16018	24027	2.40E-05	62	ND	31	0.36	2.18E-08	2.40E-05
C11 as Undecane	731,097		731,097	0		0	413	ND	0	731,097	731.10	214980	322470	3.22E-04	264	J	264	3.11	1.86E-07	3.23E-04
n-Dodecane	44,630		44,630	0		0	410	ND	0	44,630	44.63	13124	19685	1.97E-05	62	ND	31	0.37	2.20E-08	1.97E-05
C12 as Dodecane	732,101		732,101	0		0	410	ND	0	732,101	732.10	215275	322912	3.23E-04	663		663	7.81	4.68E-07	3.23E-04
n-Tridecane	32,594		32,594	0		0	411	ND	0	32,594	32.59	9584	14376	1.44E-05	63	ND	31	0.37	2.22E-08	1.44E-05
C13 as Tridecane	686,239		686,239	0		0	411	ND	0	686,239	686.24	201789	302684	3.03E-04	649		649	7.63	4.58E-07	3.03E-04
n-Tetradecane	61,955		61,955	0		0	411	ND	0	61,955	61.96	18218	27327	2.73E-05	430	J	430	5.06	3.04E-07	2.76E-05
C14 as tetradecane	448,550		448,550	0		0	411	ND	0	448,550	448.55	131897	197845	1.98E-04	2,382		2,382	28.03	1.68E-06	2.00E-04
n-Pentadecane	24,535		24,535	0		0	413	ND	0	24,535	24.53	7214	10822	1.08E-05	1,040		1,040	12.24	7.34E-07	1.16E-05
C15 as Pentadecane	248,063		248,063	0		0	413	ND	0	248,063	248.06	72943	109415	1.09E-04	9,242		9,242	108.73	6.52E-06	1.16E-04
n-Hexadecane	20,045		20,045	0		0	411	ND	0	20,045	20.04	5894	8841	8.84E-06	1,885		1,885	22.17	1.33E-06	1.02E-05
C16 as Hexadecane	167,256		167,256	0		0	411	ND	0	167,256	167.26	49182	73773	7.38E-05	13,103		13,103	154.15	9.25E-06	8.30E-05
n-Heptadecane	15,362		15,362	0		0	406	ND	0	15,362	15.36	4517	6776	6.78E-06	4,254		4,254	50.05	3.00E-06	9.78E-06
C17 as Heptadecane	92,784		92,784	0		0	406	ND	0	92,784	92.78	27283	40925	4.09E-05	27,807		27,807	327.14	1.96E-05	6.06E-05
n-Octadecane	6,085		6,085	0		0	410	ND	0	6,085	6.09	1789	2684	2.68E-06	3,347		3,347	39.37	2.36E-06	5.05E-06
C18 as Octodecane	40,900		40,900	0		0	410	ND	0	40,900	40.90	12027	18040	1.80E-05	42,551		42,551	500.60	3.00E-05	4.81E-05
n-Nonadecane	3,984		3,984	0		0	411	ND	0	3,984	3.98	1171	1757	1.76E-06	4,716		4,716	55.48	3.33E-06	5.09E-06
C19 as Nonadecane	26,144		26,144	0		0	411	ND	0	26,144	26.14	7688	11531	1.15E-05	34,605		34,605	407.12	2.44E-05	3.60E-05
n-Eicosane	2,198		2,198	0		0	410	ND	0	2,198	2.20	646	969	9.69E-07	5,549		5,549	65.29	3.92E-06	4.89E-06
C20 as Eicosane	16,763		16,763	0		0	410	ND	0	16,763	16.76	4929	7394	7.39E-06	45,389		45,389	533.99	3.20E-05	3.94E-05
n-Heneicosane	1,431	J	1,431	0		0	414	ND	0	1,431	1.43	421	631	6.31E-07	7,139		7,139	83.99	5.04E-06	5.67E-06
C21 as Heneicosane	3,819		3,819	0		0	414	ND	0	3,819	3.82	1123	1685	1.68E-06	30,023		30,023	353.21	2.12E-05	2.29E-05
n-Docosane	582	J	582	0		0	409	ND	0	582	0.58	171	257	2.57E-07	5,790		5,790	68.11	4.09E-06	4.34E-06
C22 as Docosane	1,340	J	1,340	0		0	409	ND	0	1,340	1.34	394	591	5.91E-07	20,943		20,943	246.39	1.48E-05	1.54E-05
n-Tricosane	247	J	247	0		0	409	ND	0	247	0.25	73	109	1.09E-07	3,727		3,727	43.85	2.63E-06	2.74E-06
C23 as Tricosane	379	J	379	0		0	409	ND	0	379	0.38	111	167	1.67E-07	18,778		18,778	220.92	1.33E-05	1.34E-05
n-Tetracosane	159	ND	79	0		0	412	ND	0	79	0.08	23	35	3.51E-08	2,936		2,936	34.55	2.07E-06	2.11E-06
C24 as Tetracosane	159	ND	79	0		0	412	ND	0	79	0.08	23	35	3.51E-08	26,128		26,128	307.39	1.84E-05	1.85E-05
Total Hydrocarbon	4,291,679		4,291,520			0			0		4291.52	1261925	1,892,888	1.89E-03	313973.2		313,656	3,690	2.21E-04	2.11E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A03B	#A03B		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	374	ND	187	0		0	920	ND	0	187	0.19	52	76	7.57E-08	12	ND	6	0.07	4.13E-09	7.99E-08
C5 as Pentane	11,888		11,888	0		0	920	ND	0	11,888	11.89	3286	4809	4.81E-06	12	ND	6	0.07	4.13E-09	4.81E-06
n-Hexane	1,800	J	1,800	0		0	973	ND	0	1,800	1.80	498	728	7.28E-07	12	ND	6	0.07	4.29E-09	7.32E-07
C6 as Hexane	21,932		21,932	0		0	973	ND	0	21,932	21.93	6063	8873	8.87E-06	12	ND	6	0.07	4.29E-09	8.88E-06
n-Heptane	3,869	J	3,869	0		0	1018	ND	0	3,869	3.87	1069	1565	1.57E-06	13	ND	6	0.07	4.48E-09	1.57E-06
C7 as Heptane	30,505		30,505	0		0	1018	ND	0	30,505	30.51	8433	12341	1.23E-05	13	ND	6	0.07	4.48E-09	1.23E-05
n-Octane	3,667	J	3,667	0		0	407	ND	0	3,667	3.67	1014	1484	1.48E-06	63	ND	31	0.37	2.22E-08	1.51E-06
C8 as Octane	18,415		18,415	0		0	407	ND	0	18,415	18.41	5091	7450	7.45E-06	63	ND	31	0.37	2.22E-08	7.47E-06
n-Nonane	3,780	J	3,780	0		0	410	ND	0	3,780	3.78	1045	1529	1.53E-06	62	ND	31	0.36	2.19E-08	1.55E-06
C9 as Nonane	136,601		136,601	0		0	410	ND	0	136,601	136.60	37762	55261	5.53E-05	62	ND	31	0.36	2.19E-08	5.53E-05
n-Decane	29,534		29,534	0		0	414	ND	0	29,534	29.53	8164	11948	1.19E-05	62	ND	31	0.36	2.19E-08	1.20E-05
C10 as Decane	304,667		304,667	0		0	414	ND	0	304,667	304.67	84222	123252	1.23E-04	62	ND	31	0.36	2.19E-08	1.23E-04
n-Undecane	44,968		44,968	0		0	413	ND	0	44,968	44.97	12431	18192	1.82E-05	62	ND	31	0.36	2.18E-08	1.82E-05
C11 as Undecane	557,557		557,557	0		0	413	ND	0	557,557	557.56	154132	225558	2.26E-04	264	J	264	3.11	1.86E-07	2.26E-04
n-Dodecane	40,381		40,381	0		0	410	ND	0	40,381	40.38	11163	16336	1.63E-05	62	ND	31	0.37	2.20E-08	1.64E-05
C12 as Dodecane	656,637		656,637	0		0	410	ND	0	656,637	656.64	181521	265641	2.66E-04	663		663	7.81	4.68E-07	2.66E-04
n-Tridecane	43,236		43,236	0		0	411	ND	0	43,236	43.24	11952	17491	1.75E-05	63	ND	31	0.37	2.22E-08	1.75E-05
C13 as Tridecane	658,598		658,598	0		0	411	ND	0	658,598	658.60	182063	266434	2.66E-04	649		649	7.63	4.58E-07	2.67E-04
n-Tetradecane	9,726		9,726	0		0	411	ND	0	9,726	9.73	2689	3935	3.93E-06	430	J	430	5.06	3.04E-07	4.24E-06
C14 as tetradecane	402,308		402,308	0		0	411	ND	0	402,308	402.31	111214	162753	1.63E-04	2,382		2,382	28.03	1.68E-06	1.64E-04
n-Pentadecane	24,091		24,091	0		0	413	ND	0	24,091	24.09	6660	9746	9.75E-06	1,040		1,040	12.24	7.34E-07	1.05E-05
C15 as Pentadecane	149,657		149,657	0		0	413	ND	0	149,657	149.66	41371	60543	6.05E-05	9,242		9,242	108.73	6.52E-06	6.71E-05
n-Hexadecane	22,233		22,233	0		0	411	ND	0	22,233	22.23	6146	8994	8.99E-06	1,885		1,885	22.17	1.33E-06	1.03E-05
C16 as Hexadecane	98,470		98,470	0		0	411	ND	0	98,470	98.47	27221	39836	3.98E-05	13,103		13,103	154.15	9.25E-06	4.91E-05
n-Heptadecane	10,519		10,519	0		0	406	ND	0	10,519	10.52	2908	4255	4.26E-06	4,254		4,254	50.05	3.00E-06	7.26E-06
C17 as Heptadecane	394	ND	197	0		0	406	ND	0	197	0.20	55	80	7.98E-08	27,807		27,807	327.14	1.96E-05	1.97E-05
n-Octadecane	6,370		6,370	0		0	410	ND	0	6,370	6.37	1761	2577	2.58E-06	3,347		3,347	39.37	2.36E-06	4.94E-06
C18 as Octodecane	32,558		32,558	0		0	410	ND	0	32,558	32.56	9000	13171	1.32E-05	42,551		42,551	500.60	3.00E-05	4.32E-05
n-Nonadecane	4,885		4,885	0		0	411	ND	0	4,885	4.89	1351	1976	1.98E-06	4,716		4,716	55.48	3.33E-06	5.31E-06
C19 as Nonadecane	18,107		18,107	0		0	411	ND	0	18,107	18.11	5005	7325	7.33E-06	34,605		34,605	407.12	2.44E-05	3.18E-05
n-Eicosane	1,596	J	1,596	0		0	410	ND	0	1,596	1.60	441	646	6.46E-07	5,549		5,549	65.29	3.92E-06	4.56E-06
C20 as Eicosane	9,723		9,723	0		0	410	ND	0	9,723	9.72	2688	3933	3.93E-06	45,389		45,389	533.99	3.20E-05	3.60E-05
n-Heneicosane	926	J	926	0		0	414	ND	0	926	0.93	256	374	3.74E-07	7,139		7,139	83.99	5.04E-06	5.41E-06
C21 as Heneicosane	3,443	J	3,443	0		0	414	ND	0	3,443	3.44	952	1393	1.39E-06	30,023		30,023	353.21	2.12E-05	2.26E-05
n-Docosane	433	J	433	0		0	409	ND	0	433	0.43	120	175	1.75E-07	5,790		5,790	68.11	4.09E-06	4.26E-06
C22 as Docosane	883	J	883	0		0	409	ND	0	883	0.88	244	357	3.57E-07	20,943		20,943	246.39	1.48E-05	1.51E-05
n-Tricosane	398	ND	199	0		0	409	ND	0	199	0.20	55	80	8.05E-08	3,727		3,727	43.85	2.63E-06	2.71E-06
C23 as Tricosane	398	ND	199	0		0	409	ND	0	199	0.20	55	80	8.05E-08	18,778		18,778	220.92	1.33E-05	1.33E-05
n-Tetracosane	401	ND	200	0		0	412	ND	0	200	0.20	55	81	8.10E-08	2,936		2,936	34.55	2.07E-06	2.15E-06
C24 as Tetracosane	401	ND	200	0		0	412	ND	0	200	0.20	55	81	8.10E-08	26,128		26,128	307.39	1.84E-05	1.85E-05
Total Hydrocarbon	3,366,328		3,365,146			0			0		3365.15	989524	1,361,361	1.36E-03	313973.2		313,656	3,690	2.21E-04	1.58E-03

Bagging Data Form — Vacuum Method

Sample Id A04 A/B/C

WSPA — Western States Petroleum Association

Equipment type:	Valve	**Component ID:**	A-464
Equipment Subtype:	Gate	**Plant ID:**	Refinery A
Line Size:	4 *inches*	**Date:**	23-Feb-17
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	30.22 *inHg* / 767.6 *mmHg*	**Sample Pump ID**	BU51791
Ambient Temperature:	56 °F / 13.3 °C	**TVA ID**	9509
Stream Temperature:	°F / -17.8 °C	**Stream pressure:**	*psig*
Stream Description:	*LGO Min Flow*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A04A

Time	Bagging Test Measurement Data									
9:43	Pre-Test M21	251	*ppmv*		Background		*ppmv*	Pre-Test $M21_{Corr}$	251	*ppmv*
10:30	Volume Start	74.2	*Liters*							
10:34	DGM_{10L} Time	01:30.3	*min:sec.frac*	DGM Time 1.500	DGM Flow	6.67		$DGM\ Flow_{STP}$	6.86	*liters/minute*
10:34	Vacuum check	0.04	*inches H2O*							
10:45	DGM_T	58	*°F*	14.4 °C	DGM_P	1.8	*inches H2O vacuum*		764.2	*mmHg*
11:05	$Bag\ Conc_{ppm}$	65	*ppmv*							
11:10	Volume Stop	86.4	*Liters*	Total Vol 12.2	*Liters*					
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.305	*L/min*	$Sorbent\ Flow_{STP}$	0.314	*L/min*
	$Sorbent\ Vol_{STP}$	12.55	*Liters*	$DGM\ Vol_{STP}$ 274.40	*Liters*			$Total\ Run\ Vol_{STP}$	299.25	*Liters*

A04B

Time	Bagging Test Measurement Data									
11:16	Volume Start	86.4	*Liters*							
11:27	DGM_{10L} Time	01:28.4	*min:sec.frac*	DGM Time 1.467	DGM Flow	6.82		$DGM\ Flow_{STP}$	7.00	*liters/minute*
11:27	Vacuum check	0.035	*inches H2O*							
11:36	DGM_T	59.5	*°F*	15.3 °C	DGM_P	1.75	*inches H2O vacuum*		764.3	*mmHg*
11:50	$Bag\ Conc_{ppm}$	60	*ppmv*							
11:56	Volume Stop	98.3	*Liters*	Total Vol 11.9	*Liters*					
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.298	*L/min*	$Sorbent\ Flow_{STP}$	0.305	*L/min*
	$Sorbent\ Vol_{STP}$	12.21	*Liters*	$DGM\ Vol_{STP}$ 279.86	*Liters*			$Total\ Run\ Vol_{STP}$	292.08	*Liters*

12:15 **Final Screening (ppmv) - equipment** 267 *ppmv* **background** *ppmv*

Condensate accumulation: starting time — Final time — 0
Organic condensate collected *ml*
Density of organic condensate *g/ml*

Average THC emissions =	6.79E-04 kg/hr
Percent difference THC ER =	31%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	9.77E-08
C5 as Pentane	1.53E-06
n-Hexane	5.39E-07
C6 as Hexane	3.02E-06
n-Heptane	7.09E-07
C7 as Heptane	5.20E-06
n-Octane	8.51E-07
C8 as Octane	4.02E-06
n-Nonane	5.86E-07
C9 as Nonane	2.46E-05
n-Decane	3.32E-06
C10 as Decane	5.02E-05
n-Undecane	7.32E-06
C11 as Undecane	9.57E-05
n-Dodecane	5.49E-06
C12 as Dodecane	1.07E-04
n-Tridecane	8.07E-06
C13 as Tridecane	1.14E-04
n-Tetradecane	5.71E-06
C14 as tetradecane	8.18E-05
n-Pentadecane	7.45E-06
C15 as Pentadecane	4.06E-05
n-Hexadecane	4.72E-06
C16 as Hexadecane	3.60E-05
n-Heptadecane	4.57E-06
C17 as Heptadecane	2.95E-06
n-Octadecane	2.25E-06
C18 as Octodecane	1.72E-05
n-Nonadecane	2.10E-06
C19 as Nonadecane	1.39E-05
n-Eicosane	1.44E-06
C20 as Eicosane	9.58E-06
n-Heneicosane	1.29E-06
C21 as Heneicosane	5.33E-06
n-Docosane	8.16E-07
C22 as Docosane	2.72E-06
n-Tricosane	5.48E-07
C23 as Tricosane	1.71E-06
n-Tetracosane	3.64E-07
C24 as Tetracosane	3.33E-06
Total Hydrocarbon	6.79E-04

THC: 3.59E-02 lbs/day 6.56E-03 tons/yr

#A04A	ANALYTICAL RESULTS #A04A µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A0XXA µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	234	J	234	0		0	920	ND	0	234	0.23	70	105	1.05E-07	12	ND	6	0.07	4.08E-09	1.09E-07
C5 as Pentane	2,623		2,623	0		0	920	ND	0	2,623	2.62	785	1177	1.18E-06	12	ND	6	0.07	4.08E-09	1.18E-06
n-Hexane	478	J	478	0		0	973	ND	0	478	0.48	143	214	2.14E-07	12	ND	6	0.07	4.24E-09	2.19E-07
C6 as Hexane	6,134		6,134	0		0	973	ND	0	6,134	6.13	1836	2754	2.75E-06	12	ND	6	0.07	4.24E-09	2.76E-06
n-Heptane	1,102	J	1,102	0		0	1018	ND	0	1,102	1.10	330	495	4.95E-07	13	ND	6	0.07	4.43E-09	4.99E-07
C7 as Heptane	8,180		8,180	0		0	1018	ND	0	8,180	8.18	2448	3672	3.67E-06	13	ND	6	0.07	4.43E-09	3.68E-06
n-Octane	1,968		1,968	0		0	407	ND	0	1,968	1.97	589	884	8.84E-07	12	ND	6	0.07	4.32E-09	8.88E-07
C8 as Octane	11,022		11,022	0		0	407	ND	0	11,022	11.02	3298	4948	4.95E-06	12	ND	6	0.07	4.32E-09	4.95E-06
n-Nonane	840	J	840	0		0	410	ND	0	840	0.84	251	377	3.77E-07	12	ND	6	0.07	4.35E-09	3.81E-07
C9 as Nonane	58,632		58,632	0		0	410	ND	0	58,632	58.63	17546	26319	2.63E-05	12	ND	6	0.07	4.35E-09	2.63E-05
n-Decane	2,543		2,543	0		0	414	ND	0	2,543	2.54	761	1142	1.14E-06	13	ND	6	0.07	4.39E-09	1.15E-06
C10 as Decane	90,662		90,662	0		0	414	ND	0	90,662	90.66	27131	40696	4.07E-05	13	ND	6	0.07	4.40E-09	4.07E-05
n-Undecane	14,171		14,171	0		0	413	ND	0	14,171	14.17	4241	6361	6.36E-06	13	ND	6	0.07	4.38E-09	6.37E-06
C11 as Undecane	197,375		197,375	0		0	413	ND	0	197,375	197.37	59065	88598	8.86E-05	13	ND	6	0.07	4.36E-09	8.86E-05
n-Dodecane	8,137		8,137	0		0	410	ND	0	8,137	8.14	2435	3653	3.65E-06	12	ND	6	0.07	4.35E-09	3.66E-06
C12 as Dodecane	208,551		208,551	0		0	410	ND	0	208,551	208.55	62410	93615	9.36E-05	16	J	16	0.18	1.08E-08	9.36E-05
n-Tridecane	15,454		15,454	0		0	411	ND	0	15,454	15.45	4625	6937	6.94E-06	12	ND	6	0.07	4.36E-09	6.94E-06
C13 as Tridecane	209,012		209,012	0		0	411	ND	0	209,012	209.01	62548	93822	9.38E-05	41	J	41	0.48	2.87E-08	9.39E-05
n-Tetradecane	19,730		19,730	0		0	411	ND	0	19,730	19.73	5904	8856	8.86E-06	35	J	35	0.41	2.45E-08	8.88E-06
C14 as tetradecane	138,563		138,563	0		0	411	ND	0	138,563	138.56	41466	62198	6.22E-05	180		180	2.10	1.26E-07	6.23E-05
n-Pentadecane	15,482		15,482	0		0	413	ND	0	15,482	15.48	4633	6950	6.95E-06	18	J	18	0.21	1.23E-08	6.96E-06
C15 as Pentadecane	74,755		74,755	0		0	413	ND	0	74,755	74.76	22371	33556	3.36E-05	539		539	6.27	3.76E-07	3.39E-05
n-Hexadecane	7,500		7,500	0		0	411	ND	0	7,500	7.50	2244	3367	3.37E-06	134		134	1.55	9.32E-08	3.46E-06
C16 as Hexadecane	63,633		63,633	0		0	411	ND	0	63,633	63.63	19043	28564	2.86E-05	917		917	10.67	6.40E-07	2.92E-05
n-Heptadecane	6,512		6,512	0		0	406	ND	0	6,512	6.51	1949	2923	2.92E-06	346		346	4.03	2.42E-07	3.16E-06
C17 as Heptadecane	6,512		6,512	0		0	406	ND	0	6,512	6.51	1949	2923	2.92E-06	2,133		2,133	24.80	1.49E-06	4.41E-06
n-Octadecane	3,001		3,001	0		0	410	ND	0	3,001	3.00	898	1347	1.35E-06	223		223	2.59	1.55E-07	1.50E-06
C18 as Octodecane	18,890		18,890	0		0	410	ND	0	18,890	18.89	5653	8479	8.48E-06	2,821		2,821	32.80	1.97E-06	1.04E-05
n-Nonadecane	3,050		3,050	0		0	411	ND	0	3,050	3.05	913	1369	1.37E-06	220		220	2.56	1.54E-07	1.52E-06
C19 as Nonadecane	13,102		13,102	0		0	411	ND	0	13,102	13.10	3921	5881	5.88E-06	4,967		4,967	57.76	3.47E-06	9.35E-06
n-Eicosane	1,236	J	1,236	0		0	410	ND	0	1,236	1.24	370	555	5.55E-07	677		677	7.87	4.72E-07	1.03E-06
C20 as Eicosane	7,444		7,444	0		0	410	ND	0	7,444	7.44	2228	3341	3.34E-06	5,185		5,185	60.29	3.62E-06	6.96E-06
n-Heneicosane	780	J	780	0		0	414	ND	0	780	0.78	233	350	3.50E-07	959		959	11.16	6.69E-07	1.02E-06
C21 as Heneicosane	2,592		2,592	0		0	414	ND	0	2,592	2.59	776	1164	1.16E-06	4,388		4,388	51.02	3.06E-06	4.22E-06
n-Docosane	321	J	321	0		0	409	ND	0	321	0.32	96	144	1.44E-07	819		819	9.52	5.71E-07	7.15E-07
C22 as Docosane	760	J	760	0		0	409	ND	0	760	0.76	227	341	3.41E-07	3,034		3,034	35.28	2.12E-06	2.46E-06
n-Tricosane	163	ND	82	0		0	409	ND	0	82	0.08	24	37	3.66E-08	713		713	8.29	4.97E-07	5.34E-07
C23 as Tricosane	163	ND	82	0		0	409	ND	0	82	0.08	24	37	3.66E-08	2,427		2,427	28.22	1.69E-06	1.73E-06
n-Tetracosane	164	ND	82	0		0	412	ND	0	82	0.08	25	37	3.68E-08	442		442	5.14	3.08E-07	3.45E-07
C24 as Tetracosane	164	ND	82	0		0	412	ND	0	82	0.08	25	37	3.68E-08	4,806		4,806	55.88	3.35E-06	3.39E-06
Total Hydrocarbon	1,221,634		1,221,307			0			0		1221.31	365481	548,222	5.48E-04	36236.85		36,138	420	2.52E-05	5.73E-04

#A04B	ANALYTICAL RESULTS #A04B µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A0XXA µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	393	ND	197	0		0	920	ND	0	197	0.20	57	86	8.62E-08	12	ND	0	0	0.00E+00	8.62E-08
C5 as Pentane	4,288		4,288	0		0	920	ND	0	4,288	4.29	1252	1879	1.88E-06	12	ND	0	0	0.00E+00	1.88E-06
n-Hexane	1,963	J	1,963	0		0	973	ND	0	1,963	1.96	573	860	8.60E-07	12	ND	0	0	0.00E+00	8.60E-07
C6 as Hexane	7,510		7,510	0		0	973	ND	0	7,510	7.51	2194	3290	3.29E-06	12	ND	0	0	0.00E+00	3.29E-06
n-Heptane	2,098	J	2,098	0		0	1018	ND	0	2,098	2.10	613	919	9.19E-07	13	ND	0	0	0.00E+00	9.19E-07
C7 as Heptane	15,327		15,327	0		0	1018	ND	0	15,327	15.33	4477	6715	6.71E-06	13	ND	0	0	0.00E+00	6.71E-06
n-Octane	1,856	J	1,856	0		0	407	ND	0	1,856	1.86	542	813	8.13E-07	12	ND	0	0	0.00E+00	8.13E-07
C8 as Octane	7,030		7,030	0		0	407	ND	0	7,030	7.03	2053	3080	3.08E-06	12	ND	0	0	0.00E+00	3.08E-06
n-Nonane	1,806	J	1,806	0		0	410	ND	0	1,806	1.81	527	791	7.91E-07	12	ND	0	0	0.00E+00	7.91E-07
C9 as Nonane	52,225		52,225	0		0	410	ND	0	52,225	52.23	15254	22881	2.29E-05	12	ND	0	0	0.00E+00	2.29E-05
n-Decane	12,522		12,522	0		0	414	ND	0	12,522	12.52	3657	5486	5.49E-06	13	ND	0	0	0.00E+00	5.49E-06
C10 as Decane	136,079		136,079	0		0	414	ND	0	136,079	136.08	39745	59618	5.96E-05	13	ND	0	0	0.00E+00	5.96E-05
n-Undecane	18,905		18,905	0		0	413	ND	0	18,905	18.90	5522	8282	8.28E-06	13	ND	0	0	0.00E+00	8.28E-06
C11 as Undecane	234,702		234,702	0		0	413	ND	0	234,702	234.70	68551	102826	1.03E-04	13	ND	0	0	0.00E+00	1.03E-04
n-Dodecane	16,736		16,736	0		0	410	ND	0	16,736	16.74	4888	7332	7.33E-06	12	ND	0	0	0.00E+00	7.33E-06
C12 as Dodecane	275,170		275,170	0		0	410	ND	0	275,170	275.17	80370	120556	1.21E-04	16	J	16	0	1.03E-08	1.21E-04
n-Tridecane	21,016		21,016	0		0	411	ND	0	21,016	21.02	6138	9207	9.21E-06	12	ND	0	0	0.00E+00	9.21E-06
C13 as Tridecane	307,575		307,575	0		0	411	ND	0	307,575	307.57	89835	134752	1.35E-04	41	J	41	0	2.71E-08	1.35E-04
n-Tetradecane	5,743		5,743	0		0	411	ND	0	5,743	5.74	1678	2516	2.52E-06	35	J	35	0	2.31E-08	2.54E-06
C14 as tetradecane	230,940		230,940	0		0	411	ND	0	230,940	230.94	67452	101178	1.01E-04	180		180	2	1.19E-07	1.01E-04
n-Pentadecane	18,094		18,094	0		0	413	ND	0	18,094	18.09	5285	7927	7.93E-06	18	J	18	0	1.16E-08	7.94E-06
C15 as Pentadecane	106,917		106,917	0		0	413	ND	0	106,917	106.92	31228	46842	4.68E-05	539		539	6	3.56E-07	4.72E-05
n-Hexadecane	13,463		13,463	0		0	411	ND	0	13,463	13.46	3932	5898	5.90E-06	134		134	1	8.81E-08	5.99E-06
C16 as Hexadecane	96,221		96,221	0		0	411	ND	0	96,221	96.22	28104	42156	4.22E-05	917		917	10	6.05E-07	4.28E-05
n-Heptadecane	13,122		13,122	0		0	406	ND	0	13,122	13.12	3833	5749	5.75E-06	346		346	4	2.28E-07	5.98E-06
C17 as Heptadecane	414	ND	207	0		0	406	ND	0	207	0.21	61	91	9.08E-08	2,133		2,133	23	1.41E-06	1.50E-06
n-Octadecane	6,499		6,499	0		0	410	ND	0	6,499	6.50	1898	2847	2.85E-06	223		223	2	1.47E-07	2.99E-06
C18 as Octodecane	50,528		50,528	0		0	410	ND	0	50,528	50.53	14758	22137	2.21E-05	2,821		2,821	31	1.86E-06	2.40E-05
n-Nonadecane	5,800		5,800	0		0	411	ND	0	5,800	5.80	1694	2541	2.54E-06	220		220	2	1.45E-07	2.69E-06
C19 as Nonadecane	34,637		34,637	0		0	411	ND	0	34,637	34.64	10117	15175	1.52E-05	4,967		4,967	55	3.27E-06	1.84E-05
n-Eicosane	3,209	J	3,209	0		0	410	ND	0	3,209	3.21	937	1406	1.41E-06	677		677	7	4.46E-07	1.85E-06
C20 as Eicosane	20,061		20,061	0		0	410	ND	0	20,061	20.06	5859	8789	8.79E-06	5,185		5,185	57	3.42E-06	1.22E-05
n-Heneicosane	2,120	J	2,120	0		0	414	ND	0	2,120	2.12	619	929	9.29E-07	959		959	11	6.33E-07	1.56E-06
C21 as Heneicosane	8,102		8,102	0		0	414	ND	0	8,102	8.10	2366	3549	3.55E-06	4,388		4,388	48	2.89E-06	6.44E-06
n-Docosane	861	J	861	0		0	409	ND	0	861	0.86	251	377	3.77E-07	819		819	9	5.40E-07	9.17E-07
C22 as Docosane	2,235	J	2,235	0		0	409	ND	0	2,235	2.24	653	979	9.79E-07	3,034		3,034	33	2.00E-06	2.98E-06
n-Tricosane	418	ND	209	0		0	409	ND	0	209	0.21	61	92	9.15E-08	713		713	8	4.70E-07	5.61E-07
C23 as Tricosane	418	ND	209	0		0	409	ND	0	209	0.21	61	92	9.15E-08	2,427		2,427	27	1.60E-06	1.69E-06
n-Tetracosane	421	ND	210	0		0	412	ND	0	210	0.21	61	92	9.22E-08	442		442	5	2.91E-07	3.84E-07
C24 as Tetracosane	421	ND	210	0		0	412	ND	0	210	0.21	61	92	9.22E-08	4,806		4,806	53	3.17E-06	3.26E-06
Total Hydrocarbon	1,737,843		1,736,600			0			0		1736.60	519685	760,827	7.61E-04	36236.85		36,039	396	2.38E-05	7.85E-04

Bagging Data Form — Vacuum Method

Sample Id: A05 A/B

WSPA — Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	A-325	
Equipment Subtype:	Control			**Plant ID:**	Refinery A	
Line Size:	4	*inches*		**Date:**	23-Feb-17	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30.17 *inHg*	766.3	*mmHg*	**Sample Pump ID**	BU51791	
Ambient Temperature:	59.3 *°F*	15.2	*°C*	**TVA ID**	9509	
Stream Temperature:	*°F*	-17.8	*°C*	**Stream pressure:**		*psig*
Stream Description:	*LGO Product*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A05A

Time	Bagging Test Measurement Data										
13:43	Pre-Test M21	192	*ppmv*		Background		*ppmv*	Pre-Test $M21_{Corr}$	192	*ppmv*	
14:20	Volume Start	98.4	*Liters*								
14:03	DGM_{10L} Time	01:40.8	*min:sec.frac*	DGM Time	1.683	DGM Flow	5.94	$DGM\ Flow_{STP}$	5.86	*liters/minute*	
14:03	Vacuum check	0.005	*inches H2O*								
14:37	DGM_T	80	*°F*	26.7	*°C*	DGM_P	1.18	*inches H2O vacuum*	764.1	*mmHg*	
15:28	$Bag\ Conc_{ppm}$	49	*ppmv*								
15:00	Volume Stop	110.7	*Liters*	Total Vol	12.3	*Liters*					
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.308	*L/min*	$Sorbent\ Flow_{STP}$	0.303	*L/min*	
	$Sorbent\ Vol_{STP}$	12.14	*Liters*	$DGM\ Vol_{STP}$	234.51	*Liters*	$Total\ Run\ Vol_{STP}$	258.89	*Liters*		

A05B

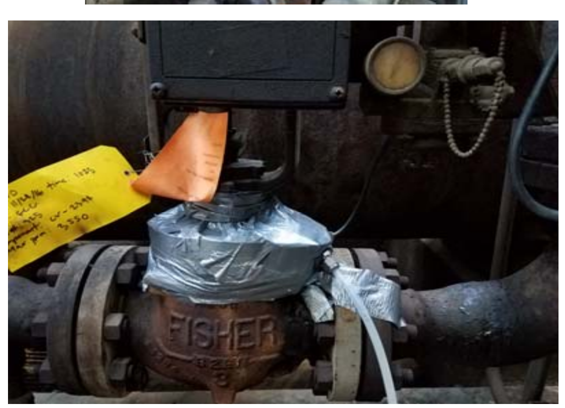
Time	Bagging Test Measurement Data										
15:07	Volume Start	110.7	*Liters*								
15:11	DGM_{10L} Time	01:33.3	*min:sec.frac*	DGM Time	1.550	DGM Flow	6.45	$DGM\ Flow_{STP}$	6.32	*liters/minute*	
15:11	Vacuum check	0.005	*inches H2O*								
15:29	DGM_T	84	*°F*	28.9	*°C*	DGM_P	1.18	*inches H2O vacuum*	764.1	*mmHg*	
15:40	$Bag\ Conc_{ppm}$	48	*ppmv*								
15:47	Volume Stop	123.3	*Liters*	Total Vol	12.6	*Liters*					
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.315	*L/min*	$Sorbent\ Flow_{STP}$	0.309	*L/min*	
	$Sorbent\ Vol_{STP}$	12.34	*Liters*	$DGM\ Vol_{STP}$	252.81	*Liters*	$Total\ Run\ Vol_{STP}$	265.15	*Liters*		

16:02	**Final Screening (ppmv) - equipment**	226	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time			Final time			0
Organic condensate collected		*ml*				
Density of organic condensate		*g/ml*				

Average THC emissions =	2.02E-04 kg/hr
Percent difference THC ER =	57%
Acceptable?	No

AVERAGE EMISSION RATES Component	Avg ER kg/hr
n-Pentane	5.17E-08
C5 as Pentane	3.10E-07
n-Hexane	5.37E-08
C6 as Hexane	2.32E-07
n-Heptane	1.09E-07
C7 as Heptane	4.98E-07
n-Octane	7.84E-08
C8 as Octane	3.15E-07
n-Nonane	1.03E-07
C9 as Nonane	2.28E-06
n-Decane	5.22E-07
C10 as Decane	8.94E-06
n-Undecane	6.32E-07
C11 as Undecane	1.90E-05
n-Dodecane	1.31E-06
C12 as Dodecane	2.12E-05
n-Tridecane	3.28E-06
C13 as Tridecane	4.05E-05
n-Tetradecane	4.90E-06
C14 as tetradecane	4.63E-05
n-Pentadecane	4.85E-06
C15 as Pentadecane	2.62E-05
n-Hexadecane	2.01E-06
C16 as Hexadecane	1.48E-05
n-Heptadecane	4.94E-07
C17 as Heptadecane	1.65E-06
n-Octadecane	1.09E-07
C18 as Octodecane	1.96E-07
n-Nonadecane	7.65E-08
C19 as Nonadecane	1.48E-07
n-Eicosane	5.51E-08
C20 as Eicosane	7.75E-08
n-Heneicosane	5.56E-08
C21 as Heneicosane	5.56E-08
n-Docosane	5.49E-08
C22 as Docosane	5.49E-08
n-Tricosane	5.49E-08
C23 as Tricosane	5.49E-08
n-Tetracosane	5.53E-08
C24 as Tetracosane	5.53E-08
Total Hydrocarbon	2.02E-04

THC:	1.07E-02	lbs/day	1.95E-03	tons/yr



#A05A Component	ANALYTICAL RESULTS #A05A $\mu g/m^3$	Flag	ND Adj $\mu g/m^3$	BACKGROUND #A0XXA $\mu g/m^3$	Flag	ND Adj $\mu g/m^3$	TRIP BLANK #A024A $\mu g/m^3$	Flag	ND Adj $\mu g/m^3$	ADJUSTED G/V CONCENTRATION $\mu g/m^3$	$\mu g/L$	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	152	ND	76	0		0	920	ND	0	76	0.08	20	30	2.96E-08			0	0	0.00E+00	2.96E-08
C5 as Pentane	204	J	204	0		0	920	ND	0	204	0.20	53	79	7.93E-08			0	0	0.00E+00	7.93E-08
n-Hexane	158	ND	79	0		0	973	ND	0	79	0.08	20	31	3.07E-08			0	0	0.00E+00	3.07E-08
C6 as Hexane	158	ND	79	0		0	973	ND	0	79	0.08	20	31	3.07E-08			0	0	0.00E+00	3.07E-08
n-Heptane	165	ND	83	0		0	1018	ND	0	83	0.08	21	32	3.21E-08			0	0	0.00E+00	3.21E-08
C7 as Heptane	568	J	568	0		0	1018	ND	0	568	0.57	147	221	2.21E-07			0	0	0.00E+00	2.21E-07
n-Octane	203	J	203	0		0	407	ND	0	203	0.20	52	79	7.86E-08			0	0	0.00E+00	7.86E-08
C8 as Octane	1,422	J	1,422	0		0	407	ND	0	1,422	1.42	368	552	5.52E-07			0	0	0.00E+00	5.52E-07
n-Nonane	329	J	329	0		0	410	ND	0	329	0.33	85	128	1.28E-07			0	0	0.00E+00	1.28E-07
C9 as Nonane	7,087		7,087	0		0	410	ND	0	7,087	7.09	1835	2752	2.75E-06			0	0	0.00E+00	2.75E-06
n-Decane	1,952		1,952	0		0	414	ND	0	1,952	1.95	505	758	7.58E-07			0	0	0.00E+00	7.58E-07
C10 as Decane	29,971		29,971	0		0	414	ND	0	29,971	29.97	7759	11639	1.16E-05			0	0	0.00E+00	1.16E-05
n-Undecane	765	J	765	0		0	413	ND	0	765	0.76	198	297	2.97E-07			0	0	0.00E+00	2.97E-07
C11 as Undecane	62,030		62,030	0		0	413	ND	0	62,030	62.03	16059	24088	2.41E-05			0	0	0.00E+00	2.41E-05
n-Dodecane	4,443		4,443	0		0	410	ND	0	4,443	4.44	1150	1725	1.73E-06			0	0	0.00E+00	1.73E-06
C12 as Dodecane	72,361		72,361	0		0	410	ND	0	72,361	72.36	18733	28100	2.81E-05			0	0	0.00E+00	2.81E-05
n-Tridecane	12,609		12,609	0		0	411	ND	0	12,609	12.61	3264	4896	4.90E-06			0	0	0.00E+00	4.90E-06
C13 as Tridecane	137,651		137,651	0		0	411	ND	0	137,651	137.65	35636	53454	5.35E-05			0	0	0.00E+00	5.35E-05
n-Tetradecane	23,059		23,059	0		0	411	ND	0	23,059	23.06	5970	8954	8.95E-06			0	0	0.00E+00	8.95E-06
C14 as tetradecane	151,359		151,359	0		0	411	ND	0	151,359	151.36	39185	58778	5.88E-05			0	0	0.00E+00	5.88E-05
n-Pentadecane	16,269		16,269	0		0	413	ND	0	16,269	16.27	4212	6318	6.32E-06			0	0	0.00E+00	6.32E-06
C15 as Pentadecane	84,447		84,447	0		0	413	ND	0	84,447	84.45	21862	32793	3.28E-05			0	0	0.00E+00	3.28E-05
n-Hexadecane	3,890		3,890	0		0	411	ND	0	3,890	3.89	1007	1511	1.51E-06			0	0	0.00E+00	1.51E-06
C16 as Hexadecane	43,134		43,134	0		0	411	ND	0	43,134	43.13	11167	16750	1.68E-05			0	0	0.00E+00	1.68E-05
n-Heptadecane	1,345	J	1,345	0		0	406	ND	0	1,345	1.34	348	522	5.22E-07			0	0	0.00E+00	5.22E-07
C17 as Heptadecane	8,291		8,291	0		0	406	ND	0	8,291	8.29	2147	3220	3.22E-06			0	0	0.00E+00	3.22E-06
n-Octadecane	359	J	359	0		0	410	ND	0	359	0.36	93	140	1.40E-07			0	0	0.00E+00	1.40E-07
C18 as Octodecane	804	J	804	0		0	410	ND	0	804	0.80	208	312	3.12E-07			0	0	0.00E+00	3.12E-07
n-Nonadecane	191	J	191	0		0	411	ND	0	191	0.19	49	74	7.42E-08			0	0	0.00E+00	7.42E-08
C19 as Nonadecane	558	J	558	0		0	411	ND	0	558	0.56	145	217	2.17E-07			0	0	0.00E+00	2.17E-07
n-Eicosane	162	ND	81	0		0	410	ND	0	81	0.08	21	31	3.15E-08			0	0	0.00E+00	3.15E-08
C20 as Eicosane	196	J	196	0		0	410	ND	0	196	0.20	51	76	7.63E-08			0	0	0.00E+00	7.63E-08
n-Heneicosane	164	ND	82	0		0	414	ND	0	82	0.08	21	32	3.18E-08			0	0	0.00E+00	3.18E-08
C21 as Heneicosane	164	ND	82	0		0	414	ND	0	82	0.08	21	32	3.18E-08			0	0	0.00E+00	3.18E-08
n-Docosane	162	ND	81	0		0	409	ND	0	81	0.08	21	31	3.14E-08			0	0	0.00E+00	3.14E-08
C22 as Docosane	162	ND	81	0		0	409	ND	0	81	0.08	21	31	3.14E-08			0	0	0.00E+00	3.14E-08
n-Tricosane	162	ND	81	0		0	409	ND	0	81	0.08	21	31	3.14E-08			0	0	0.00E+00	3.14E-08
C23 as Tricosane	162	ND	81	0		0	409	ND	0	81	0.08	21	31	3.14E-08			0	0	0.00E+00	3.14E-08
n-Tetracosane	163	ND	81	0		0	412	ND	0	81	0.08	21	32	3.16E-08			0	0	0.00E+00	3.16E-08
C24 as Tetracosane	163	ND	81	0		0	412	ND	0	81	0.08	21	32	3.16E-08			0	0	0.00E+00	3.16E-08
Total Hydrocarbon	667,595		666,547			0			0		666.55	172561	258,842	2.59E-04	0		0	0	0.00E+00	2.59E-04

#A05B Component	ANALYTICAL RESULTS #A05B $\mu g/m^3$	Flag	ND Adj $\mu g/m^3$	BACKGROUND #A0XXA $\mu g/m^3$	Flag	ND Adj $\mu g/m^3$	TRIP BLANK #A024A $\mu g/m^3$	Flag	ND Adj $\mu g/m^3$	ADJUSTED G/V CONCENTRATION $\mu g/m^3$	$\mu g/L$	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	372	ND	186	0		0	920	ND	0	186	0.19	49	74	7.39E-08			0	0	0.00E+00	7.39E-08
C5 as Pentane	1,360	J	1,360	0		0	920	ND	0	1,360	1.36	361	541	5.41E-07			0	0	0.00E+00	5.41E-07
n-Hexane	386	ND	193	0		0	973	ND	0	193	0.19	51	77	7.68E-08			0	0	0.00E+00	7.68E-08
C6 as Hexane	1,088	J	1,088	0		0	973	ND	0	1,088	1.09	289	433	4.33E-07			0	0	0.00E+00	4.33E-07
n-Heptane	470	J	470	0		0	1018	ND	0	470	0.47	125	187	1.87E-07			0	0	0.00E+00	1.87E-07
C7 as Heptane	1,948	J	1,948	0		0	1018	ND	0	1,948	1.95	517	775	7.75E-07			0	0	0.00E+00	7.75E-07
n-Octane	393	ND	196	0		0	407	ND	0	196	0.20	52	78	7.81E-08			0	0	0.00E+00	7.81E-08
C8 as Octane	393	ND	196	0		0	407	ND	0	196	0.20	52	78	7.81E-08			0	0	0.00E+00	7.81E-08
n-Nonane	396	ND	198	0		0	410	ND	0	198	0.20	52	79	7.87E-08			0	0	0.00E+00	7.87E-08
C9 as Nonane	4,552		4,552	0		0	410	ND	0	4,552	4.55	1207	1810	1.81E-06			0	0	0.00E+00	1.81E-06
n-Decane	718	J	718	0		0	414	ND	0	718	0.72	190	286	2.86E-07			0	0	0.00E+00	2.86E-07
C10 as Decane	15,670		15,670	0		0	414	ND	0	15,670	15.67	4155	6233	6.23E-06			0	0	0.00E+00	6.23E-06
n-Undecane	2,434	J	2,434	0		0	413	ND	0	2,434	2.43	645	968	9.68E-07			0	0	0.00E+00	9.68E-07
C11 as Undecane	35,152		35,152	0		0	413	ND	0	35,152	35.15	9321	13981	1.40E-05			0	0	0.00E+00	1.40E-05
n-Dodecane	2,239	J	2,239	0		0	410	ND	0	2,239	2.24	594	890	8.90E-07			0	0	0.00E+00	8.90E-07
C12 as Dodecane	35,998		35,998	0		0	410	ND	0	35,998	36.00	9545	14318	1.43E-05			0	0	0.00E+00	1.43E-05
n-Tridecane	4,169		4,169	0		0	411	ND	0	4,169	4.17	1106	1658	1.66E-06			0	0	0.00E+00	1.66E-06
C13 as Tridecane	69,363		69,363	0		0	411	ND	0	69,363	69.36	18392	27588	2.76E-05			0	0	0.00E+00	2.76E-05
n-Tetradecane	2,103	J	2,103	0		0	411	ND	0	2,103	2.10	558	837	8.37E-07			0	0	0.00E+00	8.37E-07
C14 as tetradecane	84,933		84,933	0		0	411	ND	0	84,933	84.93	22520	33780	3.38E-05			0	0	0.00E+00	3.38E-05
n-Pentadecane	8,516		8,516	0		0	413	ND	0	8,516	8.52	2258	3387	3.39E-06			0	0	0.00E+00	3.39E-06
C15 as Pentadecane	49,252		49,252	0		0	413	ND	0	49,252	49.25	13059	19589	1.96E-05			0	0	0.00E+00	1.96E-05
n-Hexadecane	6,315		6,315	0		0	411	ND	0	6,315	6.32	1674	2512	2.51E-06			0	0	0.00E+00	2.51E-06
C16 as Hexadecane	32,089		32,089	0		0	411	ND	0	32,089	32.09	8508	12763	1.28E-05			0	0	0.00E+00	1.28E-05
n-Heptadecane	1,169	J	1,169	0		0	406	ND	0	1,169	1.17	310	465	4.65E-07			0	0	0.00E+00	4.65E-07
C17 as Heptadecane	391	ND	196	0		0	406	ND	0	196	0.20	52	78	7.78E-08			0	0	0.00E+00	7.78E-08
n-Octadecane	396	ND	198	0		0	410	ND	0	198	0.20	52	79	7.87E-08			0	0	0.00E+00	7.87E-08
C18 as Octodecane	396	ND	198	0		0	410	ND	0	198	0.20	52	79	7.87E-08			0	0	0.00E+00	7.87E-08
n-Nonadecane	396	ND	198	0		0	411	ND	0	198	0.20	53	79	7.88E-08			0	0	0.00E+00	7.88E-08
C19 as Nonadecane	396	ND	198	0		0	411	ND	0	198	0.20	53	79	7.88E-08			0	0	0.00E+00	7.88E-08
n-Eicosane	395	ND	198	0		0	410	ND	0	198	0.20	52	79	7.86E-08			0	0	0.00E+00	7.86E-08
C20 as Eicosane	395	ND	198	0		0	410	ND	0	198	0.20	52	79	7.86E-08			0	0	0.00E+00	7.86E-08
n-Heneicosane	399	ND	200	0		0	414	ND	0	200	0.20	53	79	7.94E-08			0	0	0.00E+00	7.94E-08
C21 as Heneicosane	399	ND	200	0		0	414	ND	0	200	0.20	53	79	7.94E-08			0	0	0.00E+00	7.94E-08
n-Docosane	395	ND	197	0		0	409	ND	0	197	0.20	52	78	7.85E-08			0	0	0.00E+00	7.85E-08
C22 as Docosane	395	ND	197	0		0	409	ND	0	197	0.20	52	78	7.85E-08			0	0	0.00E+00	7.85E-08
n-Tricosane	395	ND	197	0		0	409	ND	0	197	0.20	52	78	7.85E-08			0	0	0.00E+00	7.85E-08
C23 as Tricosane	395	ND	197	0		0	409	ND	0	197	0.20	52	78	7.85E-08			0	0	0.00E+00	7.85E-08
n-Tetracosane	397	ND	199	0		0	412	ND	0	199	0.20	53	79	7.90E-08			0	0	0.00E+00	7.90E-08
C24 as Tetracosane	397	ND	199	0		0	412	ND	0	199	0.20	53	79	7.90E-08			0	0	0.00E+00	7.90E-08
Total Hydrocarbon	367,414		363,475			0			0		363.48	94099	144,565	1.45E-04	0		0	0	0.00E+00	1.45E-04

Bagging Data Form — Vacuum Method

Sample Id: A06 A/B

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	A-1259	
Equipment Subtype:	Gate		**Plant ID:**	Refinery A	
Line Size:	6 *inches*		**Date:**	24-Feb-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.2 *inHg*	767.1 *mmHg*	**Sample Pump ID**	BU51791	
Ambient Temperature:	52.6 °*F*	11.4 °*C*	**TVA ID**	9509	
Stream Temperature:	°*F*	-17.8 °*C*	**Stream pressure:**	*psig*	
Stream Description:	*Diesel*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A06A

Time	Bagging Test Measurement Data									
9:36	Pre-Test M21	193	*ppmv*		Background		*ppmv*	Pre-Test M21$_{Corr}$	193	*ppmv*
10:16	Volume Start	123.3	*Liters*							
10:05	DGM$_{10L}$ Time	01:23.9	*min:sec.frac*	DGM Time	1.400	DGM Flow	7.14	DGM Flow$_{STP}$	7.34	*liters/minute*
10:05	Vacuum check	0.015	*inches H2O*							
10:47	DGM$_T$	58	°*F*	14.4	°*C*	DGM$_P$	2.3	*inches H2O vacuum*	762.8	*mmHg*
10:48	Bag Conc$_{ppm}$	17	*ppmv*							
10:57	Volume Stop	135.7	*Liters*	Total Vol	12.4	*Liters*				
	Sorbent Run Time	41	*Minutes*		Sorbent Flow	0.302	*L/min*	Sorbent Flow$_{STP}$	0.311	*L/min*
	Sorbent Vol$_{STP}$	12.74	*Liters*	DGM Vol$_{STP}$	300.79	*Liters*	Total Run Vol$_{STP}$	326.26	*Liters*	

A06B

Time	Bagging Test Measurement Data									
11:02	Volume Start	135.7	*Liters*							
11:04	DGM$_{10L}$ Time	01:21.1	*min:sec.frac*	DGM Time	1.350	DGM Flow	7.41	DGM Flow$_{STP}$	7.61	*liters/minute*
11:04	Vacuum check	0.015	*inches H2O*							
11:26	DGM$_T$	58	°*F*	14.4	°*C*	DGM$_P$	2.1	*inches H2O vacuum*	763.2	*mmHg*
11:40	Bag Conc$_{ppm}$	18	*ppmv*							
11:42	Volume Stop	148.0	*Liters*	Total Vol	12.3	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.308	*L/min*	Sorbent Flow$_{STP}$	0.316	*L/min*
	Sorbent Vol$_{STP}$	12.64	*Liters*	DGM Vol$_{STP}$	304.47	*Liters*	Total Run Vol$_{STP}$	317.11	*Liters*	

12:25	**Final Screening (ppmv) - equipment**	130	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time		Final time			0	
Organic condensate collected	*ml*					
Density of organic condensate	*g/ml*					

Average THC emissions =	6.43E-05 kg/hr
Percent difference THC ER =	5%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	6.33E-08
C5 as Pentane	0.00E+00
n-Hexane	1.93E-07
C6 as Hexane	7.88E-08
n-Heptane	6.87E-08
C7 as Heptane	6.71E-07
n-Octane	2.64E-07
C8 as Octane	1.16E-06
n-Nonane	9.32E-07
C9 as Nonane	6.23E-06
n-Decane	3.47E-06
C10 as Decane	2.05E-05
n-Undecane	2.40E-06
C11 as Undecane	1.43E-05
n-Dodecane	5.79E-07
C12 as Dodecane	5.58E-06
n-Tridecane	3.69E-07
C13 as Tridecane	1.74E-06
n-Tetradecane	4.66E-07
C14 as tetradecane	1.37E-06
n-Pentadecane	2.11E-07
C15 as Pentadecane	1.37E-06
n-Hexadecane	1.34E-07
C16 as Hexadecane	8.59E-07
n-Heptadecane	1.52E-07
C17 as Heptadecane	2.71E-07
n-Octadecane	6.75E-08
C18 as Octodecane	6.75E-08
n-Nonadecane	6.75E-08
C19 as Nonadecane	6.75E-08
n-Eicosane	6.71E-08
C20 as Eicosane	6.72E-08
n-Heneicosane	6.78E-08
C21 as Heneicosane	0.00E+00
n-Docosane	6.73E-08
C22 as Docosane	6.73E-08
n-Tricosane	6.73E-08
C23 as Tricosane	6.73E-08
n-Tetracosane	6.78E-08
C24 as Tetracosane	6.78E-08
Total Hydrocarbon	6.43E-05

THC:	**3.40E-03**	**lbs/day**	**6.21E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A06A	#A06A		ND Adj	#A010A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	151	ND	76	393	ND	0	920	ND	0	76	0.08	25	36	3.60E-08			0	0	0.00E+00	3.60E-08
C5 as Pentane	151	ND	76	1703	J	1,703	920	ND	0	-1,627	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	614	J	614	409	ND	0	973	ND	0	614	0.61	200	293	2.93E-07			0	0	0.00E+00	2.93E-07
C6 as Hexane	133	J	133	409	ND	0	973	ND	0	133	0.13	43	64	6.35E-08			0	0	0.00E+00	6.35E-08
n-Heptane	164	ND	82	427	ND	0	1018	ND	0	82	0.08	27	39	3.91E-08			0	0	0.00E+00	3.91E-08
C7 as Heptane	2056	J	2,056	638	J	638	1018	ND	0	1,419	1.42	463	677	6.77E-07			0	0	0.00E+00	6.77E-07
n-Octane	619	J	619	416	ND	0	407	ND	0	619	0.62	202	296	2.96E-07			0	0	0.00E+00	2.96E-07
C8 as Octane	3504		3,504	416	ND	0	407	ND	0	3,504	3.50	1143	1673	1.67E-06			0	0	0.00E+00	1.67E-06
n-Nonane	1887		1,887	419	ND	0	410	ND	0	1,887	1.89	616	901	9.01E-07			0	0	0.00E+00	9.01E-07
C9 as Nonane	16491		16,491	419	ND	0	410	ND	0	16,491	16.49	5380	7874	7.87E-06			0	0	0.00E+00	7.87E-06
n-Decane	6491		6,491	423	ND	0	414	ND	0	6,491	6.49	2118	3099	3.10E-06			0	0	0.00E+00	3.10E-06
C10 as Decane	42632		42,632	423	ND	0	414	ND	0	42,632	42.63	13909	20355	2.04E-05			0	0	0.00E+00	2.04E-05
n-Undecane	4256		4,256	422	ND	0	413	ND	0	4,256	4.26	1388	2032	2.03E-06			0	0	0.00E+00	2.03E-06
C11 as Undecane	21266		21,266	790	J	790	413	ND	0	20,476	20.48	6681	9776	9.78E-06			0	0	0.00E+00	9.78E-06
n-Dodecane	1395	J	1,395	419	ND	0	410	ND	0	1,395	1.39	455	666	6.66E-07			0	0	0.00E+00	6.66E-07
C12 as Dodecane	9278		9,278	419	ND	0	410	ND	0	9,278	9.28	3027	4430	4.43E-06			0	0	0.00E+00	4.43E-06
n-Tridecane	806	J	806	420	ND	0	411	ND	0	806	0.81	263	385	3.85E-07			0	0	0.00E+00	3.85E-07
C13 as Tridecane	4990		4,990	1043	J	1,043	411	ND	0	3,947	3.95	1288	1884	1.88E-06			0	0	0.00E+00	1.88E-06
n-Tetradecane	1262	J	1,262	419	ND	0	411	ND	0	1,262	1.26	412	602	6.02E-07			0	0	0.00E+00	6.02E-07
C14 as tetradecane	6231		6,231	1292	J	1,292	411	ND	0	4,939	4.94	1611	2358	2.36E-06			0	0	0.00E+00	2.36E-06
n-Pentadecane	1226	J	1,226	521	J	521	413	ND	0	705	0.71	230	337	3.37E-07			0	0	0.00E+00	3.37E-07
C15 as Pentadecane	8001		8,001	2267	J	2,267	413	ND	0	5,735	5.73	1871	2738	2.74E-06			0	0	0.00E+00	2.74E-06
n-Hexadecane	764	J	764	575	J	575	411	ND	0	189	0.19	62	90	9.02E-08			0	0	0.00E+00	9.02E-08
C16 as Hexadecane	3363		3,363	1427	J	1,427	411	ND	0	1,935	1.94	631	924	9.24E-07			0	0	0.00E+00	9.24E-07
n-Heptadecane	235	J	235	414	ND	0	406	ND	0	235	0.24	77	112	1.12E-07			0	0	0.00E+00	1.12E-07
C17 as Heptadecane	937	J	937	414	ND	0	406	ND	0	937	0.94	306	448	4.48E-07			0	0	0.00E+00	4.48E-07
n-Octadecane	162	ND	81	419	ND	0	410	ND	0	81	0.08	26	39	3.86E-08			0	0	0.00E+00	3.86E-08
C18 as Octodecane	162	ND	81	419	ND	0	410	ND	0	81	0.08	26	39	3.86E-08			0	0	0.00E+00	3.86E-08
n-Nonadecane	161	ND	81	420	ND	0	411	ND	0	81	0.08	26	38	3.85E-08			0	0	0.00E+00	3.85E-08
C19 as Nonadecane	161	ND	80	420	ND	0	411	ND	0	80	0.08	26	38	3.84E-08			0	0	0.00E+00	3.84E-08
n-Eicosane	155	ND	78	419	ND	0	410	ND	0	78	0.08	25	37	3.71E-08			0	0	0.00E+00	3.71E-08
C20 as Eicosane	159	ND	80	419	ND	0	410	ND	0	80	0.08	26	38	3.80E-08			0	0	0.00E+00	3.80E-08
n-Heneicosane	161	ND	80	423	ND	0	414	ND	0	80	0.08	26	38	3.84E-08			0	0	0.00E+00	3.84E-08
C21 as Heneicosane	161	ND	80	424	J	424	414	ND	0	-344	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	161	ND	81	418	ND	0	409	ND	0	81	0.08	26	38	3.85E-08			0	0	0.00E+00	3.85E-08
C22 as Docosane	161	ND	81	418	ND	0	409	ND	0	81	0.08	26	38	3.85E-08			0	0	0.00E+00	3.85E-08
n-Tricosane	161	ND	80	418	ND	0	409	ND	0	80	0.08	26	38	3.84E-08			0	0	0.00E+00	3.84E-08
C23 as Tricosane	161	ND	80	418	ND	0	409	ND	0	80	0.08	26	38	3.84E-08			0	0	0.00E+00	3.84E-08
n-Tetracosane	162	ND	81	421	ND	0	412	ND	0	81	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
C24 as Tetracosane	162	ND	81	421	ND	0	412	ND	0	81	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
Total Hydrocarbon			139,794			10,680			0		131.09	42769	62,588	6.26E-05	0		0	0	0.00E+00	6.26E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A06B	#A06B		ND Adj	#A010A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	381	ND	190	393	ND	0	920	ND	0	190	0.19	60	91	9.05E-08			0	0	0.00E+00	9.05E-08
C5 as Pentane	381	ND	190	1703	J	1,703	920	ND	0	-1,513	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	395	ND	198	409	ND	0	973	ND	0	198	0.20	63	94	9.40E-08			0	0	0.00E+00	9.40E-08
C6 as Hexane	395	ND	198	409	ND	0	973	ND	0	198	0.20	63	94	9.40E-08			0	0	0.00E+00	9.40E-08
n-Heptane	413	ND	207	427	ND	0	1018	ND	0	207	0.21	66	98	9.83E-08			0	0	0.00E+00	9.83E-08
C7 as Heptane	2034	J	2,034	638	J	638	1018	ND	0	1,396	1.40	443	664	6.64E-07			0	0	0.00E+00	6.64E-07
n-Octane	488	J	488	416	ND	0	407	ND	0	488	0.49	155	232	2.32E-07			0	0	0.00E+00	2.32E-07
C8 as Octane	1378	J	1,378	416	ND	0	407	ND	0	1,378	1.38	437	655	6.55E-07			0	0	0.00E+00	6.55E-07
n-Nonane	2025	J	2,025	419	ND	0	410	ND	0	2,025	2.03	642	963	9.63E-07			0	0	0.00E+00	9.63E-07
C9 as Nonane	9636		9,636	419	ND	0	410	ND	0	9,636	9.64	3055	4583	4.58E-06			0	0	0.00E+00	4.58E-06
n-Decane	8093		8,093	423	ND	0	414	ND	0	8,093	8.09	2566	3849	3.85E-06			0	0	0.00E+00	3.85E-06
C10 as Decane	43570		43,570	423	ND	0	414	ND	0	43,570	43.57	13816	20724	2.07E-05			0	0	0.00E+00	2.07E-05
n-Undecane	5834		5,834	422	ND	0	413	ND	0	5,834	5.83	1850	2775	2.77E-06			0	0	0.00E+00	2.77E-06
C11 as Undecane	40276		40,276	790	J	790	413	ND	0	39,486	39.49	12521	18782	1.88E-05			0	0	0.00E+00	1.88E-05
n-Dodecane	1033	J	1,033	419	ND	0	410	ND	0	1,033	1.03	328	492	4.92E-07			0	0	0.00E+00	4.92E-07
C12 as Dodecane	14158		14,158	419	ND	0	410	ND	0	14,158	14.16	4490	6734	6.73E-06			0	0	0.00E+00	6.73E-06
n-Tridecane	744	J	744	420	ND	0	411	ND	0	744	0.74	236	354	3.54E-07			0	0	0.00E+00	3.54E-07
C13 as Tridecane	4406		4,406	1043	J	1,043	411	ND	0	3,362	3.36	1066	1599	1.60E-06			0	0	0.00E+00	1.60E-06
n-Tetradecane	694	J	694	419	ND	0	411	ND	0	694	0.69	220	330	3.30E-07			0	0	0.00E+00	3.30E-07
C14 as tetradecane	2077	J	2,077	1292	J	1,292	411	ND	0	784	0.78	249	373	3.73E-07			0	0	0.00E+00	3.73E-07
n-Pentadecane	700	J	700	521	J	521	413	ND	0	179	0.18	57	85	8.53E-08			0	0	0.00E+00	8.53E-08
C15 as Pentadecane	2035	J	2,035	2267	J	2,267	413	ND	0	-232	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	949	J	949	575	J	575	411	ND	0	374	0.37	119	178	1.78E-07			0	0	0.00E+00	1.78E-07
C16 as Hexadecane	3096	J	3,096	1427	J	1,427	411	ND	0	1,668	1.67	529	794	7.94E-07			0	0	0.00E+00	7.94E-07
n-Heptadecane	404	J	404	414	ND	0	406	ND	0	404	0.40	128	192	1.92E-07			0	0	0.00E+00	1.92E-07
C17 as Heptadecane	401	ND	200	414	ND	0	406	ND	0	200	0.20	64	95	9.53E-08			0	0	0.00E+00	9.53E-08
n-Octadecane	405	ND	203	419	ND	0	410	ND	0	203	0.20	64	96	9.64E-08			0	0	0.00E+00	9.64E-08
C18 as Octodecane	405	ND	203	419	ND	0	410	ND	0	203	0.20	64	96	9.64E-08			0	0	0.00E+00	9.64E-08
n-Nonadecane	406	ND	203	420	ND	0	411	ND	0	203	0.20	64	97	9.66E-08			0	0	0.00E+00	9.66E-08
C19 as Nonadecane	406	ND	203	420	ND	0	411	ND	0	203	0.20	64	97	9.66E-08			0	0	0.00E+00	9.66E-08
n-Eicosane	408	ND	204	419	ND	0	410	ND	0	204	0.20	65	97	9.71E-08			0	0	0.00E+00	9.71E-08
C20 as Eicosane	405	ND	203	419	ND	0	410	ND	0	203	0.20	64	96	9.64E-08			0	0	0.00E+00	9.64E-08
n-Heneicosane	409	ND	204	423	ND	0	414	ND	0	204	0.20	65	97	9.73E-08			0	0	0.00E+00	9.73E-08
C21 as Heneicosane	409	ND	204	424	J	424	414	ND	0	-220	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	404	ND	202	418	ND	0	409	ND	0	202	0.20	64	96	9.62E-08			0	0	0.00E+00	9.62E-08
C22 as Docosane	404	ND	202	418	ND	0	409	ND	0	202	0.20	64	96	9.62E-08			0	0	0.00E+00	9.62E-08
n-Tricosane	404	ND	202	418	ND	0	409	ND	0	202	0.20	64	96	9.62E-08			0	0	0.00E+00	9.62E-08
C23 as Tricosane	404	ND	202	418	ND	0	409	ND	0	202	0.20	64	96	9.62E-08			0	0	0.00E+00	9.62E-08
n-Tetracosane	407	ND	204	421	ND	0	412	ND	0	204	0.20	65	97	9.68E-08			0	0	0.00E+00	9.68E-08
C24 as Tetracosane	407	ND	204	421	ND	0	412	ND	0	204	0.20	65	97	9.68E-08			0	0	0.00E+00	9.68E-08
Total Hydrocarbon			147,655			10,680			0		138.94	45331	66,088	6.61E-05	0		0	0	0.00E+00	6.61E-05

Bagging Data Form **Vacuum Method** **Sample Id** A07 A/B

Equipment type:	Valve		**Component ID:**	1245	
Equipment Subtype:	Gate		**Plant ID:**	Refinery A	
Line Size:	6 *inches*		**Date:**	24-Feb-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.19 *inHg*	766.8 *mmHg*	**Sample Pump ID**	BU51791	
Ambient Temperature:	53.5 *°F*	11.9 *°C*	**TVA ID**	9509	
Stream Temperature:	*°F*	-17.8 *°C*	**Stream pressure:**	*psig*	
Stream Description:	*Diesel*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A07A

Time	Bagging Test Measurement Data								
12:00	Pre-Test M21	980	*ppmv*	Background		*ppmv*	Pre-Test $M21_{Corr}$	980	*ppmv*
12:27	Volume Start	148.0	*Liters*						
12:39	DGM_{10L} Time	01:33.4	*min:sec.frac*	DGM Time	1.550	DGM Flow	6.45	$DGM\ Flow_{STP}$	6.59 *liters/minute*
12:39	Vacuum check	0.1	*inches H2O*						
12:49	DGM_T	61	*°F*	16.1	°C	DGM_P	2 *inches H2O vacuum*	763.1	*mmHg*
12:56	$Bag\ Conc_{ppm}$	135	*ppmv*						
13:07	Volume Stop	160.7	*Liters*	Total Vol	12.7	*Liters*			
	Sorbent Run Time	40	*Minutes*	Sorbent Flow	0.317	*L/min*	$Sorbent\ Flow_{STP}$	0.324	*L/min*
	$Sorbent\ Vol_{STP}$	12.97	*Liters*	$DGM\ Vol_{STP}$	263.63	*Liters*	$Total\ Run\ Vol_{STP}$	289.48	*Liters*

A07B

Time	Bagging Test Measurement Data								
13:14	Volume Start	160.7	*Liters*						
13:17	DGM_{10L} Time	01:27.9	*min:sec.frac*	DGM Time	1.467	DGM Flow	6.82	$DGM\ Flow_{STP}$	6.97 *liters/minute*
13:17	Vacuum check	0.07	*inches H2O*						
13:29	DGM_T	61	*°F*	16.1	°C	DGM_P	1.9 *inches H2O vacuum*	763.3	*mmHg*
13:45	$Bag\ Conc_{ppm}$	115	*ppmv*						
13:54	Volume Stop	172.9	*Liters*	Total Vol	12.2	*Liters*			
	Sorbent Run Time	40	*Minutes*	Sorbent Flow	0.305	*L/min*	$Sorbent\ Flow_{STP}$	0.312	*L/min*
	$Sorbent\ Vol_{STP}$	12.47	*Liters*	$DGM\ Vol_{STP}$	278.68	*Liters*	$Total\ Run\ Vol_{STP}$	291.14	*Liters*

14:44	**Final Screening (ppmv) - equipment**	552	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time			Final time		0	
Organic condensate collected		*ml*				
Density of organic condensate		*g/ml*				

Average THC emissions =	1.75E-03	kg/hr
Percent difference THC ER =	5%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.25E-07
C5 as Pentane	0.00E+00
n-Hexane	4.58E-07
C6 as Hexane	6.14E-07
n-Heptane	3.58E-07
C7 as Heptane	2.21E-06
n-Octane	1.14E-06
C8 as Octane	7.40E-06
n-Nonane	4.55E-06
C9 as Nonane	5.70E-05
n-Decane	4.23E-05
C10 as Decane	3.21E-04
n-Undecane	7.62E-05
C11 as Undecane	3.84E-04
n-Dodecane	5.57E-05
C12 as Dodecane	3.49E-04
n-Tridecane	4.15E-05
C13 as Tridecane	1.85E-04
n-Tetradecane	1.91E-05
C14 as tetradecane	1.09E-04
n-Pentadecane	9.76E-06
C15 as Pentadecane	4.96E-05
n-Hexadecane	3.97E-06
C16 as Hexadecane	1.97E-05
n-Heptadecane	2.65E-06
C17 as Heptadecane	2.26E-06
n-Octadecane	1.13E-06
C18 as Octodecane	1.85E-06
n-Nonadecane	1.15E-06
C19 as Nonadecane	3.58E-07
n-Eicosane	7.48E-07
C20 as Eicosane	1.05E-07
n-Heneicosane	5.72E-07
C21 as Heneicosane	3.84E-07
n-Docosane	2.30E-07
C22 as Docosane	7.08E-08
n-Tricosane	1.74E-07
C23 as Tricosane	1.30E-07
n-Tetracosane	1.76E-07
C24 as Tetracosane	1.31E-07
Total Hydrocarbon	1.75E-03

THC: 9.27E-02 lbs/day 1.69E-02 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
#A07A	#A07A		ND Adj	#A010A		ND Adj	#A024A		ND Adj											
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	382	J	382	393	ND	0	920	ND	0	382	0.38	111	166	1.66E-07			0	0	0.00E+00	1.66E-07
C5 as Pentane	757	J	757	1703	J	1,703	920	ND	0	-946	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	1314	J	1,314	409	ND	0	973	ND	0	1,314	1.31	380	571	5.71E-07			0	0	0.00E+00	5.71E-07
C6 as Hexane	2629		2,629	409	ND	0	973	ND	0	2,629	2.63	761	1142	1.14E-06			0	0	0.00E+00	1.14E-06
n-Heptane	1440		1,440	427	ND	0	1018	ND	0	1,440	1.44	417	625	6.25E-07			0	0	0.00E+00	6.25E-07
C7 as Heptane	8554		8,554	638	J	638	1018	ND	0	7,916	7.92	2291	3437	3.44E-06			0	0	0.00E+00	3.44E-06
n-Octane	3490		3,490	416	ND	0	407	ND	0	3,490	3.49	1010	1515	1.52E-06			0	0	0.00E+00	1.52E-06
C8 as Octane	21192		21,192	416	ND	0	407	ND	0	21,192	21.19	6134	9202	9.20E-06			0	0	0.00E+00	9.20E-06
n-Nonane	12167		12,167	419	ND	0	410	ND	0	12,167	12.17	3522	5283	5.28E-06			0	0	0.00E+00	5.28E-06
C9 as Nonane	148863		148,863	419	ND	0	410	ND	0	148,863	148.86	43092	64638	6.46E-05			0	0	0.00E+00	6.46E-05
n-Decane	105095		105,095	423	ND	0	414	ND	0	105,095	105.10	30423	45634	4.56E-05			0	0	0.00E+00	4.56E-05
C10 as Decane	785707		785,707	423	ND	0	414	ND	0	785,707	785.71	227443	341164	3.41E-04			0	0	0.00E+00	3.41E-04
n-Undecane	178092		178,092	422	ND	0	413	ND	0	178,092	178.09	51553	77330	7.73E-05			0	0	0.00E+00	7.73E-05
C11 as Undecane	891498		891,498	790	J	790	413	ND	0	890,708	890.71	257838	386757	3.87E-04			0	0	0.00E+00	3.87E-04
n-Dodecane	124889		124,889	419	ND	0	410	ND	0	124,889	124.89	36152	54228	5.42E-05			0	0	0.00E+00	5.42E-05
C12 as Dodecane	771733		771,733	419	ND	0	410	ND	0	771,733	771.73	223398	335096	3.35E-04			0	0	0.00E+00	3.35E-04
n-Tridecane	87687		87,687	420	ND	0	411	ND	0	87,687	87.69	25383	38075	3.81E-05			0	0	0.00E+00	3.81E-05
C13 as Tridecane	383946		383,946	1043	J	1,043	411	ND	0	382,903	382.90	110841	166261	1.66E-04			0	0	0.00E+00	1.66E-04
n-Tetradecane	38875		38,875	419	ND	0	411	ND	0	38,875	38.88	11253	16880	1.69E-05			0	0	0.00E+00	1.69E-05
C14 as tetradecane	207045		207,045	1292	J	1,292	411	ND	0	205,753	205.75	59560	89340	8.93E-05			0	0	0.00E+00	8.93E-05
n-Pentadecane	18811		18,811	521	J	521	413	ND	0	18,290	18.29	5294	7942	7.94E-06			0	0	0.00E+00	7.94E-06
C15 as Pentadecane	83590		83,590	2267	J	2,267	413	ND	0	81,323	81.32	23541	35311	3.53E-05			0	0	0.00E+00	3.53E-05
n-Hexadecane	7596		7,596	575	J	575	411	ND	0	7,022	7.02	2033	3049	3.05E-06			0	0	0.00E+00	3.05E-06
C16 as Hexadecane	25720		25,720	1427	J	1,427	411	ND	0	24,293	24.29	7032	10548	1.05E-05			0	0	0.00E+00	1.05E-05
n-Heptadecane	4619		4,619	414	ND	0	406	ND	0	4,619	4.62	1337	2006	2.01E-06			0	0	0.00E+00	2.01E-06
C17 as Heptadecane	10217		10,217	414	ND	0	406	ND	0	10,217	10.22	2958	4436	4.44E-06			0	0	0.00E+00	4.44E-06
n-Octadecane	2634	J	2,634	419	ND	0	410	ND	0	2,634	2.63	762	1144	1.14E-06			0	0	0.00E+00	1.14E-06
C18 as Octodecane	3923	J	3,923	419	ND	0	410	ND	0	3,923	3.92	1136	1704	1.70E-06			0	0	0.00E+00	1.70E-06
n-Nonadecane	2788	J	2,788	420	ND	0	411	ND	0	2,788	2.79	807	1211	1.21E-06			0	0	0.00E+00	1.21E-06
C19 as Nonadecane	504	J	504	420	ND	0	411	ND	0	504	0.50	146	219	2.19E-07			0	0	0.00E+00	2.19E-07
n-Eicosane	1781	J	1,781	419	ND	0	410	ND	0	1,781	1.78	516	774	7.74E-07			0	0	0.00E+00	7.74E-07
C20 as Eicosane	279	J	279	419	ND	0	410	ND	0	279	0.28	81	121	1.21E-07			0	0	0.00E+00	1.21E-07
n-Heneicosane	1346	J	1,346	423	ND	0	414	ND	0	1,346	1.35	390	584	5.84E-07			0	0	0.00E+00	5.84E-07
C21 as Heneicosane	1346	J	1,346	424	J	424	414	ND	0	921	0.92	267	400	4.00E-07			0	0	0.00E+00	4.00E-07
n-Docosane	165	J	165	418	ND	0	409	ND	0	165	0.16	48	72	7.15E-08			0	0	0.00E+00	7.15E-08
C22 as Docosane	120	J	120	418	ND	0	409	ND	0	120	0.12	35	52	5.21E-08			0	0	0.00E+00	5.21E-08
n-Tricosane	785	ND	392	418	ND	0	409	ND	0	392	0.39	114	170	1.70E-07			0	0	0.00E+00	1.70E-07
C23 as Tricosane	785	ND	392	418	ND	0	409	ND	0	392	0.39	114	170	1.70E-07			0	0	0.00E+00	1.70E-07
n-Tetracosane	792	ND	396	421	ND	0	412	ND	0	396	0.40	115	172	1.72E-07			0	0	0.00E+00	1.72E-07
C24 as Tetracosane	792	ND	396	421	ND	0	412	ND	0	396	0.40	115	172	1.72E-07			0	0	0.00E+00	1.72E-07
Total Hydrocarbon			3,942,368			10,680			0		3932.63	1138400	#######	1.71E-03	0		0	0	0.00E+00	1.71E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
#A07B	#A07B		ND Adj	#A010A		ND Adj	#A024A		ND Adj											
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	384	ND	192	393	ND	0	920	ND	0	192	0.19	56	84	8.38E-08			0	0	0.00E+00	8.38E-08
C5 as Pentane	384	ND	192	1703	J	1,703	920	ND	0	-1,511	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	792	J	792	409	ND	0	973	ND	0	792	0.79	231	346	3.46E-07			0	0	0.00E+00	3.46E-07
C6 as Hexane	399	ND	199	409	ND	0	973	ND	0	199	0.20	58	87	8.70E-08			0	0	0.00E+00	8.70E-08
n-Heptane	417	ND	208	427	ND	0	1018	ND	0	208	0.21	61	91	9.10E-08			0	0	0.00E+00	9.10E-08
C7 as Heptane	2909	J	2,909	638	J	638	1018	ND	0	2,272	2.27	661	992	9.92E-07			0	0	0.00E+00	9.92E-07
n-Octane	1768	J	1,768	416	ND	0	407	ND	0	1,768	1.77	515	772	7.72E-07			0	0	0.00E+00	7.72E-07
C8 as Octane	12834		12,834	416	ND	0	407	ND	0	12,834	12.83	3737	5605	5.60E-06			0	0	0.00E+00	5.60E-06
n-Nonane	8755		8,755	419	ND	0	410	ND	0	8,755	8.75	2549	3823	3.82E-06			0	0	0.00E+00	3.82E-06
C9 as Nonane	113178		113,178	419	ND	0	410	ND	0	113,178	113.18	32951	49427	4.94E-05			0	0	0.00E+00	4.94E-05
n-Decane	89021		89,021	423	ND	0	414	ND	0	89,021	89.02	25918	38877	3.89E-05			0	0	0.00E+00	3.89E-05
C10 as Decane	690759		690,759	423	ND	0	414	ND	0	690,759	690.76	201109	301664	3.02E-04			0	0	0.00E+00	3.02E-04
n-Undecane	172052		172,052	422	ND	0	413	ND	0	172,052	172.05	50092	75138	7.51E-05			0	0	0.00E+00	7.51E-05
C11 as Undecane	875294		875,294	790	J	790	413	ND	0	874,503	874.50	254605	381908	3.82E-04			0	0	0.00E+00	3.82E-04
n-Dodecane	130818		130,818	419	ND	0	410	ND	0	130,818	130.82	38087	57130	5.71E-05			0	0	0.00E+00	5.71E-05
C12 as Dodecane	831473		831,473	419	ND	0	410	ND	0	831,473	831.47	242078	363116	3.63E-04			0	0	0.00E+00	3.63E-04
n-Tridecane	102647		102,647	420	ND	0	411	ND	0	102,647	102.65	29885	44827	4.48E-05			0	0	0.00E+00	4.48E-05
C13 as Tridecane	468637		468,637	1043	J	1,043	411	ND	0	467,594	467.59	136137	204205	2.04E-04			0	0	0.00E+00	2.04E-04
n-Tetradecane	48756		48,756	419	ND	0	411	ND	0	48,756	48.76	14195	21293	2.13E-05			0	0	0.00E+00	2.13E-05
C14 as tetradecane	293711		293,711	1292	J	1,292	411	ND	0	292,419	292.42	85136	127703	1.28E-04			0	0	0.00E+00	1.28E-04
n-Pentadecane	27047		27,047	521	J	521	413	ND	0	26,527	26.53	7723	11585	1.16E-05			0	0	0.00E+00	1.16E-05
C15 as Pentadecane	148747		148,747	2267	J	2,267	413	ND	0	146,480	146.48	42647	63970	6.40E-05			0	0	0.00E+00	6.40E-05
n-Hexadecane	11761		11,761	575	J	575	411	ND	0	11,186	11.19	3257	4885	4.89E-06			0	0	0.00E+00	4.89E-06
C16 as Hexadecane	67614		67,614	1427	J	1,427	411	ND	0	66,187	66.19	19270	28905	2.89E-05			0	0	0.00E+00	2.89E-05
n-Heptadecane	7543	J	7,543	414	ND	0	406	ND	0	7,543	7.54	2196	3294	3.29E-06			0	0	0.00E+00	3.29E-06
C17 as Heptadecane	409	ND	205	414	ND	0	406	ND	0	205	0.20	60	89	8.93E-08			0	0	0.00E+00	8.93E-08
n-Octadecane	2571	J	2,571	419	ND	0	410	ND	0	2,571	2.57	749	1123	1.12E-06			0	0	0.00E+00	1.12E-06
C18 as Octodecane	4574	J	4,574	419	ND	0	410	ND	0	4,574	4.57	1332	1998	2.00E-06			0	0	0.00E+00	2.00E-06
n-Nonadecane	2511	J	2,511	420	ND	0	411	ND	0	2,511	2.51	731	1097	1.10E-06			0	0	0.00E+00	1.10E-06
C19 as Nonadecane	1138	J	1,138	420	ND	0	411	ND	0	1,138	1.14	331	497	4.97E-07			0	0	0.00E+00	4.97E-07
n-Eicosane	1655	J	1,655	419	ND	0	410	ND	0	1,655	1.66	482	723	7.23E-07			0	0	0.00E+00	7.23E-07
C20 as Eicosane	408	ND	204	419	ND	0	410	ND	0	204	0.20	59	89	8.92E-08			0	0	0.00E+00	8.92E-08
n-Heneicosane	1280	J	1,280	423	ND	0	414	ND	0	1,280	1.28	373	559	5.59E-07			0	0	0.00E+00	5.59E-07
C21 as Heneicosane	1268	J	1,268	424	J	424	414	ND	0	844	0.84	246	369	3.69E-07			0	0	0.00E+00	3.69E-07
n-Docosane	888	J	888	418	ND	0	409	ND	0	888	0.89	258	388	3.88E-07			0	0	0.00E+00	3.88E-07
C22 as Docosane	409	ND	205	418	ND	0	409	ND	0	205	0.20	60	89	8.94E-08			0	0	0.00E+00	8.94E-08
n-Tricosane	817	ND	408	418	ND	0	409	ND	0	408	0.41	119	178	1.78E-07			0	0	0.00E+00	1.78E-07
C23 as Tricosane	408	ND	204	418	ND	0	409	ND	0	204	0.20	59	89	8.92E-08			0	0	0.00E+00	8.92E-08
n-Tetracosane	825	ND	412	421	ND	0	412	ND	0	412	0.41	120	180	1.80E-07			0	0	0.00E+00	1.80E-07
C24 as Tetracosane	412	ND	206	421	ND	0	412	ND	0	206	0.21	60	90	9.00E-08			0	0	0.00E+00	9.00E-08
Total Hydrocarbon			4,124,639			10,680			0		4115.47	1191327	#######	1.80E-03	0		0	0	0.00E+00	1.80E-03

Bagging Data Form — Vacuum Method

Sample Id A08 A/B

Equipment type:	Valve		**Component ID:**	A-1241	
Equipment Subtype:	Gate		**Plant ID:**	Refinery A	
Line Size:	4	*inches*	**Date:**	27-Feb-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.92 *inHg*	760.0 *mmHg*	**Sample Pump ID**	BU51791	
Ambient Temperature:	55.1 *°F*	12.8 *°C*	**TVA ID**	9509	
Stream Temperature:	*°F*	-17.8 *°C*	**Stream pressure:**		*psig*
Stream Description:	*Diesel*				

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A08A

Time	Bagging Test Measurement Data										
9:56	Pre-Test M21	260	*ppmv*		Background		*ppmv*	Pre-Test M21$_{Corr}$	260	*ppmv*	
10:22	Volume Start	172.9	*Liters*								
10:23	DGM$_{10L}$ Time	01:15.3	*min:sec.frac*	DGM Time	1.250	DGM Flow	8.00	DGM Flow$_{STP}$	8.08	*liters/minute*	
10:23	Vacuum check	0.029	*inches H2O*								
10:35	DGM$_T$	62	*°F*	16.7	*°C*	DGM$_P$	2.15	*inches H2O vacuum*	756.0	*mmHg*	
10:51	Bag Conc$_{ppm}$	159	*ppmv*								
11:03	Volume Stop	185.1	*Liters*	Total Vol	12.2	*Liters*					
	Sorbent Run Time	41	*Minutes*		Sorbent Flow	0.298	*L/min*	Sorbent Flow$_{STP}$	0.301	*L/min*	
	Sorbent Vol$_{STP}$	12.32	*Liters*	DGM Vol$_{STP}$	331.30	*Liters*	Total Run Vol$_{STP}$	343.62	*Liters*		

A08B

Time	Bagging Test Measurement Data										
11:05	Volume Start	185.1	*Liters*								
11:07	DGM$_{10L}$ Time	01:20.2	*min:sec.frac*	DGM Time	1.333	DGM Flow	7.50	DGM Flow$_{STP}$	7.61	*liters/minute*	
11:07	Vacuum check	0.025	*inches H2O*								
11:23	DGM$_T$	60	*°F*	15.6	*°C*	DGM$_P$	1.9	*inches H2O vacuum*	756.4	*mmHg*	
11:43	Bag Conc$_{ppm}$	108	*ppmv*								
11:48	Volume Stop	198.1	*Liters*	Total Vol	13.0	*Liters*					
	Sorbent Run Time	43	*Minutes*		Sorbent Flow	0.302	*L/min*	Sorbent Flow$_{STP}$	0.307	*L/min*	
	Sorbent Vol$_{STP}$	13.19	*Liters*	DGM Vol$_{STP}$	327.20	*Liters*	Total Run Vol$_{STP}$	340.39	*Liters*		

12:07	**Final Screening (ppmv) - equipment**	111	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time			Final time			0
Organic condensate collected		*ml*				
Density of organic condensate		*g/ml*				

Average THC emissions =	1.29E-03 kg/hr
Percent difference THC ER =	73%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.68E-07
C5 as Pentane	0.00E+00
n-Hexane	3.72E-07
C6 as Hexane	9.80E-07
n-Heptane	5.71E-07
C7 as Heptane	3.06E-06
n-Octane	1.15E-06
C8 as Octane	6.53E-06
n-Nonane	4.13E-06
C9 as Nonane	4.60E-05
n-Decane	4.13E-05
C10 as Decane	2.48E-04
n-Undecane	6.09E-05
C11 as Undecane	2.70E-04
n-Dodecane	3.51E-05
C12 as Dodecane	2.20E-04
n-Tridecane	2.94E-05
C13 as Tridecane	1.34E-04
n-Tetradecane	1.65E-05
C14 as tetradecane	9.28E-05
n-Pentadecane	8.47E-06
C15 as Pentadecane	4.49E-05
n-Hexadecane	4.11E-06
C16 as Hexadecane	1.57E-05
n-Heptadecane	1.26E-06
C17 as Heptadecane	1.39E-06
n-Octadecane	2.14E-07
C18 as Octodecane	3.18E-07
n-Nonadecane	7.82E-08
C19 as Nonadecane	6.62E-08
n-Eicosane	1.47E-07
C20 as Eicosane	6.58E-08
n-Heneicosane	1.49E-07
C21 as Heneicosane	0.00E+00
n-Docosane	1.48E-07
C22 as Docosane	1.48E-07
n-Tricosane	1.48E-07
C23 as Tricosane	1.48E-07
n-Tetracosane	1.49E-07
C24 as Tetracosane	1.49E-07
Total Hydrocarbon	1.29E-03

THC:	**6.81E-02**	**lbs/day**	**1.24E-02**	**tons/yr**

#A08A	ANALYTICAL RESULTS #A08A		ND Adj	BACKGROUND #A010A		ND Adj	TRIP BLANK #A024A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	500	J	500	393	ND	0	920	ND	0	500	0.50	172	251	2.51E-07			0	0	0.00E+00	2.51E-07
C5 as Pentane	153	ND	77	1703	J	1,703	920	ND	0	-1,626	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	1304	J	1,304	409	ND	0	973	ND	0	1,304	1.30	448	656	6.56E-07			0	0	0.00E+00	6.56E-07
C6 as Hexane	2167		2,167	409	ND	0	973	ND	0	2,167	2.17	745	1090	1.09E-06			0	0	0.00E+00	1.09E-06
n-Heptane	1769		1,769	427	ND	0	1018	ND	0	1,769	1.77	608	889	8.89E-07			0	0	0.00E+00	8.89E-07
C7 as Heptane	8974		8,974	638	J	638	1018	ND	0	8,336	8.34	2865	4192	4.19E-06			0	0	0.00E+00	4.19E-06
n-Octane	3189		3,189	416	ND	0	407	ND	0	3,189	3.19	1096	1604	1.60E-06			0	0	0.00E+00	1.60E-06
C8 as Octane	19849		19,849	416	ND	0	407	ND	0	19,849	19.85	6821	9982	9.98E-06			0	0	0.00E+00	9.98E-06
n-Nonane	10732		10,732	419	ND	0	410	ND	0	10,732	10.73	3688	5397	5.40E-06			0	0	0.00E+00	5.40E-06
C9 as Nonane	149741		149,741	419	ND	0	410	ND	0	149,741	149.74	51455	75300	7.53E-05			0	0	0.00E+00	7.53E-05
n-Decane	107956		107,956	423	ND	0	414	ND	0	107,956	107.96	37097	54288	5.43E-05			0	0	0.00E+00	5.43E-05
C10 as Decane	724132		724,132	423	ND	0	414	ND	0	724,132	724.13	248830	364141	3.64E-04			0	0	0.00E+00	3.64E-04
n-Undecane	163632		163,632	422	ND	0	413	ND	0	163,632	163.63	56228	82285	8.23E-05			0	0	0.00E+00	8.23E-05
C11 as Undecane	727826		727,826	790	J	790	413	ND	0	727,036	727.04	249828	365602	3.66E-04			0	0	0.00E+00	3.66E-04
n-Dodecane	98676		98,676	419	ND	0	410	ND	0	98,676	98.68	33908	49621	4.96E-05			0	0	0.00E+00	4.96E-05
C12 as Dodecane	619818		619,818	419	ND	0	410	ND	0	619,818	619.82	212985	311685	3.12E-04			0	0	0.00E+00	3.12E-04
n-Tridecane	76920		76,920	420	ND	0	411	ND	0	76,920	76.92	26432	38680	3.87E-05			0	0	0.00E+00	3.87E-05
C13 as Tridecane	360020		360,020	1043	J	1,043	411	ND	0	358,976	358.98	123353	180517	1.81E-04			0	0	0.00E+00	1.81E-04
n-Tetradecane	39321		39,321	419	ND	0	411	ND	0	39,321	39.32	13512	19773	1.98E-05			0	0	0.00E+00	1.98E-05
C14 as tetradecane	223642		223,642	1292	J	1,292	411	ND	0	222,350	222.35	76405	111812	1.12E-04			0	0	0.00E+00	1.12E-04
n-Pentadecane	19693		19,693	521	J	521	413	ND	0	19,172	19.17	6588	9641	9.64E-06			0	0	0.00E+00	9.64E-06
C15 as Pentadecane	93355		93,355	2267	J	2,267	413	ND	0	91,088	91.09	31300	45805	4.58E-05			0	0	0.00E+00	4.58E-05
n-Hexadecane	7071		7,071	575	J	575	411	ND	0	6,496	6.50	2232	3267	3.27E-06			0	0	0.00E+00	3.27E-06
C16 as Hexadecane	26771		26,771	1427	J	1,427	411	ND	0	25,344	25.34	8709	12745	1.27E-05			0	0	0.00E+00	1.27E-05
n-Heptadecane	3133	J	3,133	414	ND	0	406	ND	0	3,133	3.13	1077	1576	1.58E-06			0	0	0.00E+00	1.58E-06
C17 as Heptadecane	5350		5,350	414	ND	0	406	ND	0	5,350	5.35	1838	2690	2.69E-06			0	0	0.00E+00	2.69E-06
n-Octadecane	277	J	277	419	ND	0	410	ND	0	277	0.28	95	139	1.39E-07			0	0	0.00E+00	1.39E-07
C18 as Octodecane	389	J	389	419	ND	0	410	ND	0	389	0.39	134	195	1.95E-07			0	0	0.00E+00	1.95E-07
n-Nonadecane	130	J	130	420	ND	0	411	ND	0	130	0.13	45	65	6.52E-08			0	0	0.00E+00	6.52E-08
C19 as Nonadecane	164	ND	82	420	ND	0	411	ND	0	82	0.08	28	41	4.11E-08			0	0	0.00E+00	4.11E-08
n-Eicosane	808	ND	404	419	ND	0	410	ND	0	404	0.40	139	203	2.03E-07			0	0	0.00E+00	2.03E-07
C20 as Eicosane	162	ND	81	419	ND	0	410	ND	0	81	0.08	28	41	4.06E-08			0	0	0.00E+00	4.06E-08
n-Heneicosane	817	ND	409	423	ND	0	414	ND	0	409	0.41	140	205	2.05E-07			0	0	0.00E+00	2.05E-07
C21 as Heneicosane	817	ND	409	424	J	424	414	ND	0	-16	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	819	ND	409	418	ND	0	409	ND	0	409	0.41	141	206	2.06E-07			0	0	0.00E+00	2.06E-07
C22 as Docosane	819	ND	409	418	ND	0	409	ND	0	409	0.41	141	206	2.06E-07			0	0	0.00E+00	2.06E-07
n-Tricosane	817	ND	408	418	ND	0	409	ND	0	408	0.41	140	205	2.05E-07			0	0	0.00E+00	2.05E-07
C23 as Tricosane	817	ND	408	418	ND	0	409	ND	0	408	0.41	140	205	2.05E-07			0	0	0.00E+00	2.05E-07
n-Tetracosane	825	ND	412	421	ND	0	412	ND	0	412	0.41	142	207	2.07E-07			0	0	0.00E+00	2.07E-07
C24 as Tetracosane	825	ND	412	421	ND	0	412	ND	0	412	0.41	142	207	2.07E-07			0	0	0.00E+00	2.07E-07
Total Hydrocarbon			3,500,257			10,680			0		3491.22	1199670	#######	1.76E-03	0		0	0	0.00E+00	1.76E-03

#A08B	ANALYTICAL RESULTS #A08B		ND Adj	BACKGROUND #A010A		ND Adj	TRIP BLANK #A024A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	360	ND	180	393	ND	0	920	ND	0	180	0.18	61	86	8.55E-08			0	0	0.00E+00	8.55E-08
C5 as Pentane	1287	J	1,287	1703	J	1,703	920	ND	0	-416	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	374	ND	187	409	ND	0	973	ND	0	187	0.19	64	89	8.88E-08			0	0	0.00E+00	8.88E-08
C6 as Hexane	1833	J	1,833	409	ND	0	973	ND	0	1,833	1.83	624	871	8.71E-07			0	0	0.00E+00	8.71E-07
n-Heptane	532	J	532	427	ND	0	1018	ND	0	532	0.53	181	253	2.53E-07			0	0	0.00E+00	2.53E-07
C7 as Heptane	4702		4,702	638	J	638	1018	ND	0	4,064	4.06	1383	1930	1.93E-06			0	0	0.00E+00	1.93E-06
n-Octane	1454	J	1,454	416	ND	0	407	ND	0	1,454	1.45	495	690	6.90E-07			0	0	0.00E+00	6.90E-07
C8 as Octane	6483		6,483	416	ND	0	407	ND	0	6,483	6.48	2207	3079	3.08E-06			0	0	0.00E+00	3.08E-06
n-Nonane	6018		6,018	419	ND	0	410	ND	0	6,018	6.02	2048	2858	2.86E-06			0	0	0.00E+00	2.86E-06
C9 as Nonane	35124		35,124	419	ND	0	410	ND	0	35,124	35.12	11956	16683	1.67E-05			0	0	0.00E+00	1.67E-05
n-Decane	59797		59,797	423	ND	0	414	ND	0	59,797	59.80	20354	28401	2.84E-05			0	0	0.00E+00	2.84E-05
C10 as Decane	276695		276,695	423	ND	0	414	ND	0	276,695	276.69	94185	131421	1.31E-04			0	0	0.00E+00	1.31E-04
n-Undecane	83316		83,316	422	ND	0	413	ND	0	83,316	83.32	28360	39572	3.96E-05			0	0	0.00E+00	3.96E-05
C11 as Undecane	366259		366,259	790	J	790	413	ND	0	365,469	365.47	124403	173586	1.74E-04			0	0	0.00E+00	1.74E-04
n-Dodecane	43137		43,137	419	ND	0	410	ND	0	43,137	43.14	14683	20488	2.05E-05			0	0	0.00E+00	2.05E-05
C12 as Dodecane	270794		270,794	419	ND	0	410	ND	0	270,794	270.79	92176	128618	1.29E-04			0	0	0.00E+00	1.29E-04
n-Tridecane	42500		42,500	420	ND	0	411	ND	0	42,500	42.50	14467	20186	2.02E-05			0	0	0.00E+00	2.02E-05
C13 as Tridecane	183616		183,616	1043	J	1,043	411	ND	0	182,572	182.57	62146	86716	8.67E-05			0	0	0.00E+00	8.67E-05
n-Tetradecane	27659		27,659	419	ND	0	411	ND	0	27,659	27.66	9415	13137	1.31E-05			0	0	0.00E+00	1.31E-05
C14 as tetradecane	156848		156,848	1292	J	1,292	411	ND	0	155,556	155.56	52950	73884	7.39E-05			0	0	0.00E+00	7.39E-05
n-Pentadecane	15882		15,882	521	J	521	413	ND	0	15,361	15.36	5229	7296	7.30E-06			0	0	0.00E+00	7.30E-06
C15 as Pentadecane	95062		95,062	2267	J	2,267	413	ND	0	92,795	92.80	31587	44075	4.41E-05			0	0	0.00E+00	4.41E-05
n-Hexadecane	11005		11,005	575	J	575	411	ND	0	10,430	10.43	3550	4954	4.95E-06			0	0	0.00E+00	4.95E-06
C16 as Hexadecane	40788		40,788	1427	J	1,427	411	ND	0	39,360	39.36	13398	18695	1.87E-05			0	0	0.00E+00	1.87E-05
n-Heptadecane	1981	J	1,981	414	ND	0	406	ND	0	1,981	1.98	674	941	9.41E-07			0	0	0.00E+00	9.41E-07
C17 as Heptadecane	379	ND	190	414	ND	0	406	ND	0	190	0.19	65	90	9.01E-08			0	0	0.00E+00	9.01E-08
n-Octadecane	608	J	608	419	ND	0	410	ND	0	608	0.61	207	289	2.89E-07			0	0	0.00E+00	2.89E-07
C18 as Octodecane	926	J	926	419	ND	0	410	ND	0	926	0.93	315	440	4.40E-07			0	0	0.00E+00	4.40E-07
n-Nonadecane	384	ND	192	420	ND	0	411	ND	0	192	0.19	65	91	9.12E-08			0	0	0.00E+00	9.12E-08
C19 as Nonadecane	384	ND	192	420	ND	0	411	ND	0	192	0.19	65	91	9.12E-08			0	0	0.00E+00	9.12E-08
n-Eicosane	383	ND	192	419	ND	0	410	ND	0	192	0.19	65	91	9.10E-08			0	0	0.00E+00	9.10E-08
C20 as Eicosane	383	ND	192	419	ND	0	410	ND	0	192	0.19	65	91	9.10E-08			0	0	0.00E+00	9.10E-08
n-Heneicosane	387	ND	193	423	ND	0	414	ND	0	193	0.19	66	92	9.19E-08			0	0	0.00E+00	9.19E-08
C21 as Heneicosane	387	ND	193	424	J	424	414	ND	0	-231	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	383	ND	191	418	ND	0	409	ND	0	191	0.19	65	91	9.08E-08			0	0	0.00E+00	9.08E-08
C22 as Docosane	383	ND	191	418	ND	0	409	ND	0	191	0.19	65	91	9.08E-08			0	0	0.00E+00	9.08E-08
n-Tricosane	383	ND	191	418	ND	0	409	ND	0	191	0.19	65	91	9.08E-08			0	0	0.00E+00	9.08E-08
C23 as Tricosane	383	ND	191	418	ND	0	409	ND	0	191	0.19	65	91	9.08E-08			0	0	0.00E+00	9.08E-08
n-Tetracosane	385	ND	193	421	ND	0	412	ND	0	193	0.19	66	91	9.15E-08			0	0	0.00E+00	9.15E-08
C24 as Tetracosane	385	ND	193	421	ND	0	412	ND	0	193	0.19	66	91	9.15E-08			0	0	0.00E+00	9.15E-08
Total Hydrocarbon			1,737,165			10,680			0		1727.13	593486	820,330	8.20E-04	0		0	0	0.00E+00	8.20E-04

Bagging Data Form	Vacuum Method			Sample Id	A09 A/B
Equipment type:	Connector			Component ID:	A-1239
Equipment Subtype:	Flange			Plant ID:	Refinery A
Line Size:	4 inches			Date:	27-Feb-17
Phase (G, LL, HL):	HL			Analysis team:	EG/DR
Barometric pressure	29.91 inHg	759.7 mmHg		Sample Pump ID	BU51791
Ambient Temperature:	57.7 °F	14.3 °C		TVA ID	9509
Stream Temperature:	°F	-17.8 °C		Stream pressure:	psig
Stream Description:	Diesel				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A09A

Time	Bagging Test Measurement Data										
12:14	Pre-Test M21	1089	ppmv		Background		ppmv	Pre-Test $M21_{Corr}$	1089	ppmv	
12:49	Volume Start	198.1	Liters								
13:00	DGM_{10L} Time	01:24.5	min:sec.frac	DGM Time	1.400	DGM Flow	7.14	$DGM\ Flow_{STP}$	7.27	liters/minute	
13:00	Vacuum check	0.001	inches H2O								
13:20	DGM_T	58	°F	14.4	°C	DGM_P	1.85	inches H2O vacuum	756.3	mmHg	
13:18	$Bag\ Conc_{ppm}$	82	ppmv								
13:30	Volume Stop	210.7	Liters	Total Vol	12.6	Liters					
	Sorbent Run Time	41	Minutes		Sorbent Flow	0.307	L/min	$Sorbent\ Flow_{STP}$	0.313	L/min	
	$Sorbent\ Vol_{STP}$	12.83	Liters	$DGM\ Vol_{STP}$	298.21	Liters	$Total\ Run\ Vol_{STP}$	311.04	Liters		

A09B

Time	Bagging Test Measurement Data										
13:32	Volume Start	210.7	Liters								
13:33	DGM_{10L} Time	01:24.5	min:sec.frac	DGM Time	1.400	DGM Flow	7.14	$DGM\ Flow_{STP}$	7.25	liters/minute	
13:33	Vacuum check	0.001	inches H2O								
14:23	DGM_T	59.5	°F	15.3	°C	DGM_P	1.85	inches H2O vacuum	756.3	mmHg	
	$Bag\ Conc_{ppm}$		ppmv								
14:23	Volume Stop	226.2	Liters	Total Vol	15.5	Liters					
	Sorbent Run Time	51	Minutes		Sorbent Flow	0.304	L/min	$Sorbent\ Flow_{STP}$	0.309	L/min	
	$Sorbent\ Vol_{STP}$	15.74	Liters	$DGM\ Vol_{STP}$	369.88	Liters	$Total\ Run\ Vol_{STP}$	385.61	Liters		

14:33	**Final Screening (ppmv) - equipment**	942	ppmv	**background**		ppmv
Condensate accumulation: starting time			Final time			0
Organic condensate collected		ml				
Density of organic condensate		g/ml				

Average THC emissions =	8.91E-04 kg/hr
Percent difference THC ER =	192%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	8.79E-08
C5 as Pentane	0.00E+00
n-Hexane	1.39E-07
C6 as Hexane	1.19E-06
n-Heptane	3.19E-07
C7 as Heptane	1.46E-06
n-Octane	6.34E-07
C8 as Octane	2.60E-06
n-Nonane	2.56E-06
C9 as Nonane	2.22E-05
n-Decane	2.75E-05
C10 as Decane	1.69E-04
n-Undecane	4.19E-05
C11 as Undecane	1.88E-04
n-Dodecane	2.12E-05
C12 as Dodecane	1.44E-04
n-Tridecane	1.70E-05
C13 as Tridecane	7.72E-05
n-Tetradecane	8.35E-06
C14 as tetradecane	6.58E-05
n-Pentadecane	6.90E-06
C15 as Pentadecane	4.24E-05
n-Hexadecane	3.84E-06
C16 as Hexadecane	2.53E-05
n-Heptadecane	3.15E-06
C17 as Heptadecane	1.22E-05
n-Octadecane	1.11E-06
C18 as Octodecane	2.31E-06
n-Nonadecane	7.06E-07
C19 as Nonadecane	4.38E-07
n-Eicosane	2.45E-07
C20 as Eicosane	5.45E-08
n-Heneicosane	1.28E-07
C21 as Heneicosane	0.00E+00
n-Docosane	1.26E-07
C22 as Docosane	1.26E-07
n-Tricosane	1.26E-07
C23 as Tricosane	1.26E-07
n-Tetracosane	1.27E-07
C24 as Tetracosane	1.27E-07
Total Hydrocarbon	8.91E-04

THC:	4.71E-02	lbs/day	8.60E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS ND Adj					COMBINED EMISSION RATE
#A09A	#A09A		ND Adj	#A010A		ND Adj	#A024A		ND Adj											
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	236	J	236	393	ND	0	920	ND	0	236	0.24	73	107	1.07E-07			0	0	0.00E+00	1.07E-07
C5 as Pentane	281	J	281	1703	J	1,703	920	ND	0	-1,422	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	455	J	455	409	ND	0	973	ND	0	455	0.46	142	207	2.07E-07			0	0	0.00E+00	2.07E-07
C6 as Hexane	3974		3,974	409	ND	0	973	ND	0	3,974	3.97	1236	1809	1.81E-06			0	0	0.00E+00	1.81E-06
n-Heptane	1239	J	1,239	427	ND	0	1018	ND	0	1,239	1.24	385	564	5.64E-07			0	0	0.00E+00	5.64E-07
C7 as Heptane	7046		7,046	638	J	638	1018	ND	0	6,408	6.41	1993	2917	2.92E-06			0	0	0.00E+00	2.92E-06
n-Octane	2628	J	2,628	416	ND	0	407	ND	0	2,628	2.63	818	1196	1.20E-06			0	0	0.00E+00	1.20E-06
C8 as Octane	11255		11,255	416	ND	0	407	ND	0	11,255	11.26	3501	5123	5.12E-06			0	0	0.00E+00	5.12E-06
n-Nonane	10825		10,825	419	ND	0	410	ND	0	10,825	10.82	3367	4927	4.93E-06			0	0	0.00E+00	4.93E-06
C9 as Nonane	95262		95,262	419	ND	0	410	ND	0	95,262	95.26	29631	43362	4.34E-05			0	0	0.00E+00	4.34E-05
n-Decane	116537		116,537	423	ND	0	414	ND	0	116,537	116.54	36248	53046	5.30E-05			0	0	0.00E+00	5.30E-05
C10 as Decane	726448		726,448	423	ND	0	414	ND	0	726,448	726.45	225957	330669	3.31E-04			0	0	0.00E+00	3.31E-04
n-Undecane	179769		179,769	422	ND	0	413	ND	0	179,769	179.77	55916	81828	8.18E-05			0	0	0.00E+00	8.18E-05
C11 as Undecane	807608		807,608	790	J	790	413	ND	0	806,817	806.82	250955	367252	3.67E-04			0	0	0.00E+00	3.67E-04
n-Dodecane	90658		90,658	419	ND	0	410	ND	0	90,658	90.66	28199	41266	4.13E-05			0	0	0.00E+00	4.13E-05
C12 as Dodecane	620154		620,154	419	ND	0	410	ND	0	620,154	620.15	192895	282285	2.82E-04			0	0	0.00E+00	2.82E-04
n-Tridecane	72981		72,981	420	ND	0	411	ND	0	72,981	72.98	22700	33220	3.32E-05			0	0	0.00E+00	3.32E-05
C13 as Tridecane	334601		334,601	1043	J	1,043	411	ND	0	333,558	333.56	103751	151831	1.52E-04			0	0	0.00E+00	1.52E-04
n-Tetradecane	35578		35,578	419	ND	0	411	ND	0	35,578	35.58	11066	16194	1.62E-05			0	0	0.00E+00	1.62E-05
C14 as tetradecane	287309		287,309	1292	J	1,292	411	ND	0	286,017	286.02	88964	130191	1.30E-04			0	0	0.00E+00	1.30E-04
n-Pentadecane	30602		30,602	521	J	521	413	ND	0	30,081	30.08	9357	13692	1.37E-05			0	0	0.00E+00	1.37E-05
C15 as Pentadecane	188609		188,609	2267	J	2,267	413	ND	0	186,343	186.34	57961	84820	8.48E-05			0	0	0.00E+00	8.48E-05
n-Hexadecane	17427		17,427	575	J	575	411	ND	0	16,852	16.85	5242	7671	7.67E-06			0	0	0.00E+00	7.67E-06
C16 as Hexadecane	112736		112,736	1427	J	1,427	411	ND	0	111,309	111.31	34622	50666	5.07E-05			0	0	0.00E+00	5.07E-05
n-Heptadecane	13687		13,687	414	ND	0	406	ND	0	13,687	13.69	4257	6230	6.23E-06			0	0	0.00E+00	6.23E-06
C17 as Heptadecane	53387		53,387	414	ND	0	406	ND	0	53,387	53.39	16606	24301	2.43E-05			0	0	0.00E+00	2.43E-05
n-Octadecane	4717	J	4,717	419	ND	0	410	ND	0	4,717	4.72	1467	2147	2.15E-06			0	0	0.00E+00	2.15E-06
C18 as Octodecane	9998		9,998	419	ND	0	410	ND	0	9,998	10.00	3110	4551	4.55E-06			0	0	0.00E+00	4.55E-06
n-Nonadecane	2943	J	2,943	420	ND	0	411	ND	0	2,943	2.94	915	1340	1.34E-06			0	0	0.00E+00	1.34E-06
C19 as Nonadecane	1762	J	1,762	420	ND	0	411	ND	0	1,762	1.76	548	802	8.02E-07			0	0	0.00E+00	8.02E-07
n-Eicosane	915	J	915	419	ND	0	410	ND	0	915	0.91	285	416	4.16E-07			0	0	0.00E+00	4.16E-07
C20 as Eicosane	158	ND	79	419	ND	0	410	ND	0	79	0.08	25	36	3.60E-08			0	0	0.00E+00	3.60E-08
n-Heneicosane	798	ND	399	423	ND	0	414	ND	0	399	0.40	124	182	1.82E-07			0	0	0.00E+00	1.82E-07
C21 as Heneicosane	798	ND	399	424	J	424	414	ND	0	-25	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	789	ND	395	418	ND	0	409	ND	0	395	0.39	123	180	1.80E-07			0	0	0.00E+00	1.80E-07
C22 as Docosane	789	ND	395	418	ND	0	409	ND	0	395	0.39	123	180	1.80E-07			0	0	0.00E+00	1.80E-07
n-Tricosane	789	ND	395	418	ND	0	409	ND	0	395	0.39	123	180	1.80E-07			0	0	0.00E+00	1.80E-07
C23 as Tricosane	789	ND	395	418	ND	0	409	ND	0	395	0.39	123	180	1.80E-07			0	0	0.00E+00	1.80E-07
n-Tetracosane	795	ND	397	421	ND	0	412	ND	0	397	0.40	124	181	1.81E-07			0	0	0.00E+00	1.81E-07
C24 as Tetracosane	795	ND	397	421	ND	0	412	ND	0	397	0.40	124	181	1.81E-07			0	0	0.00E+00	1.81E-07
Total Hydrocarbon			3,844,876			10,680			0		3835.64	1193053	#######	1.75E-03	0		0	0	0.00E+00	1.75E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS ND Adj					COMBINED EMISSION RATE
#A09B	#A09B		ND Adj	#A010A		ND Adj	#A024A		ND Adj											
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	302	ND	151	393	ND	0	920	ND	0	151	0.15	58	69	6.85E-08			0	0	0.00E+00	6.85E-08
C5 as Pentane	959	J	959	1703	J	1,703	920	ND	0	-744	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	314	ND	157	409	ND	0	973	ND	0	157	0.16	60	71	7.12E-08			0	0	0.00E+00	7.12E-08
C6 as Hexane	1267	J	1,267	409	ND	0	973	ND	0	1,267	1.27	488	575	5.75E-07			0	0	0.00E+00	5.75E-07
n-Heptane	328	ND	164	427	ND	0	1018	ND	0	164	0.16	63	74	7.44E-08			0	0	0.00E+00	7.44E-08
C7 as Heptane	328	ND	164	638	J	638	1018	ND	0	-474	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Octane	319	ND	160	416	ND	0	407	ND	0	160	0.16	62	72	7.24E-08			0	0	0.00E+00	7.24E-08
C8 as Octane	319	ND	160	416	ND	0	407	ND	0	160	0.16	62	72	7.24E-08			0	0	0.00E+00	7.24E-08
n-Nonane	405	J	405	419	ND	0	410	ND	0	405	0.41	156	184	1.84E-07			0	0	0.00E+00	1.84E-07
C9 as Nonane	2175	J	2,175	419	ND	0	410	ND	0	2,175	2.18	839	987	9.87E-07			0	0	0.00E+00	9.87E-07
n-Decane	4279		4,279	423	ND	0	414	ND	0	4,279	4.28	1650	1941	1.94E-06			0	0	0.00E+00	1.94E-06
C10 as Decane	15651		15,651	423	ND	0	414	ND	0	15,651	15.65	6035	7100	7.10E-06			0	0	0.00E+00	7.10E-06
n-Undecane	4449		4,449	422	ND	0	413	ND	0	4,449	4.45	1716	2018	2.02E-06			0	0	0.00E+00	2.02E-06
C11 as Undecane	21053		21,053	790	J	790	413	ND	0	20,263	20.26	7814	9192	9.19E-06			0	0	0.00E+00	9.19E-06
n-Dodecane	2333	J	2,333	419	ND	0	410	ND	0	2,333	2.33	900	1059	1.06E-06			0	0	0.00E+00	1.06E-06
C12 as Dodecane	12896		12,896	419	ND	0	410	ND	0	12,896	12.90	4973	5850	5.85E-06			0	0	0.00E+00	5.85E-06
n-Tridecane	1647	J	1,647	420	ND	0	411	ND	0	1,647	1.65	635	747	7.47E-07			0	0	0.00E+00	7.47E-07
C13 as Tridecane	6745		6,745	1043	J	1,043	411	ND	0	5,702	5.70	2199	2587	2.59E-06			0	0	0.00E+00	2.59E-06
n-Tetradecane	1105	J	1,105	419	ND	0	411	ND	0	1,105	1.10	426	501	5.01E-07			0	0	0.00E+00	5.01E-07
C14 as tetradecane	4277		4,277	1292	J	1,292	411	ND	0	2,985	2.98	1151	1354	1.35E-06			0	0	0.00E+00	1.35E-06
n-Pentadecane	774	J	774	521	J	521	413	ND	0	254	0.25	98	115	1.15E-07			0	0	0.00E+00	1.15E-07
C15 as Pentadecane	1732	J	1,732	2267	J	2,267	413	ND	0	-535	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	348	J	348	575	J	575	411	ND	0	-226	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	445	J	445	1427	J	1,427	411	ND	0	-982	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	318	ND	159	414	ND	0	406	ND	0	159	0.16	61	72	7.21E-08			0	0	0.00E+00	7.21E-08
C17 as Heptadecane	318	ND	159	414	ND	0	406	ND	0	159	0.16	61	72	7.21E-08			0	0	0.00E+00	7.21E-08
n-Octadecane	322	ND	161	419	ND	0	410	ND	0	161	0.16	62	73	7.30E-08			0	0	0.00E+00	7.30E-08
C18 as Octodecane	322	ND	161	419	ND	0	410	ND	0	161	0.16	62	73	7.30E-08			0	0	0.00E+00	7.30E-08
n-Nonadecane	322	ND	161	420	ND	0	411	ND	0	161	0.16	62	73	7.31E-08			0	0	0.00E+00	7.31E-08
C19 as Nonadecane	322	ND	161	420	ND	0	411	ND	0	161	0.16	62	73	7.31E-08			0	0	0.00E+00	7.31E-08
n-Eicosane	321	ND	161	419	ND	0	410	ND	0	161	0.16	62	73	7.29E-08			0	0	0.00E+00	7.29E-08
C20 as Eicosane	321	ND	161	419	ND	0	410	ND	0	161	0.16	62	73	7.29E-08			0	0	0.00E+00	7.29E-08
n-Heneicosane	325	ND	162	423	ND	0	414	ND	0	162	0.16	63	74	7.36E-08			0	0	0.00E+00	7.36E-08
C21 as Heneicosane	325	ND	162	424	J	424	414	ND	0	-262	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	321	ND	160	418	ND	0	409	ND	0	160	0.16	62	73	7.28E-08			0	0	0.00E+00	7.28E-08
C22 as Docosane	321	ND	160	418	ND	0	409	ND	0	160	0.16	62	73	7.28E-08			0	0	0.00E+00	7.28E-08
n-Tricosane	321	ND	160	418	ND	0	409	ND	0	160	0.16	62	73	7.28E-08			0	0	0.00E+00	7.28E-08
C23 as Tricosane	321	ND	160	418	ND	0	409	ND	0	160	0.16	62	73	7.28E-08			0	0	0.00E+00	7.28E-08
n-Tetracosane	323	ND	162	421	ND	0	412	ND	0	162	0.16	62	73	7.33E-08			0	0	0.00E+00	7.33E-08
C24 as Tetracosane	323	ND	162	421	ND	0	412	ND	0	162	0.16	62	73	7.33E-08			0	0	0.00E+00	7.33E-08
Total Hydrocarbon			86,069			10,680			0		78.61	24452	35,663	3.57E-05	0		0	0	0.00E+00	3.57E-05

Bagging Data Form	**Vacuum Method**		**Sample Id**	**A011 A/B**
Equipment type:	Valve		**Component ID:**	**A-1259**
Equipment Subtype:	Gate		**Plant ID:**	Refinery A
Line Size:	6 *inches*		**Date:**	28-Feb-17
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR
Barometric pressure	30.16 *inHg*	766.1 *mmHg*	**Sample Pump ID**	BU51791
Ambient Temperature:	54.3 *°F*	12.4 *°C*	**TVA ID**	9509
Stream Temperature:	*°F*	-17.8 *°C*	**Stream pressure:**	*psig*
Stream Description:	*Diesel to the Diesel Stripper*			

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A011A

Time	**Bagging Test Measurement Data**									
9:40	Pre-Test M21	58	*ppmv*		Background		*ppmv*	Pre-Test M21$_{Corr}$	58	*ppmv*
10:04	Volume Start	226.2	*Liters*							
10:07	DGM$_{10L}$ Time	01:17.9	*min:sec.frac*	DGM Time	1.300	DGM Flow	7.69	DGM Flow$_{STP}$	7.99	*liters/minute*
10:07	Vacuum check	0.085	*inches H2O*							
10:20	DGM$_T$	52	*°F*	11.1	°C	DGM$_P$	2.1	*inches H2O vacuum*	762.1	*mmHg*
10:43	Bag Conc$_{ppm}$	13.5	*ppmv*							
10:45	Volume Stop	238.5	*Liters*	Total Vol	12.3	*Liters*				
	Sorbent Run Time	41	*Minutes*		Sorbent Flow	0.300	*L/min*	Sorbent Flow$_{STP}$	0.311	*L/min*
	Sorbent Vol$_{STP}$	12.77	*Liters*	DGM Vol$_{STP}$	327.45	*Liters*	Total Run Vol$_{STP}$	340.22	*Liters*	

A011B

Time	**Bagging Test Measurement Data**									
10:47	Volume Start	238.5	*Liters*							
10:48	DGM$_{10L}$ Time	01:22.9	*min:sec.frac*	DGM Time	1.383	DGM Flow	7.23	DGM Flow$_{STP}$	7.45	*liters/minute*
10:48	Vacuum check	0.13	*inches H2O*							
11:10	DGM$_T$	56	*°F*	13.3	°C	DGM$_P$	2	*inches H2O vacuum*	762.3	*mmHg*
11:18	Bag Conc$_{ppm}$	15.5	*ppmv*							
11:27	Volume Stop	250.8	*Liters*	Total Vol	12.3	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.308	*L/min*	Sorbent Flow$_{STP}$	0.317	*L/min*
	Sorbent Vol$_{STP}$	12.67	*Liters*	DGM Vol$_{STP}$	297.96	*Liters*	Total Run Vol$_{STP}$	310.63	*Liters*	
11:38	**Final Screening (ppmv) - equipment**			401	*ppmv*	**background**		*ppmv*		

Condensate accumulation: starting time		Final time	0
Organic condensate collected	*ml*		
Density of organic condensate	*g/ml*		

Average THC emissions =	4.97E-05	kg/hr
Percent difference THC ER =	36%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	6.26E-08
C5 as Pentane	0.00E+00
n-Hexane	6.50E-08
C6 as Hexane	3.62E-07
n-Heptane	3.50E-07
C7 as Heptane	1.66E-06
n-Octane	6.89E-07
C8 as Octane	1.58E-06
n-Nonane	1.14E-06
C9 as Nonane	6.41E-06
n-Decane	2.45E-06
C10 as Decane	1.61E-05
n-Undecane	1.21E-06
C11 as Undecane	9.51E-06
n-Dodecane	5.36E-07
C12 as Dodecane	3.00E-06
n-Tridecane	2.63E-07
C13 as Tridecane	1.73E-06
n-Tetradecane	1.98E-07
C14 as tetradecane	1.57E-07
n-Pentadecane	7.60E-08
C15 as Pentadecane	2.88E-07
n-Hexadecane	1.73E-07
C16 as Hexadecane	3.48E-07
n-Heptadecane	1.18E-07
C17 as Heptadecane	3.68E-07
n-Octadecane	6.66E-08
C18 as Octodecane	6.66E-08
n-Nonadecane	6.68E-08
C19 as Nonadecane	6.68E-08
n-Eicosane	6.66E-08
C20 as Eicosane	6.66E-08
n-Heneicosane	6.72E-08
C21 as Heneicosane	0.00E+00
n-Docosane	6.65E-08
C22 as Docosane	6.65E-08
n-Tricosane	6.65E-08
C23 as Tricosane	6.65E-08
n-Tetracosane	6.69E-08
C24 as Tetracosane	6.69E-08
Total Hydrocarbon	4.97E-05

THC:	**2.63E-03**	**lbs/day**	**4.80E-04 tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A011A	#A011A		ND Adj	#A010A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	152	ND	76	393	ND	0	920	ND	0	76	0.08	26	38	3.79E-08			0	0	0.00E+00	3.79E-08
C5 as Pentane	152	ND	76	1703	J	1,703	920	ND	0	-1,627	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	158	ND	79	409	ND	0	973	ND	0	79	0.08	27	39	3.94E-08			0	0	0.00E+00	3.94E-08
C6 as Hexane	1272	J	1,272	409	ND	0	973	ND	0	1,272	1.27	433	633	6.33E-07			0	0	0.00E+00	6.33E-07
n-Heptane	1010	J	1,010	427	ND	0	1018	ND	0	1,010	1.01	344	503	5.03E-07			0	0	0.00E+00	5.03E-07
C7 as Heptane	5635		5,635	638	J	638	1018	ND	0	4,997	5.00	1700	2488	2.49E-06			0	0	0.00E+00	2.49E-06
n-Octane	2141		2,141	416	ND	0	407	ND	0	2,141	2.14	728	1066	1.07E-06			0	0	0.00E+00	1.07E-06
C8 as Octane	4438		4,438	416	ND	0	407	ND	0	4,438	4.44	1510	2210	2.21E-06			0	0	0.00E+00	2.21E-06
n-Nonane	2776		2,776	419	ND	0	410	ND	0	2,776	2.78	945	1382	1.38E-06			0	0	0.00E+00	1.38E-06
C9 as Nonane	16765		16,765	419	ND	0	410	ND	0	16,765	16.77	5704	8347	8.35E-06			0	0	0.00E+00	8.35E-06
n-Decane	5075		5,075	423	ND	0	414	ND	0	5,075	5.07	1727	2527	2.53E-06			0	0	0.00E+00	2.53E-06
C10 as Decane	36841		36,841	423	ND	0	414	ND	0	36,841	36.84	12534	18342	1.83E-05			0	0	0.00E+00	1.83E-05
n-Undecane	2642		2,642	422	ND	0	413	ND	0	2,642	2.64	899	1315	1.32E-06			0	0	0.00E+00	1.32E-06
C11 as Undecane	20345		20,345	790	J	790	413	ND	0	19,555	19.55	6653	9736	9.74E-06			0	0	0.00E+00	9.74E-06
n-Dodecane	1146	J	1,146	419	ND	0	410	ND	0	1,146	1.15	390	570	5.70E-07			0	0	0.00E+00	5.70E-07
C12 as Dodecane	6576		6,576	419	ND	0	410	ND	0	6,576	6.58	2237	3274	3.27E-06			0	0	0.00E+00	3.27E-06
n-Tridecane	661	J	661	420	ND	0	411	ND	0	661	0.66	225	329	3.29E-07			0	0	0.00E+00	3.29E-07
C13 as Tridecane	5458		5,458	1043	J	1,043	411	ND	0	4,415	4.41	1502	2198	2.20E-06			0	0	0.00E+00	2.20E-06
n-Tetradecane	611	J	611	419	ND	0	411	ND	0	611	0.61	208	304	3.04E-07			0	0	0.00E+00	3.04E-07
C14 as tetradecane	1924		1,924	1292	J	1,292	411	ND	0	632	0.63	215	314	3.14E-07			0	0	0.00E+00	3.14E-07
n-Pentadecane	826	J	826	521	J	521	413	ND	0	305	0.31	104	152	1.52E-07			0	0	0.00E+00	1.52E-07
C15 as Pentadecane	3425		3,425	2267	J	2,267	413	ND	0	1,158	1.16	394	577	5.77E-07			0	0	0.00E+00	5.77E-07
n-Hexadecane	1271	J	1,271	575	J	575	411	ND	0	697	0.70	237	347	3.47E-07			0	0	0.00E+00	3.47E-07
C16 as Hexadecane	2825		2,825	1427	J	1,427	411	ND	0	1,398	1.40	476	696	6.96E-07			0	0	0.00E+00	6.96E-07
n-Heptadecane	288	J	288	414	ND	0	406	ND	0	288	0.29	98	143	1.43E-07			0	0	0.00E+00	1.43E-07
C17 as Heptadecane	1293	J	1,293	414	ND	0	406	ND	0	1,293	1.29	440	644	6.44E-07			0	0	0.00E+00	6.44E-07
n-Octadecane	162	ND	81	419	ND	0	410	ND	0	81	0.08	28	40	4.04E-08			0	0	0.00E+00	4.04E-08
C18 as Octodecane	162	ND	81	419	ND	0	410	ND	0	81	0.08	28	40	4.04E-08			0	0	0.00E+00	4.04E-08
n-Nonadecane	162	ND	81	420	ND	0	411	ND	0	81	0.08	28	40	4.04E-08			0	0	0.00E+00	4.04E-08
C19 as Nonadecane	162	ND	81	420	ND	0	411	ND	0	81	0.08	28	40	4.04E-08			0	0	0.00E+00	4.04E-08
n-Eicosane	162	ND	81	419	ND	0	410	ND	0	81	0.08	28	40	4.03E-08			0	0	0.00E+00	4.03E-08
C20 as Eicosane	162	ND	81	419	ND	0	410	ND	0	81	0.08	28	40	4.03E-08			0	0	0.00E+00	4.03E-08
n-Heneicosane	164	ND	82	423	ND	0	414	ND	0	82	0.08	28	41	4.07E-08			0	0	0.00E+00	4.07E-08
C21 as Heneicosane	123	ND	61	424	J	424	414	ND	0	-363	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	162	ND	81	418	ND	0	409	ND	0	81	0.08	28	40	4.03E-08			0	0	0.00E+00	4.03E-08
C22 as Docosane	162	ND	81	418	ND	0	409	ND	0	81	0.08	28	40	4.03E-08			0	0	0.00E+00	4.03E-08
n-Tricosane	162	ND	81	418	ND	0	409	ND	0	81	0.08	28	40	4.03E-08			0	0	0.00E+00	4.03E-08
C23 as Tricosane	162	ND	81	418	ND	0	409	ND	0	81	0.08	28	40	4.03E-08			0	0	0.00E+00	4.03E-08
n-Tetracosane	163	ND	81	421	ND	0	412	ND	0	81	0.08	28	41	4.05E-08			0	0	0.00E+00	4.05E-08
C24 as Tetracosane	163	ND	81	421	ND	0	412	ND	0	81	0.08	28	41	4.05E-08			0	0	0.00E+00	4.05E-08
Total Hydrocarbon			126,591			10,680			0		117.90	40112	58,701	5.87E-05	0		0	0	0.00E+00	5.87E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A011B	#A011B		ND Adj	#A010A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	374	ND	187	393	ND	0	920	ND	0	187	0.19	58	87	8.72E-08			0	0	0.00E+00	8.72E-08
C5 as Pentane	374	ND	187	1703	J	1,703	920	ND	0	-1,516	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	389	ND	195	409	ND	0	973	ND	0	195	0.19	60	91	9.06E-08			0	0	0.00E+00	9.06E-08
C6 as Hexane	389	ND	195	409	ND	0	973	ND	0	195	0.19	60	91	9.06E-08			0	0	0.00E+00	9.06E-08
n-Heptane	423	J	423	427	ND	0	1018	ND	0	423	0.42	131	197	1.97E-07			0	0	0.00E+00	1.97E-07
C7 as Heptane	2432	J	2,432	638	J	638	1018	ND	0	1,794	1.79	557	836	8.36E-07			0	0	0.00E+00	8.36E-07
n-Octane	670	J	670	416	ND	0	407	ND	0	670	0.67	208	312	3.12E-07			0	0	0.00E+00	3.12E-07
C8 as Octane	2036	J	2,036	416	ND	0	407	ND	0	2,036	2.04	632	949	9.49E-07			0	0	0.00E+00	9.49E-07
n-Nonane	1930	J	1,930	419	ND	0	410	ND	0	1,930	1.93	600	899	8.99E-07			0	0	0.00E+00	8.99E-07
C9 as Nonane	9589		9,589	419	ND	0	410	ND	0	9,589	9.59	2979	4468	4.47E-06			0	0	0.00E+00	4.47E-06
n-Decane	5089		5,089	423	ND	0	414	ND	0	5,089	5.09	1581	2371	2.37E-06			0	0	0.00E+00	2.37E-06
C10 as Decane	29600		29,600	423	ND	0	414	ND	0	29,600	29.60	9195	13792	1.38E-05			0	0	0.00E+00	1.38E-05
n-Undecane	2384	J	2,384	422	ND	0	413	ND	0	2,384	2.38	740	1111	1.11E-06			0	0	0.00E+00	1.11E-06
C11 as Undecane	20706		20,706	790	J	790	413	ND	0	19,916	19.92	6187	9280	9.28E-06			0	0	0.00E+00	9.28E-06
n-Dodecane	1076	J	1,076	419	ND	0	410	ND	0	1,076	1.08	334	501	5.01E-07			0	0	0.00E+00	5.01E-07
C12 as Dodecane	5871		5,871	419	ND	0	410	ND	0	5,871	5.87	1824	2736	2.74E-06			0	0	0.00E+00	2.74E-06
n-Tridecane	421	J	421	420	ND	0	411	ND	0	421	0.42	131	196	1.96E-07			0	0	0.00E+00	1.96E-07
C13 as Tridecane	3734	J	3,734	1043	J	1,043	411	ND	0	2,690	2.69	836	1254	1.25E-06			0	0	0.00E+00	1.25E-06
n-Tetradecane	399	ND	200	419	ND	0	411	ND	0	200	0.20	62	93	9.30E-08			0	0	0.00E+00	9.30E-08
C14 as tetradecane	399	ND	200	1292	J	1,292	411	ND	0	-1,093	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Pentadecane	401	ND	201	521	J	521	413	ND	0	-320	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	401	ND	201	2267	J	2,267	413	ND	0	-2,066	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	399	ND	200	575	J	575	411	ND	0	-375	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	399	ND	200	1427	J	1,427	411	ND	0	-1,228	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	394	ND	197	414	ND	0	406	ND	0	197	0.20	61	92	9.19E-08			0	0	0.00E+00	9.19E-08
C17 as Heptadecane	394	ND	197	414	ND	0	406	ND	0	197	0.20	61	92	9.19E-08			0	0	0.00E+00	9.19E-08
n-Octadecane	399	ND	199	419	ND	0	410	ND	0	199	0.20	62	93	9.29E-08			0	0	0.00E+00	9.29E-08
C18 as Octodecane	399	ND	199	419	ND	0	410	ND	0	199	0.20	62	93	9.29E-08			0	0	0.00E+00	9.29E-08
n-Nonadecane	400	ND	200	420	ND	0	411	ND	0	200	0.20	62	93	9.31E-08			0	0	0.00E+00	9.31E-08
C19 as Nonadecane	400	ND	200	420	ND	0	411	ND	0	200	0.20	62	93	9.31E-08			0	0	0.00E+00	9.31E-08
n-Eicosane	399	ND	199	419	ND	0	410	ND	0	199	0.20	62	93	9.29E-08			0	0	0.00E+00	9.29E-08
C20 as Eicosane	399	ND	199	419	ND	0	410	ND	0	199	0.20	62	93	9.29E-08			0	0	0.00E+00	9.29E-08
n-Heneicosane	402	ND	201	423	ND	0	414	ND	0	201	0.20	62	94	9.37E-08			0	0	0.00E+00	9.37E-08
C21 as Heneicosane	402	ND	201	424	J	424	414	ND	0	-223	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Docosane	398	ND	199	418	ND	0	409	ND	0	199	0.20	62	93	9.27E-08			0	0	0.00E+00	9.27E-08
C22 as Docosane	398	ND	199	418	ND	0	409	ND	0	199	0.20	62	93	9.27E-08			0	0	0.00E+00	9.27E-08
n-Tricosane	398	ND	199	418	ND	0	409	ND	0	199	0.20	62	93	9.27E-08			0	0	0.00E+00	9.27E-08
C23 as Tricosane	398	ND	199	418	ND	0	409	ND	0	199	0.20	62	93	9.27E-08			0	0	0.00E+00	9.27E-08
n-Tetracosane	401	ND	200	421	ND	0	412	ND	0	200	0.20	62	93	9.33E-08			0	0	0.00E+00	9.33E-08
C24 as Tetracosane	401	ND	200	421	ND	0	412	ND	0	200	0.20	62	93	9.33E-08			0	0	0.00E+00	9.33E-08
Total Hydrocarbon			91,113			10,680			0		87.25	29685	40,656	4.07E-05	0		0	0	0.00E+00	4.07E-05

Bagging Data Form — Vacuum Method

Sample Id: A012 A/B

Equipment type:	Valve	**Component ID:**	A-1305
Equipment Subtype:	Gate	**Plant ID:**	Refinery A
Line Size:	4 *inches*	**Date:**	28-Feb-17
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	30.15 *inHg* / 765.8 *mmHg*	**Sample Pump ID**	BU51791
Ambient Temperature:	63.1 °F / 17.3 °C	**TVA ID**	9509
Stream Temperature:	°F / -17.8 °C	**Stream pressure:**	*psig*
Stream Description:	*Diesel at Fin Fans*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A012A

Time	Bagging Test Measurement Data									
11:45	Pre-Test M21	784	*ppmv*		Background		*ppmv*	Pre-Test $M21_{Corr}$	784	*ppmv*
12:36	Volume Start	250.8	*Liters*							
12:40	DGM_{10L} Time	01:26.0	*min:sec.frac*	DGM Time	1.433	DGM Flow	6.98	DGM $Flow_{STP}$	6.89	*liters/minute*
12:40	Vacuum check	0.005	*inches H2O*							
12:43	DGM_T	78	°F	25.6	°C	DGM_P	1.9	*inches H2O vacuum*	762.3	*mmHg*
13:08	Bag $Conc_{ppm}$	270	*ppmv*							
13:16	Volume Stop	262.8	*Liters*	Total Vol	12.0	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.300	*L/min*	Sorbent $Flow_{STP}$	0.296	*L/min*
	Sorbent Vol_{STP}	11.86	*Liters*	DGM Vol_{STP}	275.77	*Liters*	Total Run Vol_{STP}	287.63	*Liters*	

A012B

Time	Bagging Test Measurement Data									
13:20	Volume Start	262.8	*Liters*							
13:21	DGM_{10L} Time	01:41.9	*min:sec.frac*	DGM Time	1.700	DGM Flow	5.88	DGM $Flow_{STP}$	5.79	*liters/minute*
13:21	Vacuum check	0.01	*inches H2O*							
13:36	DGM_T	80	°F	26.7	°C	DGM_P	1.9	*inches H2O vacuum*	762.3	*mmHg*
13:55	Bag $Conc_{ppm}$	196	*ppmv*							
14:00	Volume Stop	275.3	*Liters*	Total Vol	12.5	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.313	*L/min*	Sorbent $Flow_{STP}$	0.308	*L/min*
	Sorbent Vol_{STP}	12.31	*Liters*	DGM Vol_{STP}	231.65	*Liters*	Total Run Vol_{STP}	243.96	*Liters*	

14:26	**Final Screening (ppmv) - equipment**	171 *ppmv*	**background**	*ppmv*	
Condensate accumulation: starting time			Final time		0
Organic condensate collected	*ml*				
Density of organic condensate	*g/ml*				

Average THC emissions =	3.66E-03 kg/hr
Percent difference THC ER =	21%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	5.94E-08
C5 as Pentane	3.98E-07
n-Hexane	6.18E-08
C6 as Hexane	3.92E-07
n-Heptane	6.45E-08
C7 as Heptane	4.39E-07
n-Octane	5.07E-07
C8 as Octane	3.02E-06
n-Nonane	4.75E-06
C9 as Nonane	3.27E-05
n-Decane	4.40E-05
C10 as Decane	3.22E-04
n-Undecane	8.50E-05
C11 as Undecane	4.36E-04
n-Dodecane	5.68E-05
C12 as Dodecane	4.39E-04
n-Tridecane	7.20E-05
C13 as Tridecane	3.40E-04
n-Tetradecane	5.84E-05
C14 as tetradecane	3.74E-04
n-Pentadecane	6.22E-05
C15 as Pentadecane	3.40E-04
n-Hexadecane	5.21E-05
C16 as Hexadecane	3.04E-04
n-Heptadecane	5.14E-05
C17 as Heptadecane	1.66E-04
n-Octadecane	3.07E-05
C18 as Octodecane	1.76E-04
n-Nonadecane	2.93E-05
C19 as Nonadecane	8.28E-05
n-Eicosane	1.20E-05
C20 as Eicosane	4.62E-05
n-Heneicosane	5.57E-06
C21 as Heneicosane	1.72E-05
n-Docosane	2.75E-06
C22 as Docosane	5.08E-06
n-Tricosane	1.26E-06
C23 as Tricosane	2.34E-06
n-Tetracosane	4.91E-07
C24 as Tetracosane	3.09E-06
Total Hydrocarbon	3.66E-03

THC:	**1.94E-01**	**lbs/day**	**3.53E-02**	**tons/yr**

G/V ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture			COMBINED EMISSION RATE
#A012A	#A012A		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj									
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	156	ND	78	0		0	920	ND	0	78	0.08	22	34	3.37E-08	12	0.14	8.36E-09	4.20E-08
C5 as Pentane	255	J	255	0		0	920	ND	0	255	0.26	73	110	1.10E-07	12	0.14	8.36E-09	1.19E-07
n-Hexane	162	ND	81	0		0	973	ND	0	81	0.08	23	35	3.50E-08	12	0.14	8.68E-09	4.37E-08
C6 as Hexane	1017	J	1,017	0		0	973	ND	0	1,017	1.02	292	439	4.39E-07	12	0.14	8.68E-09	4.47E-07
n-Heptane	169	ND	85	0		0	1018	ND	0	85	0.08	24	37	3.65E-08	13	0.15	9.07E-09	4.56E-08
C7 as Heptane	1128	J	1,128	0		0	1018	ND	0	1,128	1.13	324	487	4.87E-07	13	0.15	9.07E-09	4.96E-07
n-Octane	1294	J	1,294	0		0	407	ND	0	1,294	1.29	372	558	5.58E-07	69	0.82	4.94E-08	6.08E-07
C8 as Octane	6823	J	6,823	0		0	407	ND	0	6,823	6.82	1963	2944	2.94E-06	69	0.82	4.94E-08	2.99E-06
n-Nonane	12003		12,003	0		0	410	ND	0	12,003	12.00	3452	5179	5.18E-06	68	0.81	4.87E-08	5.23E-06
C9 as Nonane	89036		89,036	0		0	410	ND	0	89,036	89.04	25609	38414	3.84E-05	826	9.84	5.90E-07	3.90E-05
n-Decane	110734		110,734	0		0	414	ND	0	110,734	110.73	31850	47775	4.78E-05	1,342	15.97	9.58E-07	4.87E-05
C10 as Decane	772768		772,768	0		0	414	ND	0	772,768	772.77	222269	333404	3.33E-04	11,524	137.19	8.23E-06	3.42E-04
n-Undecane	206703		206,703	0		0	413	ND	0	206,703	206.70	59454	89180	8.92E-05	5,785	68.87	4.13E-06	9.33E-05
C11 as Undecane	1032924		1,032,924	0		0	413	ND	0	1,032,924	1032.92	297097	445646	4.46E-04	31,426	374.12	2.24E-05	4.68E-04
n-Dodecane	129304		129,304	0		0	410	ND	0	129,304	129.30	37191	55787	5.58E-05	7,926	94.35	5.66E-06	6.14E-05
C12 as Dodecane	998420		998,420	0		0	410	ND	0	998,420	998.42	287173	430760	4.31E-04	60,941	725.49	4.35E-05	4.74E-04
n-Tridecane	164436		164,436	0		0	411	ND	0	164,436	164.44	47296	70945	7.09E-05	15,007	178.66	1.07E-05	8.17E-05
C13 as Tridecane	714111		714,111	0		0	411	ND	0	714,111	714.11	205398	308097	3.08E-04	80,198	954.74	5.73E-05	3.65E-04
n-Tetradecane	98600		98,600	0		0	411	ND	0	98,600	98.60	28360	42540	4.25E-05	19,418	231.16	1.39E-05	5.64E-05
C14 as tetradecane	792257		792,257	0		0	411	ND	0	792,257	792.26	227875	341812	3.42E-04	109,484	1,303.38	7.82E-05	4.20E-04
n-Pentadecane	119331		119,331	0		0	413	ND	0	119,331	119.33	34323	51484	5.15E-05	20,694	246.36	1.48E-05	6.63E-05
C15 as Pentadecane	675036		675,036	0		0	413	ND	0	675,036	675.04	194159	291239	2.91E-04	113,476	1,350.91	8.11E-05	3.72E-04
n-Hexadecane	108444		108,444	0		0	411	ND	0	108,444	108.44	31192	46787	4.68E-05	16,766	199.59	1.20E-05	5.88E-05
C16 as Hexadecane	594751		594,751	0		0	411	ND	0	594,751	594.75	171067	256600	2.57E-04	105,074	1,250.88	7.51E-05	3.32E-04
n-Heptadecane	98081		98,081	0		0	406	ND	0	98,081	98.08	28211	42316	4.23E-05	16,339	194.52	1.17E-05	5.40E-05
C17 as Heptadecane	451755		451,755	0		0	406	ND	0	451,755	451.76	129937	194906	1.95E-04	95,501	1,136.91	6.82E-05	2.63E-04
n-Octadecane	60615		60,615	0		0	410	ND	0	60,615	60.61	17434	26152	2.62E-05	10,279	122.37	7.34E-06	3.35E-05
C18 as Octodecane	337819		337,819	0		0	410	ND	0	337,819	337.82	97166	145749	1.46E-04	62,205	740.53	4.44E-05	1.90E-04
n-Nonadecane	48048		48,048	0		0	411	ND	0	48,048	48.05	13820	20730	2.07E-05	11,189	133.21	7.99E-06	2.87E-05
C19 as Nonadecane	174479		174,479	0		0	411	ND	0	174,479	174.48	50185	75277	7.53E-05	28,422	338.36	2.03E-05	9.56E-05
n-Eicosane	20290		20,290	0		0	410	ND	0	20,290	20.29	5836	8754	8.75E-06	4,464	53.14	3.19E-06	1.19E-05
C20 as Eicosane	78053		78,053	0		0	410	ND	0	78,053	78.05	22450	33675	3.37E-05	20,302	241.69	1.45E-05	4.82E-05
n-Heneicosane	7946	J	7,946	0		0	414	ND	0	7,946	7.95	2286	3428	3.43E-06	2,734	32.55	1.95E-06	5.38E-06
C21 as Heneicosane	19052		19,052	0		0	414	ND	0	19,052	19.05	5480	8220	8.22E-06	10,372	123.47	7.41E-06	1.56E-05
n-Docosane	3864	J	3,864	0		0	409	ND	0	3,864	3.86	1111	1667	1.67E-06	1,618	19.26	1.16E-06	2.82E-06
C22 as Docosane	2452	J	2,452	0		0	409	ND	0	2,452	2.45	705	1058	1.06E-06	5,561	66.21	3.97E-06	5.03E-06
n-Tricosane	1664	J	1,664	0		0	409	ND	0	1,664	1.66	479	718	7.18E-07	846	10.07	6.04E-07	1.32E-06
C23 as Tricosane	829	ND	414	0		0	409	ND	0	414	0.41	119	179	1.79E-07	3,104	36.95	2.22E-06	2.40E-06
n-Tetracosane	834	ND	417	0		0	412	ND	0	417	0.42	120	180	1.80E-07	459	5.46	3.28E-07	5.08E-07
C24 as Tetracosane	834	ND	417	0		0	412	ND	0	417	0.42	120	180	1.80E-07	4,151	49.42	2.97E-06	3.15E-06
Total Hydrocarbon			7,934,989			0			0	0		0	3,423,482	3.42E-03	877,712	10,449	6.27E-04	4.05E-03

2017-06-14 REVISED LIQUID RESULTS	AO12L1			AO12L2			Sum
	µg	Flag	Adj.	µg	Flag	Adj.	µg
n-Pentane	12	ND	6	12	ND	6	12
C5 as Pentane	12	ND	6	12	ND	6	12
n-Hexane	12	ND	6	12	ND	6	12
C6 as Hexane	12	ND	6	12	ND	6	12
n-Heptane	13	ND	6	13	ND	6	13
C7 as Heptane	13	ND	6	13	ND	6	13
n-Octane	126	ND	63	13	ND	6	69
C8 as Octane	126	ND	63	13	ND	6	69
n-Nonane	124	ND	62	12	ND	6	68
C9 as Nonane	820		820	12	ND	6	826
n-Decane	1336		1336	12	ND	6	1342
C10 as Decane	11472		11472	52		52	11524
n-Undecane	5723		5723	62	J	62	5785
C11 as Undecane	31141		31141	285		285	31426
n-Dodecane	7769		7769	157		157	7926
C12 as Dodecane	59773		59773	1168		1168	60941
n-Tridecane	14462		14462	545		545	15007
C13 as Tridecane	77027		77027	3171		3171	80198
n-Tetradecane	18105		18105	1313		1313	19418
C14 as tetradecane	101295		101295	8189		8189	109484
n-Pentadecane	18274		18274	2420		2420	20694
C15 as Pentadecane	99813		99813	13663		13663	113476
n-Hexadecane	13853		13853	2913		2913	16766
C16 as Hexadecane	86539		86539	18534		18534	105074
n-Heptadecane	12655		12655	3684		3684	16339
C17 as Heptadecane	74146		74146	21355		21355	95501
n-Octadecane	7247		7247	3032		3032	10279
C18 as Octodecane	42222		42222	19983		19983	62205
n-Nonadecane	7040		7040	4149		4149	11189
C19 as Nonadecane	17038		17038	11384		11384	28422
n-Eicosane	2455		2455	2009		2009	4464
C20 as Eicosane	9596		9596	10706		10706	20302
n-Heneicosane	964	J	964	1770		1770	2734
C21 as Heneicosane	2919		2919	7453		7453	10372
n-Docosane	359	J	359	1259		1259	1618
C22 as Docosane	179	J	179	5383		5383	5561
n-Tricosane	125	ND	62	783		783	846
C23 as Tricosane	125	ND	62	3041		3041	3104
n-Tetracosane	126	ND	63	396		396	459
C24 as Tetracosane	559	J	559	3593		3593	4151
Total Hydrocarbon			725192			152520	877712

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		#T012L1&L2			COMBINED EMISSION RATE
#A012B	#A012B		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj									
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	374	ND	187	0	0	0	920	ND	0	187	0.19	46	69	6.85E-08	12	0.14	8.36E-09	7.69E-08
C5 as Pentane	1829	J	1,829	0	0	0	920	ND	0	1,829	1.83	446	669	6.69E-07	12	0.14	8.36E-09	6.78E-07
n-Hexane	389	ND	195	0	0	0	973	ND	0	195	0.19	47	71	7.12E-08	12	0.14	8.68E-09	7.99E-08
C6 as Hexane	894	J	894	0	0	0	973	ND	0	894	0.89	218	327	3.27E-07	12	0.14	8.68E-09	3.36E-07
n-Heptane	407	ND	203	0	0	0	1018	ND	0	203	0.20	50	74	7.44E-08	13	0.15	9.07E-09	8.35E-08
C7 as Heptane	1020	J	1,020	0	0	0	1018	ND	0	1,020	1.02	249	373	3.73E-07	13	0.15	9.07E-09	3.82E-07
n-Octane	973	J	973	0	0	0	407	ND	0	973	0.97	237	356	3.56E-07	69	0.82	4.94E-08	4.05E-07
C8 as Octane	8182		8,182	0	0	0	407	ND	0	8,182	8.18	1996	2994	2.99E-06	69	0.82	4.94E-08	3.04E-06
n-Nonane	11569		11,569	0	0	0	410	ND	0	11,569	11.57	2822	4233	4.23E-06	68	0.81	4.87E-08	4.28E-06
C9 as Nonane	70551		70,551	0	0	0	410	ND	0	70,551	70.55	17211	25817	2.58E-05	826	9.84	5.90E-07	2.64E-05
n-Decane	104949		104,949	0	0	0	414	ND	0	104,949	104.95	25603	38404	3.84E-05	1,342	15.97	9.58E-07	3.94E-05
C10 as Decane	804135		804,135	0	0	0	414	ND	0	804,135	804.14	196173	294260	2.94E-04	11,524	137.19	8.23E-06	3.02E-04
n-Undecane	198003		198,003	0	0	0	413	ND	0	198,003	198.00	48304	72456	7.25E-05	5,785	68.87	4.13E-06	7.66E-05
C11 as Undecane	1041653		1,041,653	0	0	0	413	ND	0	1,041,653	1041.65	254117	381176	3.81E-04	31,426	374.12	2.24E-05	4.04E-04
n-Dodecane	126906		126,906	0	0	0	410	ND	0	126,906	126.91	30959	46439	4.64E-05	7,926	94.35	5.66E-06	5.21E-05
C12 as Dodecane	983777		983,777	0	0	0	410	ND	0	983,777	983.78	239998	359997	3.60E-04	60,941	725.49	4.35E-05	4.04E-04
n-Tridecane	141179		141,179	0	0	0	411	ND	0	141,179	141.18	34441	51662	5.17E-05	15,007	178.66	1.07E-05	6.24E-05
C13 as Tridecane	701925		701,925	0	0	0	411	ND	0	701,925	701.93	171239	256858	2.57E-04	80,198	954.74	5.73E-05	3.14E-04
n-Tetradecane	127113		127,113	0	0	0	411	ND	0	127,113	127.11	31010	46515	4.65E-05	19,418	231.16	1.39E-05	6.04E-05
C14 as tetradecane	681609		681,609	0	0	0	411	ND	0	681,609	681.61	166282	249424	2.49E-04	109,484	1,303.38	7.82E-05	3.28E-04
n-Pentadecane	118281		118,281	0	0	0	413	ND	0	118,281	118.28	28855	43283	4.33E-05	20,694	246.36	1.48E-05	5.81E-05
C15 as Pentadecane	618617		618,617	0	0	0	413	ND	0	618,617	618.62	150915	226373	2.26E-04	113,476	1,350.91	8.11E-05	3.07E-04
n-Hexadecane	91470		91,470	0	0	0	411	ND	0	91,470	91.47	22315	33472	3.35E-05	16,766	199.59	1.20E-05	4.54E-05
C16 as Hexadecane	550473		550,473	0	0	0	411	ND	0	550,473	550.47	134291	201437	2.01E-04	105,074	1,250.88	7.51E-05	2.76E-04
n-Heptadecane	101594		101,594	0	0	0	406	ND	0	101,594	101.59	24784	37177	3.72E-05	16,339	194.52	1.17E-05	4.88E-05
C17 as Heptadecane	399	ND	200	0	0	0	406	ND	0	200	0.20	49	73	7.30E-08	95,501	1,136.91	6.82E-05	6.83E-05
n-Octadecane	56362		56,362	0	0	0	410	ND	0	56,362	56.36	13750	20625	2.06E-05	10,279	122.37	7.34E-06	2.80E-05
C18 as Octodecane	320875		320,875	0	0	0	410	ND	0	320,875	320.87	78279	117419	1.17E-04	62,205	740.53	4.44E-05	1.62E-04
n-Nonadecane	59603		59,603	0	0	0	411	ND	0	59,603	59.60	14541	21811	2.18E-05	11,189	133.21	7.99E-06	2.98E-05
C19 as Nonadecane	135773		135,773	0	0	0	411	ND	0	135,773	135.77	33123	49684	4.97E-05	28,422	338.36	2.03E-05	7.00E-05
n-Eicosane	24073		24,073	0	0	0	410	ND	0	24,073	24.07	5873	8809	8.81E-06	4,464	53.14	3.19E-06	1.20E-05
C20 as Eicosane	81226		81,226	0	0	0	410	ND	0	81,226	81.23	19816	29723	2.97E-05	20,302	241.69	1.45E-05	4.42E-05
n-Heneicosane	10395		10,395	0	0	0	414	ND	0	10,395	10.40	2536	3804	3.80E-06	2,734	32.55	1.95E-06	5.76E-06
C21 as Heneicosane	30914		30,914	0	0	0	414	ND	0	30,914	30.91	7542	11313	1.13E-05	10,372	123.47	7.41E-06	1.87E-05
n-Docosane	4136	J	4,136	0	0	0	409	ND	0	4,136	4.14	1009	1513	1.51E-06	1,618	19.26	1.16E-06	2.67E-06
C22 as Docosane	3190	J	3,190	0	0	0	409	ND	0	3,190	3.19	778	1167	1.17E-06	5,561	66.21	3.97E-06	5.14E-06
n-Tricosane	1597	J	1,597	0	0	0	409	ND	0	1,597	1.60	390	584	5.84E-07	846	10.07	6.04E-07	1.19E-06
C23 as Tricosane	399	ND	199	0	0	0	409	ND	0	199	0.20	49	73	7.29E-08	3,104	36.95	2.22E-06	2.29E-06
n-Tetracosane	805	ND	402	0	0	0	412	ND	0	402	0.40	98	147	1.47E-07	459	5.46	3.28E-07	4.75E-07
C24 as Tetracosane	402	ND	201	0	0	0	412	ND	0	201	0.20	49	74	7.36E-08	4,151	49.42	2.97E-06	3.04E-06
Total Hydrocarbon			7,216,434			0			0	0		0	2,640,736	2.64E-03	877,712	10,449	6.27E-04	3.27E-03

Bagging Data Form **Vacuum Method** **Sample Id** **A013 A/B**

WSPA
Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	**A-901**	
Equipment Subtype:	Hatch Cover			**Plant ID:**	Refinery A	
Line Size:	24 *inches*			**Date:**	1-Mar-17	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30.37 *inHg*	771.4	*mmHg*	**Sample Pump ID**	BU51791	
Ambient Temperature:	65 *°F*	18.3	*°C*	**TVA ID**	9509	
Stream Temperature:	*°F*	-17.8	*°C*	**Stream pressure:**		*psig*
Stream Description:	*Diesel*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A013A

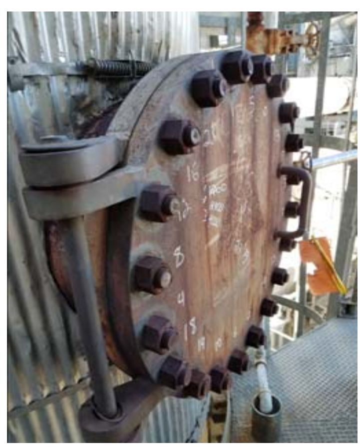
Time	Bagging Test Measurement Data								
10:05	Pre-Test M21	141	*ppmv*	Background		*ppmv*	Pre-Test $M21_{Corr}$	141	*ppmv*
11:39	Volume Start	275.3	*Liters*						
11:46	DGM_{10L} Time	02:41.2	*min:sec.frac*	DGM Time	2.683	DGM Flow 3.73	DGM $Flow_{STP}$	3.79	*liters/minute*
11:46	Vacuum check	0.01	*inches H2O*						
12:05	DGM_T	66	*°F*	18.9	*°C*	DGM_P 2.3	*inches H2O vacuum*	767.1	*mmHg*
12:02	Bag $Conc_{ppm}$	94.5	*ppmv*						
12:21	Volume Stop	288.2	*Liters*	Total Vol	12.9	*Liters*			
	Sorbent Run Time	42	*Minutes*	Sorbent Flow	0.307	*L/min*	Sorbent $Flow_{STP}$	0.312	*L/min*
	Sorbent Vol_{STP}	13.12	*Liters*	DGM Vol_{STP}	159.21	*Liters*	Total Run Vol_{STP}	172.33	*Liters*

A013B

Time	Bagging Test Measurement Data								
12:25	Volume Start	288.2	*Liters*						
12:25	DGM_{10L} Time	02:47.2	*min:sec.frac*	DGM Time	2.783	DGM Flow 3.59	DGM $Flow_{STP}$	3.66	*liters/minute*
12:25	Vacuum check	0.03	*inches H2O*						
12:37	DGM_T	66	*°F*	18.9	*°C*	DGM_P 2.1	*inches H2O vacuum*	767.5	*mmHg*
13:04	Bag $Conc_{ppm}$	125	*ppmv*						
13:07	Volume Stop	301.3	*Liters*	Total Vol	13.1	*Liters*			
	Sorbent Run Time	42	*Minutes*	Sorbent Flow	0.312	*L/min*	Sorbent $Flow_{STP}$	0.317	*L/min*
	Sorbent Vol_{STP}	13.33	*Liters*	DGM Vol_{STP}	153.56	*Liters*	Total Run Vol_{STP}	166.89	*Liters*

13:25	**Final Screening (ppmv) - equipment**	223 *ppmv*	**background**	*ppmv*	
Condensate accumulation: starting time		Final time		0	
Organic condensate collected	*ml*				
Density of organic condensate	*g/ml*				

Average THC emissions =	4.63E-04 kg/hr
Percent difference THC ER =	22%
Acceptable?	No



AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	3.02E-08
C5 as Pentane	0.00E+00
n-Hexane	4.76E-08
C6 as Hexane	3.67E-07
n-Heptane	7.45E-08
C7 as Heptane	1.87E-07
n-Octane	2.00E-07
C8 as Octane	5.08E-07
n-Nonane	3.73E-07
C9 as Nonane	3.93E-06
n-Decane	3.63E-06
C10 as Decane	6.23E-05
n-Undecane	1.60E-05
C11 as Undecane	1.26E-04
n-Dodecane	7.77E-06
C12 as Dodecane	1.12E-04
n-Tridecane	9.28E-06
C13 as Tridecane	5.75E-05
n-Tetradecane	4.08E-06
C14 as tetradecane	2.75E-05
n-Pentadecane	1.75E-06
C15 as Pentadecane	1.42E-05
n-Hexadecane	1.19E-06
C16 as Hexadecane	8.48E-06
n-Heptadecane	7.88E-07
C17 as Heptadecane	3.26E-06
n-Octadecane	2.37E-07
C18 as Octodecane	3.10E-07
n-Nonadecane	1.22E-07
C19 as Nonadecane	5.23E-08
n-Eicosane	5.26E-08
C20 as Eicosane	3.21E-08
n-Heneicosane	3.24E-08
C21 as Heneicosane	7.91E-08
n-Docosane	3.22E-08
C22 as Docosane	3.22E-08
n-Tricosane	3.21E-08
C23 as Tricosane	3.21E-08
n-Tetracosane	3.24E-08
C24 as Tetracosane	3.24E-08
Total Hydrocarbon	4.63E-04

THC:	**2.45E-02**	**lbs/day**	**4.47E-03 tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A013A	#A013A		ND Adj	#A014A		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	145	ND	73	901	ND	0	920	ND	0	73	0.07	13	18	1.79E-08			0	0	0.00E+00	1.79E-08
C5 as Pentane	145	ND	73	4412	J	4,412	920	ND	0	-4,339	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	207	J	207	953	ND	0	973	ND	0	207	0.21	36	51	5.10E-08			0	0	0.00E+00	5.10E-08
C6 as Hexane	2800		2,800	953	ND	0	973	ND	0	2,800	2.80	483	689	6.89E-07			0	0	0.00E+00	6.89E-07
n-Heptane	417	J	417	997	ND	0	1018	ND	0	417	0.42	72	103	1.03E-07			0	0	0.00E+00	1.03E-07
C7 as Heptane	3541		3,541	2020	J	2,020	1018	ND	0	1,521	1.52	262	374	3.74E-07			0	0	0.00E+00	3.74E-07
n-Octane	1004	J	1,004	399	ND	0	407	ND	0	1,004	1.00	173	247	2.47E-07			0	0	0.00E+00	2.47E-07
C8 as Octane	2423	J	2,423	399	ND	0	407	ND	0	2,423	2.42	418	597	5.97E-07			0	0	0.00E+00	5.97E-07
n-Nonane	1510		1,510	402	ND	0	410	ND	0	1,510	1.51	260	372	3.72E-07			0	0	0.00E+00	3.72E-07
C9 as Nonane	20436		20,436	402	ND	0	410	ND	0	20,436	20.44	3522	5031	5.03E-06			0	0	0.00E+00	5.03E-06
n-Decane	12727		12,727	406	ND	0	414	ND	0	12,727	12.73	2193	3133	3.13E-06			0	0	0.00E+00	3.13E-06
C10 as Decane	252272		252,272	406	ND	0	414	ND	0	252,272	252.27	43474	62106	6.21E-05			0	0	0.00E+00	6.21E-05
n-Undecane	66640		66,640	1764	J	1,764	413	ND	0	64,876	64.88	11180	15971	1.60E-05			0	0	0.00E+00	1.60E-05
C11 as Undecane	552569		552,569	5505		5,505	413	ND	0	547,064	547.06	94275	134679	1.35E-04			0	0	0.00E+00	1.35E-04
n-Dodecane	42400		42,400	7997		7,997	410	ND	0	34,403	34.40	5929	8469	8.47E-06			0	0	0.00E+00	8.47E-06
C12 as Dodecane	524852		524,852	34476		34,476	410	ND	0	490,377	490.38	84506	120723	1.21E-04			0	0	0.00E+00	1.21E-04
n-Tridecane	53072		53,072	13812		13,812	411	ND	0	39,261	39.26	6766	9665	9.67E-06			0	0	0.00E+00	9.67E-06
C13 as Tridecane	309099		309,099	56432		56,432	411	ND	0	252,667	252.67	43542	62203	6.22E-05			0	0	0.00E+00	6.22E-05
n-Tetradecane	31756		31,756	9717		9,717	411	ND	0	22,040	22.04	3798	5426	5.43E-06			0	0	0.00E+00	5.43E-06
C14 as tetradecane	193684		193,684	55803		55,803	411	ND	0	137,882	137.88	23761	33944	3.39E-05			0	0	0.00E+00	3.39E-05
n-Pentadecane	15869		15,869	4363		4,363	413	ND	0	11,506	11.51	1983	2833	2.83E-06			0	0	0.00E+00	2.83E-06
C15 as Pentadecane	102987		102,987	22723		22,723	413	ND	0	80,264	80.26	13832	19760	1.98E-05			0	0	0.00E+00	1.98E-05
n-Hexadecane	8708		8,708	755	J	755	411	ND	0	7,953	7.95	1370	1958	1.96E-06			0	0	0.00E+00	1.96E-06
C16 as Hexadecane	62536		62,536	2337	J	2,337	411	ND	0	60,199	60.20	10374	14820	1.48E-05			0	0	0.00E+00	1.48E-05
n-Heptadecane	5281		5,281	398	ND	0	406	ND	0	5,281	5.28	910	1300	1.30E-06			0	0	0.00E+00	1.30E-06
C17 as Heptadecane	26267		26,267	398	ND	0	406	ND	0	26,267	26.27	4526	6466	6.47E-06			0	0	0.00E+00	6.47E-06
n-Octadecane	1490	J	1,490	402	ND	0	410	ND	0	1,490	1.49	257	367	3.67E-07			0	0	0.00E+00	3.67E-07
C18 as Octodecane	1995		1,995	402	ND	0	410	ND	0	1,995	2.00	344	491	4.91E-07			0	0	0.00E+00	4.91E-07
n-Nonadecane	810	J	810	403	ND	0	411	ND	0	810	0.81	140	199	1.99E-07			0	0	0.00E+00	1.99E-07
C19 as Nonadecane	233	J	233	403	ND	0	411	ND	0	233	0.23	40	57	5.75E-08			0	0	0.00E+00	5.75E-08
n-Eicosane	243	J	243	402	ND	0	410	ND	0	243	0.24	42	60	5.98E-08			0	0	0.00E+00	5.98E-08
C20 as Eicosane	153	ND	76	402	ND	0	410	ND	0	76	0.08	13	19	1.88E-08			0	0	0.00E+00	1.88E-08
n-Heneicosane	155	ND	77	406	ND	0	414	ND	0	77	0.08	13	19	1.90E-08			0	0	0.00E+00	1.90E-08
C21 as Heneicosane	156	J	156	406	ND	0	414	ND	0	156	0.16	27	38	3.83E-08			0	0	0.00E+00	3.83E-08
n-Docosane	155	ND	77	401	ND	0	409	ND	0	77	0.08	13	19	1.91E-08			0	0	0.00E+00	1.91E-08
C22 as Docosane	155	ND	77	401	ND	0	409	ND	0	77	0.08	13	19	1.91E-08			0	0	0.00E+00	1.91E-08
n-Tricosane	155	ND	77	401	ND	0	409	ND	0	77	0.08	13	19	1.90E-08			0	0	0.00E+00	1.90E-08
C23 as Tricosane	155	ND	77	401	ND	0	409	ND	0	77	0.08	13	19	1.90E-08			0	0	0.00E+00	1.90E-08
n-Tetracosane	156	ND	78	404	ND	0	412	ND	0	78	0.08	13	19	1.92E-08			0	0	0.00E+00	1.92E-08
C24 as Tetracosane	156	ND	78	404	ND	0	412	ND	0	78	0.08	13	19	1.92E-08			0	0	0.00E+00	1.92E-08
Total Hydrocarbon			2,298,751			222,115			0		2080.97	358613	512,304	5.12E-04	0		0	0	0.00E+00	5.12E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A013B	#A013B		ND Adj	#A014A		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	357	ND	179	901	ND	0	920	ND	0	179	0.18	30	43	4.26E-08			0	0	0.00E+00	4.26E-08
C5 as Pentane	1165	J	1,165	4412	J	4,412	920	ND	0	-3,247	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexane	371	ND	186	953	ND	0	973	ND	0	186	0.19	31	44	4.43E-08			0	0	0.00E+00	4.43E-08
C6 as Hexane	371	ND	186	953	ND	0	973	ND	0	186	0.19	31	44	4.43E-08			0	0	0.00E+00	4.43E-08
n-Heptane	388	ND	194	997	ND	0	1018	ND	0	194	0.19	32	46	4.62E-08			0	0	0.00E+00	4.62E-08
C7 as Heptane	661	J	661	2020	J	2,020	1018	ND	0	-1,359	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Octane	639	J	639	399	ND	0	407	ND	0	639	0.64	107	152	1.52E-07			0	0	0.00E+00	1.52E-07
C8 as Octane	1756	J	1,756	399	ND	0	407	ND	0	1,756	1.76	293	419	4.19E-07			0	0	0.00E+00	4.19E-07
n-Nonane	1566	J	1,566	402	ND	0	410	ND	0	1,566	1.57	261	373	3.73E-07			0	0	0.00E+00	3.73E-07
C9 as Nonane	11880		11,880	402	ND	0	410	ND	0	11,880	11.88	1983	2832	2.83E-06			0	0	0.00E+00	2.83E-06
n-Decane	17346		17,346	406	ND	0	414	ND	0	17,346	17.35	2895	4136	4.14E-06			0	0	0.00E+00	4.14E-06
C10 as Decane	261819		261,819	406	ND	0	414	ND	0	261,819	261.82	43696	62423	6.24E-05			0	0	0.00E+00	6.24E-05
n-Undecane	68807		68,807	1764	J	1,764	413	ND	0	67,043	67.04	11189	15984	1.60E-05			0	0	0.00E+00	1.60E-05
C11 as Undecane	501557		501,557	5505	0	5,505	413	ND	0	496,051	496.05	82788	118269	1.18E-04			0	0	0.00E+00	1.18E-04
n-Dodecane	37676		37,676	7997	0	7,997	410	ND	0	29,678	29.68	4953	7076	7.08E-06			0	0	0.00E+00	7.08E-06
C12 as Dodecane	463898		463,898	34476	0	34,476	410	ND	0	429,422	429.42	71668	102383	1.02E-04			0	0	0.00E+00	1.02E-04
n-Tridecane	51127		51,127	13812	0	13,812	411	ND	0	37,316	37.32	6228	8897	8.90E-06			0	0	0.00E+00	8.90E-06
C13 as Tridecane	277730		277,730	56432	0	56,432	411	ND	0	221,298	221.30	36933	52762	5.28E-05			0	0	0.00E+00	5.28E-05
n-Tetradecane	21153		21,153	9717	0	9,717	411	ND	0	11,437	11.44	1909	2727	2.73E-06			0	0	0.00E+00	2.73E-06
C14 as tetradecane	144116		144,116	55803	0	55,803	411	ND	0	88,313	88.31	14739	21056	2.11E-05			0	0	0.00E+00	2.11E-05
n-Pentadecane	7128		7,128	4363	0	4,363	413	ND	0	2,765	2.76	461	659	6.59E-07			0	0	0.00E+00	6.59E-07
C15 as Pentadecane	59312		59,312	22723	0	22,723	413	ND	0	36,590	36.59	6107	8724	8.72E-06			0	0	0.00E+00	8.72E-06
n-Hexadecane	2558	J	2,558	755	J	755	411	ND	0	1,802	1.80	301	430	4.30E-07			0	0	0.00E+00	4.30E-07
C16 as Hexadecane	11337		11,337	2337	J	2,337	411	ND	0	9,000	9.00	1502	2146	2.15E-06			0	0	0.00E+00	2.15E-06
n-Heptadecane	1153	J	1,153	398	ND	0	406	ND	0	1,153	1.15	192	275	2.75E-07			0	0	0.00E+00	2.75E-07
C17 as Heptadecane	376	ND	188	398	ND	0	406	ND	0	188	0.19	31	45	4.49E-08			0	0	0.00E+00	4.49E-08
n-Octadecane	451	J	451	402	ND	0	410	ND	0	451	0.45	75	107	1.07E-07			0	0	0.00E+00	1.07E-07
C18 as Octodecane	541	J	541	402	ND	0	410	ND	0	541	0.54	90	129	1.29E-07			0	0	0.00E+00	1.29E-07
n-Nonadecane	381	ND	191	403	ND	0	411	ND	0	191	0.19	32	45	4.55E-08			0	0	0.00E+00	4.55E-08
C19 as Nonadecane	197	J	197	403	ND	0	411	ND	0	197	0.20	33	47	4.71E-08			0	0	0.00E+00	4.71E-08
n-Eicosane	380	ND	190	402	ND	0	410	ND	0	190	0.19	32	45	4.53E-08			0	0	0.00E+00	4.53E-08
C20 as Eicosane	380	ND	190	402	ND	0	410	ND	0	190	0.19	32	45	4.53E-08			0	0	0.00E+00	4.53E-08
n-Heneicosane	384	ND	192	406	ND	0	414	ND	0	192	0.19	32	46	4.58E-08			0	0	0.00E+00	4.58E-08
C21 as Heneicosane	503	J	503	406	ND	0	414	ND	0	503	0.50	84	120	1.20E-07			0	0	0.00E+00	1.20E-07
n-Docosane	380	ND	190	401	ND	0	409	ND	0	190	0.19	32	45	4.53E-08			0	0	0.00E+00	4.53E-08
C22 as Docosane	380	ND	190	401	ND	0	409	ND	0	190	0.19	32	45	4.53E-08			0	0	0.00E+00	4.53E-08
n-Tricosane	380	ND	190	401	ND	0	409	ND	0	190	0.19	32	45	4.53E-08			0	0	0.00E+00	4.53E-08
C23 as Tricosane	380	ND	190	401	ND	0	409	ND	0	190	0.19	32	45	4.53E-08			0	0	0.00E+00	4.53E-08
n-Tetracosane	382	ND	191	404	ND	0	412	ND	0	191	0.19	32	46	4.56E-08			0	0	0.00E+00	4.56E-08
C24 as Tetracosane	382	ND	191	404	ND	0	412	ND	0	191	0.19	32	46	4.56E-08			0	0	0.00E+00	4.56E-08
Total Hydrocarbon			1,948,911			222,115			0		1731.40	298371	412,801	4.13E-04	0		0	0	0.00E+00	4.13E-04

Bagging Data Form	Vacuum Method		Sample Id	A015 A/B
Equipment type:	Connector		Component ID:	A-1038
Equipment Subtype:	Union		Plant ID:	Refinery A
Line Size:	1 inches		Date:	2-Mar-17
Phase (G, LL, HL):	HL		Analysis team:	EG/DR
Barometric pressure	30.32 inHg	770.1 mmHg	Sample Pump ID	BU51791
Ambient Temperature:	57.7 °F	14.3 °C	TVA ID	9509
Stream Temperature:	317 °F	158.3 °C	Stream pressure:	psig
Stream Description:	HE 4637 Kerosene Tubeside Inlet			

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A015A

Time	Bagging Test Measurement Data										
9:35	Pre-Test M21	2505	ppmv		Background		ppmv	Pre-Test M21$_{Corr}$	2505	ppmv	
10:02	Volume Start	301.3	Liters								
10:03	DGM$_{10L}$ Time	01:19.2	min:sec.frac	DGM Time	1.317	DGM Flow	7.59	DGM Flow$_{STP}$	7.56	liters/minute	
10:03	Vacuum check	0.03	inches H2O								
10:21	DGM$_T$	77	°F	25.0	°C	DGM$_P$	2.1	inches H2O vacuum	766.2	mmHg	
10:31	Bag Conc$_{ppm}$	272	ppmv								
10:42	Volume Stop	313.5	Liters	Total Vol	12.2	Liters					
	Sorbent Run Time	40	Minutes		Sorbent Flow	0.305	L/min	Sorbent Flow$_{STP}$	0.304	L/min	
	Sorbent Vol$_{STP}$	12.14	Liters	DGM Vol$_{STP}$	302.32	Liters	Total Run Vol$_{STP}$	326.60	Liters		

A015B

Time	Bagging Test Measurement Data										
10:45	Volume Start	313.5	Liters								
10:50	DGM$_{10L}$ Time	01:17.8	min:sec.frac	DGM Time	1.300	DGM Flow	7.69	DGM Flow$_{STP}$	7.70	liters/minute	
10:50	Vacuum check	0.02	inches H2O								
11:10	DGM$_T$	74	°F	23.3	°C	DGM$_P$	1.9	inches H2O vacuum	766.6	mmHg	
11:12	Bag Conc$_{ppm}$	343	ppmv								
11:25	Volume Stop	325.7	Liters	Total Vol	12.2	Liters					
	Sorbent Run Time	40	Minutes		Sorbent Flow	0.305	L/min	Sorbent Flow$_{STP}$	0.305	L/min	
	Sorbent Vol$_{STP}$	12.21	Liters	DGM Vol$_{STP}$	308.07	Liters	Total Run Vol$_{STP}$	320.28	Liters		

11:58	Final Screening (ppmv) - equipment	3,389 ppmv	background	ppmv	
Condensate accumulation: starting time			Final time		0
Organic condensate collected	ml				
Density of organic condensate	g/ml				

Average THC emissions =	1.27E-03 kg/hr
Percent difference THC ER =	13%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	4.12E-07
C5 as Pentane	9.34E-08
n-Hexane	1.71E-06
C6 as Hexane	3.53E-06
n-Heptane	8.51E-06
C7 as Heptane	1.79E-05
n-Octane	1.36E-05
C8 as Octane	5.76E-05
n-Nonane	3.41E-05
C9 as Nonane	1.63E-04
n-Decane	7.67E-05
C10 as Decane	3.77E-04
n-Undecane	5.29E-05
C11 as Undecane	2.28E-04
n-Dodecane	2.88E-05
C12 as Dodecane	1.42E-04
n-Tridecane	1.12E-05
C13 as Tridecane	4.91E-05
n-Tetradecane	4.92E-07
C14 as tetradecane	4.33E-06
n-Pentadecane	0.00E+00
C15 as Pentadecane	0.00E+00
n-Hexadecane	0.00E+00
C16 as Hexadecane	0.00E+00
n-Heptadecane	1.49E-07
C17 as Heptadecane	0.00E+00
n-Octadecane	1.50E-07
C18 as Octodecane	1.99E-07
n-Nonadecane	1.49E-07
C19 as Nonadecane	6.92E-08
n-Eicosane	1.48E-07
C20 as Eicosane	6.89E-08
n-Heneicosane	1.50E-07
C21 as Heneicosane	1.50E-07
n-Docosane	1.49E-07
C22 as Docosane	1.49E-07
n-Tricosane	1.49E-07
C23 as Tricosane	1.49E-07
n-Tetracosane	1.50E-07
C24 as Tetracosane	1.50E-07
Total Hydrocarbon	1.27E-03

THC:	6.73E-02	lbs/day	1.23E-02 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
#A015A	#A015A		ND Adj	#A016A		ND Adj	#A024A		ND Adj											
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	836	J	836	384	ND	0	920	ND	0	836	0.84	273	409	4.09E-07			0	0	0.00E+00	4.09E-07
C5 as Pentane	193	J	193	384	ND	0	920	ND	0	193	0.19	63	95	9.45E-08			0	0	0.00E+00	9.45E-08
n-Hexane	3144		3,144	399	ND	0	973	ND	0	3,144	3.14	1027	1540	1.54E-06			0	0	0.00E+00	1.54E-06
C6 as Hexane	6826		6,826	399	ND	0	973	ND	0	6,826	6.83	2229	3344	3.34E-06			0	0	0.00E+00	3.34E-06
n-Heptane	16461		16,461	763	J	763	1018	ND	0	15,698	15.70	5127	7691	7.69E-06			0	0	0.00E+00	7.69E-06
C7 as Heptane	37129		37,129	3105	J	3,105	1018	ND	0	34,024	34.02	11112	16668	1.67E-05			0	0	0.00E+00	1.67E-05
n-Octane	27409		27,409	406	ND	0	407	ND	0	27,409	27.41	8952	13428	1.34E-05			0	0	0.00E+00	1.34E-05
C8 as Octane	140050		140,050	406	ND	0	407	ND	0	140,050	140.05	45741	68611	6.86E-05			0	0	0.00E+00	6.86E-05
n-Nonane	72099		72,099	409	ND	0	410	ND	0	72,099	72.10	23548	35322	3.53E-05			0	0	0.00E+00	3.53E-05
C9 as Nonane	430129		430,129	1576	J	1,576	410	ND	0	428,552	428.55	139966	209949	2.10E-04			0	0	0.00E+00	2.10E-04
n-Decane	159669		159,669	2550	J	2,550	414	ND	0	157,119	157.12	51315	76973	7.70E-05			0	0	0.00E+00	7.70E-05
C10 as Decane	765384		765,384	7097		7,097	414	ND	0	758,287	758.29	247658	371487	3.71E-04			0	0	0.00E+00	3.71E-04
n-Undecane	124255		124,255	5334		5,334	413	ND	0	118,921	118.92	38840	58260	5.83E-05			0	0	0.00E+00	5.83E-05
C11 as Undecane	523212		523,212	15714		15,714	413	ND	0	507,498	507.50	165750	248625	2.49E-04			0	0	0.00E+00	2.49E-04
n-Dodecane	78206		78,206	11908		11,908	410	ND	0	66,298	66.30	21653	32480	3.25E-05			0	0	0.00E+00	3.25E-05
C12 as Dodecane	337249		337,249	27989		27,989	410	ND	0	309,260	309.26	101005	151508	1.52E-04			0	0	0.00E+00	1.52E-04
n-Tridecane	42774		42,774	16275		16,275	411	ND	0	26,499	26.50	8655	12982	1.30E-05			0	0	0.00E+00	1.30E-05
C13 as Tridecane	136851		136,851	49127		49,127	411	ND	0	87,724	87.72	28651	42976	4.30E-05			0	0	0.00E+00	4.30E-05
n-Tetradecane	15067		15,067	13597		13,597	411	ND	0	1,470	1.47	480	720	7.20E-07			0	0	0.00E+00	7.20E-07
C14 as tetradecane	43726		43,726	42896		42,896	411	ND	0	830	0.83	271	407	4.07E-07			0	0	0.00E+00	4.07E-07
n-Pentadecane	3604	J	3,604	5651		5,651	413	ND	0	-2,047	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	4987	J	4,987	19527		19,527	413	ND	0	-14,540	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	819	ND	409	1563	J	1,563	411	ND	0	-1,154	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	819	ND	409	4178		4,178	411	ND	0	-3,768	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	818	ND	409	404	ND	0	406	ND	0	409	0.41	134	200	2.00E-07			0	0	0.00E+00	2.00E-07
C17 as Heptadecane	818	ND	409	445	J	445	406	ND	0	-36	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Octadecane	822	ND	411	409	ND	0	410	ND	0	411	0.41	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
C18 as Octodecane	822	ND	411	409	ND	0	410	ND	0	411	0.41	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
n-Nonadecane	818	ND	409	409	ND	0	411	ND	0	409	0.41	134	200	2.00E-07			0	0	0.00E+00	2.00E-07
C19 as Nonadecane	164	ND	82	409	ND	0	411	ND	0	82	0.08	27	40	4.01E-08			0	0	0.00E+00	4.01E-08
n-Eicosane	808	ND	404	408	ND	0	410	ND	0	404	0.40	132	198	1.98E-07			0	0	0.00E+00	1.98E-07
C20 as Eicosane	162	ND	81	408	ND	0	410	ND	0	81	0.08	26	40	3.96E-08			0	0	0.00E+00	3.96E-08
n-Heneicosane	817	ND	409	412	ND	0	414	ND	0	409	0.41	133	200	2.00E-07			0	0	0.00E+00	2.00E-07
C21 as Heneicosane	817	ND	409	412	ND	0	414	ND	0	409	0.41	133	200	2.00E-07			0	0	0.00E+00	2.00E-07
n-Docosane	819	ND	409	408	ND	0	409	ND	0	409	0.41	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
C22 as Docosane	819	ND	409	408	ND	0	409	ND	0	409	0.41	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
n-Tricosane	817	ND	408	408	ND	0	409	ND	0	408	0.41	133	200	2.00E-07			0	0	0.00E+00	2.00E-07
C23 as Tricosane	817	ND	408	408	ND	0	409	ND	0	408	0.41	133	200	2.00E-07			0	0	0.00E+00	2.00E-07
n-Tetracosane	825	ND	412	410	ND	0	412	ND	0	412	0.41	135	202	2.02E-07			0	0	0.00E+00	2.02E-07
C24 as Tetracosane	825	ND	412	410	ND	0	412	ND	0	412	0.41	135	202	2.02E-07			0	0	0.00E+00	2.02E-07
Total Hydrocarbon			2,975,972			229,296			0		2768.22	904107	#######	1.36E-03	0		0	0	0.00E+00	1.36E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
#A015B	#A015B		ND Adj	#A016A		ND Adj	#A024A		ND Adj											
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	865	J	865	384	ND	0	920	ND	0	865	0.86	277	415	4.15E-07			0	0	0.00E+00	4.15E-07
C5 as Pentane	384	ND	192	384	ND	0	920	ND	0	192	0.19	61	92	9.22E-08			0	0	0.00E+00	9.22E-08
n-Hexane	3913	J	3,913	399	ND	0	973	ND	0	3,913	3.91	1253	1880	1.88E-06			0	0	0.00E+00	1.88E-06
C6 as Hexane	7728		7,728	399	ND	0	973	ND	0	7,728	7.73	2475	3713	3.71E-06			0	0	0.00E+00	3.71E-06
n-Heptane	20175		20,175	763	J	763	1018	ND	0	19,412	19.41	6217	9326	9.33E-06			0	0	0.00E+00	9.33E-06
C7 as Heptane	42783		42,783	3105	J	3,105	1018	ND	0	39,678	39.68	12708	19062	1.91E-05			0	0	0.00E+00	1.91E-05
n-Octane	28582		28,582	406	ND	0	407	ND	0	28,582	28.58	9154	13731	1.37E-05			0	0	0.00E+00	1.37E-05
C8 as Octane	96958		96,958	406	ND	0	407	ND	0	96,958	96.96	31054	46581	4.66E-05			0	0	0.00E+00	4.66E-05
n-Nonane	68401		68,401	409	ND	0	410	ND	0	68,401	68.40	21908	32862	3.29E-05			0	0	0.00E+00	3.29E-05
C9 as Nonane	242616		242,616	1576	J	1,576	410	ND	0	241,040	241.04	77201	115802	1.16E-04			0	0	0.00E+00	1.16E-04
n-Decane	161773		161,773	2550	J	2,550	414	ND	0	159,223	159.22	50996	76495	7.65E-05			0	0	0.00E+00	7.65E-05
C10 as Decane	804196		804,196	7097	0	7,097	414	ND	0	797,099	797.10	255298	382947	3.83E-04			0	0	0.00E+00	3.83E-04
n-Undecane	104133		104,133	5334	0	5,334	413	ND	0	98,799	98.80	31644	47466	4.75E-05			0	0	0.00E+00	4.75E-05
C11 as Undecane	445438		445,438	15714	0	15,714	413	ND	0	429,724	429.72	137634	206450	2.06E-04			0	0	0.00E+00	2.06E-04
n-Dodecane	64300		64,300	11908	0	11,908	410	ND	0	52,393	52.39	16781	25171	2.52E-05			0	0	0.00E+00	2.52E-05
C12 as Dodecane	304179		304,179	27989	0	27,989	410	ND	0	276,190	276.19	88459	132689	1.33E-04			0	0	0.00E+00	1.33E-04
n-Tridecane	35699		35,699	16275	0	16,275	411	ND	0	19,424	19.42	6221	9332	9.33E-06			0	0	0.00E+00	9.33E-06
C13 as Tridecane	163908		163,908	49127	0	49,127	411	ND	0	114,781	114.78	36762	55144	5.51E-05			0	0	0.00E+00	5.51E-05
n-Tetradecane	14145		14,145	13597	0	13,597	411	ND	0	548	0.55	175	263	2.63E-07			0	0	0.00E+00	2.63E-07
C14 as tetradecane	60066		60,066	42896	0	42,896	411	ND	0	17,170	17.17	5499	8249	8.25E-06			0	0	0.00E+00	8.25E-06
n-Pentadecane	3463	J	3,463	5651	0	5,651	413	ND	0	-2,188	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	14928		14,928	19527	0	19,527	413	ND	0	-4,599	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	727	J	727	1563	J	1,563	411	ND	0	-836	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	1431	J	1,431	4178	0	4,178	411	ND	0	-2,746	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	404	ND	202	404	ND	0	406	ND	0	202	0.20	65	97	9.71E-08			0	0	0.00E+00	9.71E-08
C17 as Heptadecane	404	ND	202	445	J	445	406	ND	0	-243	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Octadecane	409	ND	204	409	ND	0	410	ND	0	204	0.20	65	98	9.82E-08			0	0	0.00E+00	9.82E-08
C18 as Octodecane	409	J	409	409	ND	0	410	ND	0	409	0.41	131	196	1.96E-07			0	0	0.00E+00	1.96E-07
n-Nonadecane	409	ND	205	409	ND	0	411	ND	0	205	0.20	66	98	9.83E-08			0	0	0.00E+00	9.83E-08
C19 as Nonadecane	409	ND	205	409	ND	0	411	ND	0	205	0.20	66	98	9.83E-08			0	0	0.00E+00	9.83E-08
n-Eicosane	408	ND	204	408	ND	0	410	ND	0	204	0.20	65	98	9.81E-08			0	0	0.00E+00	9.81E-08
C20 as Eicosane	408	ND	204	408	ND	0	410	ND	0	204	0.20	65	98	9.81E-08			0	0	0.00E+00	9.81E-08
n-Heneicosane	412	ND	206	412	ND	0	414	ND	0	206	0.21	66	99	9.90E-08			0	0	0.00E+00	9.90E-08
C21 as Heneicosane	412	ND	206	412	ND	0	414	ND	0	206	0.21	66	99	9.90E-08			0	0	0.00E+00	9.90E-08
n-Docosane	408	ND	204	408	ND	0	409	ND	0	204	0.20	65	98	9.79E-08			0	0	0.00E+00	9.79E-08
C22 as Docosane	408	ND	204	408	ND	0	409	ND	0	204	0.20	65	98	9.79E-08			0	0	0.00E+00	9.79E-08
n-Tricosane	408	ND	204	408	ND	0	409	ND	0	204	0.20	65	98	9.79E-08			0	0	0.00E+00	9.79E-08
C23 as Tricosane	408	ND	204	408	ND	0	409	ND	0	204	0.20	65	98	9.79E-08			0	0	0.00E+00	9.79E-08
n-Tetracosane	410	ND	205	410	ND	0	412	ND	0	205	0.21	66	99	9.86E-08			0	0	0.00E+00	9.86E-08
C24 as Tetracosane	410	ND	205	410	ND	0	412	ND	0	205	0.21	66	99	9.86E-08			0	0	0.00E+00	9.86E-08
Total Hydrocarbon			2,694,073			229,296			0		2475.39	808467	#######	1.19E-03	0		0	0	0.00E+00	1.19E-03

Bagging Data Form	Vacuum Method			Sample Id	A017 A/B		
Equipment type:	Connector			Component ID:	A-1050		
Equipment Subtype:	Plug			Plant ID:	Refinery A		
Line Size:	1	inches		Date:	2-Mar-17		
Phase (G, LL, HL):	HL			Analysis team:	EG/DR		
Barometric pressure	30.24	inHg	768.1 mmHg	Sample Pump ID	BU51791		
Ambient Temperature:	77.2	°F	25.1 °C	TVA ID	9509		
Stream Temperature:	330	°F	165.6 °C	Stream pressure:		psig	
Stream Description:	HE 4637 Kerosene Tubeside Inlet						

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A017A

Time	Bagging Test Measurement Data										
11:22	Pre-Test M21	3138	ppmv		Background		ppmv	Pre-Test $M21_{Corr}$	3138	ppmv	
13:25	Volume Start	325.7	Liters								
13:29	DGM_{10L} Time	01:33.8	min:sec.frac	DGM Time	1.567	DGM Flow	6.38	$DGM\ Flow_{STP}$	6.25	liters/minute	
13:29	Vacuum check	0.15	inches H2O								
13:45	DGM_T	85	°F	29.4	°C	DGM_P	1.9	inches H2O vacuum	764.5	mmHg	
13:40	$Bag\ Conc_{ppm}$	280	ppmv								
14:05	Volume Stop	337.6	Liters	Total Vol	11.9	Liters					
	Sorbent Run Time	40	Minutes		Sorbent Flow	0.298	L/min	$Sorbent\ Flow_{STP}$	0.291	L/min	
	$Sorbent\ Vol_{STP}$	11.64	Liters	$DGM\ Vol_{STP}$	249.80	Liters	$Total\ Run\ Vol_{STP}$	261.45	Liters		

A017B

Time	Bagging Test Measurement Data										
14:08	Volume Start	337.6	Liters								
14:10	DGM_{10L} Time	01:28.6	min:sec.frac	DGM Time	1.483	DGM Flow	6.74	$DGM\ Flow_{STP}$	6.64	liters/minute	
14:10	Vacuum check	0.045	inches H2O								
14:21	DGM_T	80	°F	26.7	°C	DGM_P	2.8	inches H2O vacuum	762.9	mmHg	
14:40	$Bag\ Conc_{ppm}$	402	ppmv								
14:48	Volume Stop	349.9	Liters	Total Vol	12.3	Liters					
	Sorbent Run Time	40	Minutes		Sorbent Flow	0.307	L/min	$Sorbent\ Flow_{STP}$	0.303	L/min	
	$Sorbent\ Vol_{STP}$	12.12	Liters	$DGM\ Vol_{STP}$	265.70	Liters	$Total\ Run\ Vol_{STP}$	277.82	Liters		

15:02	Final Screening (ppmv) - equipment	2,538	ppmv	background		ppmv
	Condensate accumulation: starting time			Final time		0
	Organic condensate collected		ml			
	Density of organic condensate		g/ml			

Average THC emissions =	8.75E-04 kg/hr
Percent difference THC ER =	112%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	4.06E-07
C5 as Pentane	9.95E-08
n-Hexane	1.87E-06
C6 as Hexane	3.36E-06
n-Heptane	8.95E-06
C7 as Heptane	1.58E-05
n-Octane	1.30E-05
C8 as Octane	4.74E-05
n-Nonane	2.91E-05
C9 as Nonane	1.22E-04
n-Decane	5.32E-05
C10 as Decane	2.10E-04
n-Undecane	3.81E-05
C11 as Undecane	1.71E-04
n-Dodecane	2.50E-05
C12 as Dodecane	8.14E-05
n-Tridecane	8.02E-06
C13 as Tridecane	3.68E-05
n-Tetradecane	9.60E-07
C14 as tetradecane	7.37E-06
n-Pentadecane	0.00E+00
C15 as Pentadecane	0.00E+00
n-Hexadecane	0.00E+00
C16 as Hexadecane	0.00E+00
n-Heptadecane	1.00E-07
C17 as Heptadecane	0.00E+00
n-Octadecane	1.01E-07
C18 as Octodecane	5.87E-08
n-Nonadecane	1.01E-07
C19 as Nonadecane	5.87E-08
n-Eicosane	1.01E-07
C20 as Eicosane	5.85E-08
n-Heneicosane	1.02E-07
C21 as Heneicosane	5.90E-08
n-Docosane	1.01E-07
C22 as Docosane	5.86E-08
n-Tricosane	1.01E-07
C23 as Tricosane	5.85E-08
n-Tetracosane	1.01E-07
C24 as Tetracosane	5.90E-08
Total Hydrocarbon	8.75E-04

THC:	4.63E-02	lbs/day	8.45E-03 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A017A	#A017A		ND Adj	#A016A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	1116	J	1,116	384	ND	0	920	ND	0	1,116	1.12	292	438	4.38E-07			0	0	0.00E+00	4.38E-07
C5 as Pentane	305	J	305	384	ND	0	920	ND	0	305	0.31	80	120	1.20E-07			0	0	0.00E+00	1.20E-07
n-Hexane	4399		4,399	399	ND	0	973	ND	0	4,399	4.40	1150	1725	1.73E-06			0	0	0.00E+00	1.73E-06
C6 as Hexane	8218		8,218	399	ND	0	973	ND	0	8,218	8.22	2149	3223	3.22E-06			0	0	0.00E+00	3.22E-06
n-Heptane	18584		18,584	763	J	763	1018	ND	0	17,821	17.82	4659	6989	6.99E-06			0	0	0.00E+00	6.99E-06
C7 as Heptane	37541		37,541	3105	J	3,105	1018	ND	0	34,436	34.44	9003	13505	1.35E-05			0	0	0.00E+00	1.35E-05
n-Octane	29644		29,644	406	ND	0	407	ND	0	29,644	29.64	7750	11625	1.16E-05			0	0	0.00E+00	1.16E-05
C8 as Octane	124793		124,793	406	ND	0	407	ND	0	124,793	124.79	32626	48940	4.89E-05			0	0	0.00E+00	4.89E-05
n-Nonane	53840		53,840	409	ND	0	410	ND	0	53,840	53.84	14076	21114	2.11E-05			0	0	0.00E+00	2.11E-05
C9 as Nonane	267964		267,964	1576	J	1,576	410	ND	0	266,387	266.39	69646	104469	1.04E-04			0	0	0.00E+00	1.04E-04
n-Decane	51106		51,106	2550	J	2,550	414	ND	0	48,556	48.56	12695	19042	1.90E-05			0	0	0.00E+00	1.90E-05
C10 as Decane	253881		253,881	7097		7,097	414	ND	0	246,784	246.78	64520	96781	9.68E-05			0	0	0.00E+00	9.68E-05
n-Undecane	30784		30,784	5334		5,334	413	ND	0	25,450	25.45	6654	9980	9.98E-06			0	0	0.00E+00	9.98E-06
C11 as Undecane	113719		113,719	15714		15,714	413	ND	0	98,004	98.00	25623	38434	3.84E-05			0	0	0.00E+00	3.84E-05
n-Dodecane	13246		13,246	11908		11,908	410	ND	0	1,338	1.34	350	525	5.25E-07			0	0	0.00E+00	5.25E-07
C12 as Dodecane	49515		49,515	27989		27,989	410	ND	0	21,526	21.53	5628	8442	8.44E-06			0	0	0.00E+00	8.44E-06
n-Tridecane	3366		3,366	16275		16,275	411	ND	0	-12,909	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C13 as Tridecane	10253		10,253	49127		49,127	411	ND	0	-38,874	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Tetradecane	538	J	538	13597		13,597	411	ND	0	-13,059	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C14 as tetradecane	994	J	994	42896		42,896	411	ND	0	-41,902	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Pentadecane	167	ND	84	5651		5,651	413	ND	0	-5,567	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	167	ND	84	19527		19,527	413	ND	0	-19,443	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	168	ND	84	1563	J	1,563	411	ND	0	-1,479	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	168	ND	84	4178		4,178	411	ND	0	-4,094	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	168	ND	84	404	ND	0	406	ND	0	84	0.08	22	33	3.29E-08			0	0	0.00E+00	3.29E-08
C17 as Heptadecane	168	ND	84	445	J	445	406	ND	0	-361	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Octadecane	169	ND	84	409	ND	0	410	ND	0	84	0.08	22	33	3.31E-08			0	0	0.00E+00	3.31E-08
C18 as Octodecane	169	ND	84	409	ND	0	410	ND	0	84	0.08	22	33	3.31E-08			0	0	0.00E+00	3.31E-08
n-Nonadecane	168	ND	84	409	ND	0	411	ND	0	84	0.08	22	33	3.29E-08			0	0	0.00E+00	3.29E-08
C19 as Nonadecane	168	ND	84	409	ND	0	411	ND	0	84	0.08	22	33	3.29E-08			0	0	0.00E+00	3.29E-08
n-Eicosane	166	ND	83	408	ND	0	410	ND	0	83	0.08	22	32	3.25E-08			0	0	0.00E+00	3.25E-08
C20 as Eicosane	166	ND	83	408	ND	0	410	ND	0	83	0.08	22	32	3.25E-08			0	0	0.00E+00	3.25E-08
n-Heneicosane	168	ND	84	412	ND	0	414	ND	0	84	0.08	22	33	3.29E-08			0	0	0.00E+00	3.29E-08
C21 as Heneicosane	168	ND	84	412	ND	0	414	ND	0	84	0.08	22	33	3.29E-08			0	0	0.00E+00	3.29E-08
n-Docosane	168	ND	84	408	ND	0	409	ND	0	84	0.08	22	33	3.29E-08			0	0	0.00E+00	3.29E-08
C22 as Docosane	168	ND	84	408	ND	0	409	ND	0	84	0.08	22	33	3.29E-08			0	0	0.00E+00	3.29E-08
n-Tricosane	167	ND	84	408	ND	0	409	ND	0	84	0.08	22	33	3.28E-08			0	0	0.00E+00	3.28E-08
C23 as Tricosane	167	ND	84	408	ND	0	409	ND	0	84	0.08	22	33	3.28E-08			0	0	0.00E+00	3.28E-08
n-Tetracosane	169	ND	85	410	ND	0	412	ND	0	85	0.08	22	33	3.32E-08			0	0	0.00E+00	3.32E-08
C24 as Tetracosane	169	ND	85	410	ND	0	412	ND	0	85	0.08	22	33	3.32E-08			0	0	0.00E+00	3.32E-08
Total Hydrocarbon			1,075,484			229,296			0		983.88	257230	385,845	3.86E-04	0		0	0	0.00E+00	3.86E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A017B	#A017B		ND Adj	#A016A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	900	J	900	384	ND	0	920	ND	0	900	0.90	250	375	3.75E-07			0	0	0.00E+00	3.75E-07
C5 as Pentane	381	ND	190	384	ND	0	920	ND	0	190	0.19	53	79	7.93E-08			0	0	0.00E+00	7.93E-08
n-Hexane	4835		4,835	399	ND	0	973	ND	0	4,835	4.84	1343	2015	2.01E-06			0	0	0.00E+00	2.01E-06
C6 as Hexane	8382		8,382	399	ND	0	973	ND	0	8,382	8.38	2329	3493	3.49E-06			0	0	0.00E+00	3.49E-06
n-Heptane	26966		26,966	763	J	763	1018	ND	0	26,203	26.20	7280	10919	1.09E-05			0	0	0.00E+00	1.09E-05
C7 as Heptane	46547		46,547	3105	J	3,105	1018	ND	0	43,441	43.44	12069	18103	1.81E-05			0	0	0.00E+00	1.81E-05
n-Octane	34484		34,484	406	ND	0	407	ND	0	34,484	34.48	9580	14370	1.44E-05			0	0	0.00E+00	1.44E-05
C8 as Octane	109974		109,974	406	ND	0	407	ND	0	109,974	109.97	30553	45829	4.58E-05			0	0	0.00E+00	4.58E-05
n-Nonane	88978		88,978	409	ND	0	410	ND	0	88,978	88.98	24719	37079	3.71E-05			0	0	0.00E+00	3.71E-05
C9 as Nonane	338189		338,189	1576	J	1,576	410	ND	0	336,613	336.61	93516	140274	1.40E-04			0	0	0.00E+00	1.40E-04
n-Decane	212040		212,040	2550	J	2,550	414	ND	0	209,490	209.49	58199	87299	8.73E-05			0	0	0.00E+00	8.73E-05
C10 as Decane	783204		783,204	7097	0	7,097	414	ND	0	776,107	776.11	215614	323422	3.23E-04			0	0	0.00E+00	3.23E-04
n-Undecane	164244		164,244	5334	0	5,334	413	ND	0	158,910	158.91	44148	66222	6.62E-05			0	0	0.00E+00	6.62E-05
C11 as Undecane	744337		744,337	15714	0	15,714	413	ND	0	728,623	728.62	202423	303634	3.04E-04			0	0	0.00E+00	3.04E-04
n-Dodecane	130549		130,549	11908	0	11,908	410	ND	0	118,641	118.64	32960	49440	4.94E-05			0	0	0.00E+00	4.94E-05
C12 as Dodecane	398252		398,252	27989	0	27,989	410	ND	0	370,263	370.26	102865	154297	1.54E-04			0	0	0.00E+00	1.54E-04
n-Tridecane	54752		54,752	16275	0	16,275	411	ND	0	38,477	38.48	10689	16034	1.60E-05			0	0	0.00E+00	1.60E-05
C13 as Tridecane	225564		225,564	49127	0	49,127	411	ND	0	176,437	176.44	49017	73525	7.35E-05			0	0	0.00E+00	7.35E-05
n-Tetradecane	18204		18,204	13597	0	13,597	411	ND	0	4,607	4.61	1280	1920	1.92E-06			0	0	0.00E+00	1.92E-06
C14 as tetradecane	78246		78,246	42896	0	42,896	411	ND	0	35,350	35.35	9821	14731	1.47E-05			0	0	0.00E+00	1.47E-05
n-Pentadecane	4990	J	4,990	5651	0	5,651	413	ND	0	-661	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	15136		15,136	19527	0	19,527	413	ND	0	-4,391	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	811	ND	406	1563	J	1,563	411	ND	0	-1,158	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	2166	J	2,166	4178	0	4,178	411	ND	0	-2,011	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	802	ND	401	404	ND	0	406	ND	0	401	0.40	111	167	1.67E-07			0	0	0.00E+00	1.67E-07
C17 as Heptadecane	401	ND	200	445	J	445	406	ND	0	-245	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Octadecane	811	ND	405	409	ND	0	410	ND	0	405	0.41	113	169	1.69E-07			0	0	0.00E+00	1.69E-07
C18 as Octodecane	405	ND	203	409	ND	0	410	ND	0	203	0.20	56	84	8.44E-08			0	0	0.00E+00	8.44E-08
n-Nonadecane	812	ND	406	409	ND	0	411	ND	0	406	0.41	113	169	1.69E-07			0	0	0.00E+00	1.69E-07
C19 as Nonadecane	406	ND	203	409	ND	0	411	ND	0	203	0.20	56	85	8.46E-08			0	0	0.00E+00	8.46E-08
n-Eicosane	810	ND	405	408	ND	0	410	ND	0	405	0.41	113	169	1.69E-07			0	0	0.00E+00	1.69E-07
C20 as Eicosane	405	ND	203	408	ND	0	410	ND	0	203	0.20	56	84	8.44E-08			0	0	0.00E+00	8.44E-08
n-Heneicosane	818	ND	409	412	ND	0	414	ND	0	409	0.41	114	170	1.70E-07			0	0	0.00E+00	1.70E-07
C21 as Heneicosane	409	ND	204	412	ND	0	414	ND	0	204	0.20	57	85	8.52E-08			0	0	0.00E+00	8.52E-08
n-Docosane	809	ND	404	408	ND	0	409	ND	0	404	0.40	112	168	1.68E-07			0	0	0.00E+00	1.68E-07
C22 as Docosane	404	ND	202	408	ND	0	409	ND	0	202	0.20	56	84	8.42E-08			0	0	0.00E+00	8.42E-08
n-Tricosane	809	ND	404	408	ND	0	409	ND	0	404	0.40	112	168	1.68E-07			0	0	0.00E+00	1.68E-07
C23 as Tricosane	404	ND	202	408	ND	0	409	ND	0	202	0.20	56	84	8.42E-08			0	0	0.00E+00	8.42E-08
n-Tetracosane	814	ND	407	410	ND	0	412	ND	0	407	0.41	113	170	1.70E-07			0	0	0.00E+00	1.70E-07
C24 as Tetracosane	407	ND	204	410	ND	0	412	ND	0	204	0.20	57	85	8.48E-08			0	0	0.00E+00	8.48E-08
Total Hydrocarbon			3,496,396			229,296			0		3275.57	856382	#######	1.37E-03	0		0	0	0.00E+00	1.37E-03

Bagging Data Form — Vacuum Method

Sample Id: **A018 A/B**

WSPA Western States Petroleum Association

Equipment type:	Valve	**Component ID:**	A-1014
Equipment Subtype:	Gate	**Plant ID:**	Refinery A
Line Size:	4 inches	**Date:**	6-Mar-17
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	30.22 inHg / 767.6 mmHg	**Sample Pump ID**	BU51791
Ambient Temperature:	66 °F / 18.9 °C	**TVA ID**	9509
Stream Temperature:	°F / -17.8 °C	**Stream pressure:**	psig
Stream Description:	HE 4149 Kerosene Shell Side Outlet		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A018A

Time	Bagging Test Measurement Data										
10:00	Pre-Test M21	1080	ppmv			Background		ppmv	Pre-Test $M21_{Corr}$	1080	ppmv
10:05	Volume Start	349.9	Liters								
10:10	DGM_{10L} Time	01:15.2	min:sec.frac	DGM Time	1.250	DGM Flow	8.00		$DGM\ Flow_{STP}$	7.88	liters/minute
10:10	Vacuum check	0.008	inches H2O								
10:34	DGM_T	81	°F	27.2	°C	DGM_P	2.1	inches H2O vacuum		763.7	mmHg
10:39	$Bag\ Conc_{ppm}$	16.3	ppmv								
10:45	Volume Stop	361.4	Liters	Total Vol	11.5	Liters					
	Sorbent Run Time	40	Minutes			Sorbent Flow	0.288	L/min	$Sorbent\ Flow_{STP}$	0.283	L/min
	$Sorbent\ Vol_{STP}$	11.32	Liters	$DGM\ Vol_{STP}$	315.04	Liters	Total Run Vol_{STP}	326.36	Liters		

A018B

Time	Bagging Test Measurement Data										
10:47	Volume Start	361.4	Liters								
10:50	DGM_{10L} Time	01:18.8	min:sec.frac	DGM Time	1.317	DGM Flow	7.59		$DGM\ Flow_{STP}$	7.63	liters/minute
10:50	Vacuum check	0.005	inches H2O								
11:13	DGM_T	70	°F	21.1	°C	DGM_P	2.05	inches H2O vacuum		763.8	mmHg
11:24	$Bag\ Conc_{ppm}$	20.5	ppmv								
11:27	Volume Stop	373.5	Liters	Total Vol	12.1	Liters					
	Sorbent Run Time	40	Minutes			Sorbent Flow	0.303	L/min	$Sorbent\ Flow_{STP}$	0.304	L/min
	$Sorbent\ Vol_{STP}$	12.16	Liters	$DGM\ Vol_{STP}$	305.34	Liters	Total Run Vol_{STP}	317.50	Liters		

11:37	**Final Screening (ppmv) - equipment**	2,267 ppmv	**background**	3.8 ppmv	
Condensate accumulation: starting time		Final time		0	
Organic condensate collected	ml				
Density of organic condensate	g/ml				

Average THC emissions =	5.26E-05 kg/hr
Percent difference THC ER =	9%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	8.02E-08
C5 as Pentane	2.01E-07
n-Hexane	2.00E-07
C6 as Hexane	2.35E-07
n-Heptane	4.26E-07
C7 as Heptane	1.15E-06
n-Octane	7.75E-07
C8 as Octane	3.07E-06
n-Nonane	1.74E-06
C9 as Nonane	8.21E-06
n-Decane	3.02E-06
C10 as Decane	1.29E-05
n-Undecane	1.97E-06
C11 as Undecane	7.16E-06
n-Dodecane	1.35E-06
C12 as Dodecane	4.20E-06
n-Tridecane	8.30E-07
C13 as Tridecane	2.24E-06
n-Tetradecane	4.92E-07
C14 as tetradecane	6.06E-07
n-Pentadecane	1.51E-07
C15 as Pentadecane	1.91E-07
n-Hexadecane	1.04E-07
C16 as Hexadecane	1.17E-07
n-Heptadecane	6.85E-08
C17 as Heptadecane	6.85E-08
n-Octadecane	6.90E-08
C18 as Octodecane	6.90E-08
n-Nonadecane	6.88E-08
C19 as Nonadecane	1.17E-07
n-Eicosane	6.82E-08
C20 as Eicosane	6.82E-08
n-Heneicosane	6.89E-08
C21 as Heneicosane	8.36E-08
n-Docosane	6.87E-08
C22 as Docosane	6.87E-08
n-Tricosane	6.86E-08
C23 as Tricosane	6.86E-08
n-Tetracosane	6.92E-08
C24 as Tetracosane	6.92E-08
Total Hydrocarbon	5.26E-05

THC:	2.78E-03	lbs/day	5.08E-04	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A018A	#A018A		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	291	ND	146	0		0	920	ND	0	146	0.15	48	71	7.13E-08			0	0	0.00E+00	7.13E-08
C5 as Pentane	639	J	639	0		0	920	ND	0	639	0.64	209	313	3.13E-07			0	0	0.00E+00	3.13E-07
n-Hexane	311	J	311	0		0	973	ND	0	311	0.31	102	152	1.52E-07			0	0	0.00E+00	1.52E-07
C6 as Hexane	480	J	480	0		0	973	ND	0	480	0.48	157	235	2.35E-07			0	0	0.00E+00	2.35E-07
n-Heptane	931	J	931	0		0	1018	ND	0	931	0.93	304	456	4.56E-07			0	0	0.00E+00	4.56E-07
C7 as Heptane	2,389		2,389	0		0	1018	ND	0	2,389	2.39	780	1169	1.17E-06			0	0	0.00E+00	1.17E-06
n-Octane	1,740	J	1,740	0		0	407	ND	0	1,740	1.74	568	852	8.52E-07			0	0	0.00E+00	8.52E-07
C8 as Octane	3,553		3,553	0		0	407	ND	0	3,553	3.55	1160	1739	1.74E-06			0	0	0.00E+00	1.74E-06
n-Nonane	3,323		3,323	0		0	410	ND	0	3,323	3.32	1084	1627	1.63E-06			0	0	0.00E+00	1.63E-06
C9 as Nonane	13,727		13,727	0		0	410	ND	0	13,727	13.73	4480	6720	6.72E-06			0	0	0.00E+00	6.72E-06
n-Decane	5,942		5,942	0		0	414	ND	0	5,942	5.94	1939	2909	2.91E-06			0	0	0.00E+00	2.91E-06
C10 as Decane	24,579		24,579	0		0	414	ND	0	24,579	24.58	8022	12032	1.20E-05			0	0	0.00E+00	1.20E-05
n-Undecane	3,734		3,734	0		0	413	ND	0	3,734	3.73	1219	1828	1.83E-06			0	0	0.00E+00	1.83E-06
C11 as Undecane	15,174		15,174	0		0	413	ND	0	15,174	15.17	4952	7428	7.43E-06			0	0	0.00E+00	7.43E-06
n-Dodecane	2,688		2,688	0		0	410	ND	0	2,688	2.69	877	1316	1.32E-06			0	0	0.00E+00	1.32E-06
C12 as Dodecane	9,290		9,290	0		0	410	ND	0	9,290	9.29	3032	4548	4.55E-06			0	0	0.00E+00	4.55E-06
n-Tridecane	1,876		1,876	0		0	411	ND	0	1,876	1.88	612	918	9.18E-07			0	0	0.00E+00	9.18E-07
C13 as Tridecane	6,001		6,001	0		0	411	ND	0	6,001	6.00	1959	2938	2.94E-06			0	0	0.00E+00	2.94E-06
n-Tetradecane	1,147	J	1,147	0		0	411	ND	0	1,147	1.15	374	561	5.61E-07			0	0	0.00E+00	5.61E-07
C14 as tetradecane	1,809		1,809	0		0	411	ND	0	1,809	1.81	590	885	8.85E-07			0	0	0.00E+00	8.85E-07
n-Pentadecane	422	J	422	0		0	413	ND	0	422	0.42	138	206	2.06E-07			0	0	0.00E+00	2.06E-07
C15 as Pentadecane	588	J	588	0		0	413	ND	0	588	0.59	192	288	2.88E-07			0	0	0.00E+00	2.88E-07
n-Hexadecane	232	J	232	0		0	411	ND	0	232	0.23	76	114	1.14E-07			0	0	0.00E+00	1.14E-07
C16 as Hexadecane	284	J	284	0		0	411	ND	0	284	0.28	93	139	1.39E-07			0	0	0.00E+00	1.39E-07
n-Heptadecane	171	ND	86	0		0	406	ND	0	86	0.09	28	42	4.20E-08			0	0	0.00E+00	4.20E-08
C17 as Heptadecane	171	ND	86	0		0	406	ND	0	86	0.09	28	42	4.20E-08			0	0	0.00E+00	4.20E-08
n-Octadecane	173	ND	87	0		0	410	ND	0	87	0.09	28	42	4.24E-08			0	0	0.00E+00	4.24E-08
C18 as Octodecane	173	ND	87	0		0	410	ND	0	87	0.09	28	42	4.24E-08			0	0	0.00E+00	4.24E-08
n-Nonadecane	174	ND	87	0		0	411	ND	0	87	0.09	28	43	4.25E-08			0	0	0.00E+00	4.25E-08
C19 as Nonadecane	174	ND	87	0		0	411	ND	0	87	0.09	28	43	4.25E-08			0	0	0.00E+00	4.25E-08
n-Eicosane	173	ND	87	0		0	410	ND	0	87	0.09	28	42	4.24E-08			0	0	0.00E+00	4.24E-08
C20 as Eicosane	173	ND	87	0		0	410	ND	0	87	0.09	28	42	4.24E-08			0	0	0.00E+00	4.24E-08
n-Heneicosane	175	ND	87	0		0	414	ND	0	87	0.09	29	43	4.28E-08			0	0	0.00E+00	4.28E-08
C21 as Heneicosane	148	J	148	0		0	414	ND	0	148	0.15	48	72	7.23E-08			0	0	0.00E+00	7.23E-08
n-Docosane	173	ND	86	0		0	409	ND	0	86	0.09	28	42	4.23E-08			0	0	0.00E+00	4.23E-08
C22 as Docosane	173	ND	86	0		0	409	ND	0	86	0.09	28	42	4.23E-08			0	0	0.00E+00	4.23E-08
n-Tricosane	173	ND	86	0		0	409	ND	0	86	0.09	28	42	4.23E-08			0	0	0.00E+00	4.23E-08
C23 as Tricosane	173	ND	86	0		0	409	ND	0	86	0.09	28	42	4.23E-08			0	0	0.00E+00	4.23E-08
n-Tetracosane	174	ND	87	0		0	412	ND	0	87	0.09	28	43	4.26E-08			0	0	0.00E+00	4.26E-08
C24 as Tetracosane	174	ND	87	0		0	412	ND	0	87	0.09	28	43	4.26E-08			0	0	0.00E+00	4.26E-08
Total Hydrocarbon	103,896		102,451			0			0		102.45	33436	50,154	5.02E-05	0		0	0	0.00E+00	5.02E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A018B	#A018B		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	374	ND	187	0		0	920	ND	0	187	0.19	59	89	8.92E-08			0	0	0.00E+00	8.92E-08
C5 as Pentane	374	ND	187	0		0	920	ND	0	187	0.19	59	89	8.92E-08			0	0	0.00E+00	8.92E-08
n-Hexane	519	J	519	0		0	973	ND	0	519	0.52	165	247	2.47E-07			0	0	0.00E+00	2.47E-07
C6 as Hexane	494	J	494	0		0	973	ND	0	494	0.49	157	235	2.35E-07			0	0	0.00E+00	2.35E-07
n-Heptane	831	J	831	0		0	1018	ND	0	831	0.83	264	396	3.96E-07			0	0	0.00E+00	3.96E-07
C7 as Heptane	2,381	J	2,381	0		0	1018	ND	0	2,381	2.38	756	1134	1.13E-06			0	0	0.00E+00	1.13E-06
n-Octane	1,465	J	1,465	0		0	407	ND	0	1,465	1.46	465	698	6.98E-07			0	0	0.00E+00	6.98E-07
C8 as Octane	9,232		9,232	0		0	407	ND	0	9,232	9.23	2931	4397	4.40E-06			0	0	0.00E+00	4.40E-06
n-Nonane	3,907	J	3,907	0		0	410	ND	0	3,907	3.91	1240	1861	1.86E-06			0	0	0.00E+00	1.86E-06
C9 as Nonane	20,373		20,373	0		0	410	ND	0	20,373	20.37	6468	9703	9.70E-06			0	0	0.00E+00	9.70E-06
n-Decane	6,594		6,594	0		0	414	ND	0	6,594	6.59	2094	3141	3.14E-06			0	0	0.00E+00	3.14E-06
C10 as Decane	29,024		29,024	0		0	414	ND	0	29,024	29.02	9215	13823	1.38E-05			0	0	0.00E+00	1.38E-05
n-Undecane	4,420		4,420	0		0	413	ND	0	4,420	4.42	1403	2105	2.10E-06			0	0	0.00E+00	2.10E-06
C11 as Undecane	14,462		14,462	0		0	413	ND	0	14,462	14.46	4592	6888	6.89E-06			0	0	0.00E+00	6.89E-06
n-Dodecane	2,902	J	2,902	0		0	410	ND	0	2,902	2.90	921	1382	1.38E-06			0	0	0.00E+00	1.38E-06
C12 as Dodecane	8,080		8,080	0		0	410	ND	0	8,080	8.08	2566	3848	3.85E-06			0	0	0.00E+00	3.85E-06
n-Tridecane	1,558	J	1,558	0		0	411	ND	0	1,558	1.56	495	742	7.42E-07			0	0	0.00E+00	7.42E-07
C13 as Tridecane	3,246		3,246	0		0	411	ND	0	3,246	3.25	1031	1546	1.55E-06			0	0	0.00E+00	1.55E-06
n-Tetradecane	889	J	889	0		0	411	ND	0	889	0.89	282	423	4.23E-07			0	0	0.00E+00	4.23E-07
C14 as tetradecane	685	J	685	0		0	411	ND	0	685	0.68	217	326	3.26E-07			0	0	0.00E+00	3.26E-07
n-Pentadecane	399	ND	199	0		0	413	ND	0	199	0.20	63	95	9.49E-08			0	0	0.00E+00	9.49E-08
C15 as Pentadecane	399	ND	199	0		0	413	ND	0	199	0.20	63	95	9.49E-08			0	0	0.00E+00	9.49E-08
n-Hexadecane	400	ND	200	0		0	411	ND	0	200	0.20	63	95	9.52E-08			0	0	0.00E+00	9.52E-08
C16 as Hexadecane	400	ND	200	0		0	411	ND	0	200	0.20	63	95	9.52E-08			0	0	0.00E+00	9.52E-08
n-Heptadecane	399	ND	200	0		0	406	ND	0	200	0.20	63	95	9.51E-08			0	0	0.00E+00	9.51E-08
C17 as Heptadecane	399	ND	200	0		0	406	ND	0	200	0.20	63	95	9.51E-08			0	0	0.00E+00	9.51E-08
n-Octadecane	401	ND	201	0		0	410	ND	0	201	0.20	64	96	9.55E-08			0	0	0.00E+00	9.55E-08
C18 as Octodecane	401	ND	201	0		0	410	ND	0	201	0.20	64	96	9.55E-08			0	0	0.00E+00	9.55E-08
n-Nonadecane	399	ND	200	0		0	411	ND	0	200	0.20	63	95	9.50E-08			0	0	0.00E+00	9.50E-08
C19 as Nonadecane	401	J	401	0		0	411	ND	0	401	0.40	127	191	1.91E-07			0	0	0.00E+00	1.91E-07
n-Eicosane	394	ND	197	0		0	410	ND	0	197	0.20	63	94	9.39E-08			0	0	0.00E+00	9.39E-08
C20 as Eicosane	394	ND	197	0		0	410	ND	0	197	0.20	63	94	9.39E-08			0	0	0.00E+00	9.39E-08
n-Heneicosane	399	ND	199	0		0	414	ND	0	199	0.20	63	95	9.50E-08			0	0	0.00E+00	9.50E-08
C21 as Heneicosane	399	ND	199	0		0	414	ND	0	199	0.20	63	95	9.50E-08			0	0	0.00E+00	9.50E-08
n-Docosane	400	ND	200	0		0	409	ND	0	200	0.20	63	95	9.52E-08			0	0	0.00E+00	9.52E-08
C22 as Docosane	400	ND	200	0		0	409	ND	0	200	0.20	63	95	9.52E-08			0	0	0.00E+00	9.52E-08
n-Tricosane	399	ND	199	0		0	409	ND	0	199	0.20	63	95	9.49E-08			0	0	0.00E+00	9.49E-08
C23 as Tricosane	399	ND	199	0		0	409	ND	0	199	0.20	63	95	9.49E-08			0	0	0.00E+00	9.49E-08
n-Tetracosane	402	ND	201	0		0	412	ND	0	201	0.20	64	96	9.58E-08			0	0	0.00E+00	9.58E-08
C24 as Tetracosane	402	ND	201	0		0	412	ND	0	201	0.20	64	96	9.58E-08			0	0	0.00E+00	9.58E-08
Total Hydrocarbon	119,796		115,630			0			0		115.63	37737	55,069	5.51E-05	0		0	0	0.00E+00	5.51E-05

Bagging Data Form **Vacuum Method** **Sample Id** **A019 A/B**

WSPA Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	A-1050	
Equipment Subtype:	Plug			**Plant ID:**	Refinery A	
Line Size:	1	*inches*		**Date:**	6-Mar-17	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30.23	*inHg*	767.8 *mmHg*	**Sample Pump ID**	BU51791	
Ambient Temperature:	70.8	°F	21.6 °C	**TVA ID**	9509	
Stream Temperature:	330	°F	165.6 °C	**Stream pressure:**		*psig*
Stream Description:	*HE 4637 Kerosene Tubeside Inlet*					

REPEAT TEST

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A019A

Time	Bagging Test Measurement Data									
11:47	Pre-Test M21	2906	*ppmv*	Background		*ppmv*	Pre-Test M21$_{Corr}$	2906	*ppmv*	
12:05	Volume Start	373.5	*Liters*							
12:08	DGM$_{10L}$ Time	01:23.2	*min:sec.frac*	DGM Time	1.383	DGM Flow 7.23	DGM Flow$_{STP}$	7.16	*liters/minute*	
12:08	Vacuum check	0.02	*inches H2O*							
12:24	DGM$_T$	78	°F	25.6	°C	DGM$_P$ 1.9	*inches H2O vacuum*	764.3	*mmHg*	
12:40	Bag Conc$_{ppm}$	180	*ppmv*							
12:45	Volume Stop	385.6	*Liters*	Total Vol	12.1	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.303 *L/min*	Sorbent Flow$_{STP}$	0.300	*L/min*	
	Sorbent Vol$_{STP}$	11.99	*Liters*	DGM Vol$_{STP}$	286.50	*Liters*	Total Run Vol$_{STP}$	298.49	*Liters*	

A019B

Time	Bagging Test Measurement Data									
12:46	Volume Start	385.6	*Liters*							
12:50	DGM$_{10L}$ Time	01:23.6	*min:sec.frac*	DGM Time	1.400	DGM Flow 7.14	DGM Flow$_{STP}$	7.05	*liters/minute*	
12:50	Vacuum check	0.015	*inches H2O*							
13:07	DGM$_T$	80	°F	26.7	°C	DGM$_P$ 1.85	*inches H2O vacuum*	764.4	*mmHg*	
13:20	Bag Conc$_{ppm}$	260	*ppmv*							
13:26	Volume Stop	397.4	*Liters*	Total Vol	11.8	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.295 *L/min*	Sorbent Flow$_{STP}$	0.291	*L/min*	
	Sorbent Vol$_{STP}$	11.65	*Liters*	DGM Vol$_{STP}$	282.07	*Liters*	Total Run Vol$_{STP}$	293.72	*Liters*	

13:36	**Final Screening (ppmv) - equipment**	2,334	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time			Final time			0
Organic condensate collected		*ml*				
Density of organic condensate		*g/ml*				

Average THC emissions =	1.03E-03	kg/hr
Percent difference THC ER =	13%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	3.91E-07
C5 as Pentane	8.50E-08
n-Hexane	2.76E-06
C6 as Hexane	4.71E-06
n-Heptane	1.26E-05
C7 as Heptane	2.08E-05
n-Octane	1.62E-05
C8 as Octane	4.37E-05
n-Nonane	2.91E-05
C9 as Nonane	1.31E-04
n-Decane	6.34E-05
C10 as Decane	2.38E-04
n-Undecane	4.83E-05
C11 as Undecane	1.61E-04
n-Dodecane	3.18E-05
C12 as Dodecane	1.11E-04
n-Tridecane	1.80E-05
C13 as Tridecane	5.71E-05
n-Tetradecane	7.65E-06
C14 as tetradecane	2.39E-05
n-Pentadecane	2.80E-06
C15 as Pentadecane	6.86E-06
n-Hexadecane	9.88E-07
C16 as Hexadecane	1.27E-06
n-Heptadecane	2.25E-07
C17 as Heptadecane	1.46E-07
n-Octadecane	8.37E-08
C18 as Octodecane	6.53E-08
n-Nonadecane	8.35E-08
C19 as Nonadecane	6.50E-08
n-Eicosane	8.29E-08
C20 as Eicosane	6.45E-08
n-Heneicosane	8.38E-08
C21 as Heneicosane	6.51E-08
n-Docosane	8.34E-08
C22 as Docosane	6.50E-08
n-Tricosane	8.33E-08
C23 as Tricosane	6.49E-08
n-Tetracosane	8.40E-08
C24 as Tetracosane	6.55E-08
Total Hydrocarbon	1.03E-03

THC:	**5.47E-02**	**lbs/day**	**9.99E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A019A	#A019A		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	1,011	J	1,011	0		0	920	ND	0	1,011	1.01	302	453	4.53E-07			0	0	0.00E+00	4.53E-07
C5 as Pentane	369	ND	185	0		0	920	ND	0	185	0.18	55	83	8.27E-08			0	0	0.00E+00	8.27E-08
n-Hexane	5,587		5,587	0		0	973	ND	0	5,587	5.59	1668	2501	2.50E-06			0	0	0.00E+00	2.50E-06
C6 as Hexane	9,628		9,628	0		0	973	ND	0	9,628	9.63	2874	4311	4.31E-06			0	0	0.00E+00	4.31E-06
n-Heptane	24,641		24,641	0		0	1018	ND	0	24,641	24.64	7355	11032	1.10E-05			0	0	0.00E+00	1.10E-05
C7 as Heptane	44,038		44,038	0		0	1018	ND	0	44,038	44.04	13145	19717	1.97E-05			0	0	0.00E+00	1.97E-05
n-Octane	35,465		35,465	0		0	407	ND	0	35,465	35.46	10586	15879	1.59E-05			0	0	0.00E+00	1.59E-05
C8 as Octane	65,895		65,895	0		0	407	ND	0	65,895	65.90	19669	29503	2.95E-05			0	0	0.00E+00	2.95E-05
n-Nonane	65,835		65,835	0		0	410	ND	0	65,835	65.84	19651	29476	2.95E-05			0	0	0.00E+00	2.95E-05
C9 as Nonane	270,947		270,947	0		0	410	ND	0	270,947	270.95	80874	121311	1.21E-04			0	0	0.00E+00	1.21E-04
n-Decane	153,522		153,522	0		0	414	ND	0	153,522	153.52	45824	68737	6.87E-05			0	0	0.00E+00	6.87E-05
C10 as Decane	572,814		572,814	0		0	414	ND	0	572,814	572.81	170978	256467	2.56E-04			0	0	0.00E+00	2.56E-04
n-Undecane	118,010		118,010	0		0	413	ND	0	118,010	118.01	35224	52837	5.28E-05			0	0	0.00E+00	5.28E-05
C11 as Undecane	392,149		392,149	0		0	413	ND	0	392,149	392.15	117052	175577	1.76E-04			0	0	0.00E+00	1.76E-04
n-Dodecane	79,583		79,583	0		0	410	ND	0	79,583	79.58	23755	35632	3.56E-05			0	0	0.00E+00	3.56E-05
C12 as Dodecane	284,259		284,259	0		0	410	ND	0	284,259	284.26	84848	127272	1.27E-04			0	0	0.00E+00	1.27E-04
n-Tridecane	45,866		45,866	0		0	411	ND	0	45,866	45.87	13690	20536	2.05E-05			0	0	0.00E+00	2.05E-05
C13 as Tridecane	165,517		165,517	0		0	411	ND	0	165,517	165.52	49405	74107	7.41E-05			0	0	0.00E+00	7.41E-05
n-Tetradecane	20,065		20,065	0		0	411	ND	0	20,065	20.06	5989	8984	8.98E-06			0	0	0.00E+00	8.98E-06
C14 as tetradecane	71,913		71,913	0		0	411	ND	0	71,913	71.91	21465	32198	3.22E-05			0	0	0.00E+00	3.22E-05
n-Pentadecane	7,311		7,311	0		0	413	ND	0	7,311	7.31	2182	3274	3.27E-06			0	0	0.00E+00	3.27E-06
C15 as Pentadecane	20,812		20,812	0		0	413	ND	0	20,812	20.81	6212	9318	9.32E-06			0	0	0.00E+00	9.32E-06
n-Hexadecane	2,227	J	2,227	0		0	411	ND	0	2,227	2.23	665	997	9.97E-07			0	0	0.00E+00	9.97E-07
C16 as Hexadecane	4,016		4,016	0		0	411	ND	0	4,016	4.02	1199	1798	1.80E-06			0	0	0.00E+00	1.80E-06
n-Heptadecane	359	J	359	0		0	406	ND	0	359	0.36	107	161	1.61E-07			0	0	0.00E+00	1.61E-07
C17 as Heptadecane	444	J	444	0		0	406	ND	0	444	0.44	133	199	1.99E-07			0	0	0.00E+00	1.99E-07
n-Octadecane	330	ND	165	0		0	410	ND	0	165	0.16	49	74	7.38E-08			0	0	0.00E+00	7.38E-08
C18 as Octodecane	165	ND	82	0		0	410	ND	0	82	0.08	25	37	3.69E-08			0	0	0.00E+00	3.69E-08
n-Nonadecane	330	ND	165	0		0	411	ND	0	165	0.17	49	74	7.39E-08			0	0	0.00E+00	7.39E-08
C19 as Nonadecane	165	ND	83	0		0	411	ND	0	83	0.08	25	37	3.70E-08			0	0	0.00E+00	3.70E-08
n-Eicosane	329	ND	165	0		0	410	ND	0	165	0.16	49	74	7.38E-08			0	0	0.00E+00	7.38E-08
C20 as Eicosane	165	ND	82	0		0	410	ND	0	82	0.08	25	37	3.69E-08			0	0	0.00E+00	3.69E-08
n-Heneicosane	333	ND	166	0		0	414	ND	0	166	0.17	50	74	7.44E-08			0	0	0.00E+00	7.44E-08
C21 as Heneicosane	166	ND	83	0		0	414	ND	0	83	0.08	25	37	3.72E-08			0	0	0.00E+00	3.72E-08
n-Docosane	329	ND	164	0		0	409	ND	0	164	0.16	49	74	7.36E-08			0	0	0.00E+00	7.36E-08
C22 as Docosane	164	ND	82	0		0	409	ND	0	82	0.08	25	37	3.68E-08			0	0	0.00E+00	3.68E-08
n-Tricosane	329	ND	164	0		0	409	ND	0	164	0.16	49	74	7.36E-08			0	0	0.00E+00	7.36E-08
C23 as Tricosane	164	ND	82	0		0	409	ND	0	82	0.08	25	37	3.68E-08			0	0	0.00E+00	3.68E-08
n-Tetracosane	331	ND	166	0		0	412	ND	0	166	0.17	49	74	7.41E-08			0	0	0.00E+00	7.41E-08
C24 as Tetracosane	166	ND	83	0		0	412	ND	0	83	0.08	25	37	3.71E-08			0	0	0.00E+00	3.71E-08
Total Hydrocarbon	2,465,749		2,463,832			0			0		2463.83	735423	#######	1.10E-03	0		0	0	0.00E+00	1.10E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A019B	#A019B		ND Adj	#A0XXA		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	748	J	748	0		0	920	ND	0	748	0.75	220	329	3.29E-07			0	0	0.00E+00	3.29E-07
C5 as Pentane	397	ND	198	0		0	920	ND	0	198	0.20	58	87	8.74E-08			0	0	0.00E+00	8.74E-08
n-Hexane	6,854		6,854	0		0	973	ND	0	6,854	6.85	2013	3020	3.02E-06			0	0	0.00E+00	3.02E-06
C6 as Hexane	11,598		11,598	0		0	973	ND	0	11,598	11.60	3407	5110	5.11E-06			0	0	0.00E+00	5.11E-06
n-Heptane	32,103		32,103	0		0	1018	ND	0	32,103	32.10	9429	14144	1.41E-05			0	0	0.00E+00	1.41E-05
C7 as Heptane	49,819		49,819	0		0	1018	ND	0	49,819	49.82	14633	21950	2.19E-05			0	0	0.00E+00	2.19E-05
n-Octane	37,450		37,450	0		0	407	ND	0	37,450	37.45	11000	16500	1.65E-05			0	0	0.00E+00	1.65E-05
C8 as Octane	131,621		131,621	0		0	407	ND	0	131,621	131.62	38660	57990	5.80E-05			0	0	0.00E+00	5.80E-05
n-Nonane	65,396		65,396	0		0	410	ND	0	65,396	65.40	19208	28812	2.88E-05			0	0	0.00E+00	2.88E-05
C9 as Nonane	318,984		318,984	0		0	410	ND	0	318,984	318.98	93693	140539	1.41E-04			0	0	0.00E+00	1.41E-04
n-Decane	131,604		131,604	0		0	414	ND	0	131,604	131.60	38655	57983	5.80E-05			0	0	0.00E+00	5.80E-05
C10 as Decane	499,328		499,328	0		0	414	ND	0	499,328	499.33	146664	219996	2.20E-04			0	0	0.00E+00	2.20E-04
n-Undecane	99,320		99,320	0		0	413	ND	0	99,320	99.32	29173	43759	4.38E-05			0	0	0.00E+00	4.38E-05
C11 as Undecane	330,153		330,153	0		0	413	ND	0	330,153	330.15	96973	145460	1.45E-04			0	0	0.00E+00	1.45E-04
n-Dodecane	63,363		63,363	0		0	410	ND	0	63,363	63.36	18611	27917	2.79E-05			0	0	0.00E+00	2.79E-05
C12 as Dodecane	214,128		214,128	0		0	410	ND	0	214,128	214.13	62894	94341	9.43E-05			0	0	0.00E+00	9.43E-05
n-Tridecane	35,149		35,149	0		0	411	ND	0	35,149	35.15	10324	15486	1.55E-05			0	0	0.00E+00	1.55E-05
C13 as Tridecane	90,855		90,855	0		0	411	ND	0	90,855	90.86	26686	40029	4.00E-05			0	0	0.00E+00	4.00E-05
n-Tetradecane	14,356		14,356	0		0	411	ND	0	14,356	14.36	4217	6325	6.32E-06			0	0	0.00E+00	6.32E-06
C14 as tetradecane	35,630		35,630	0		0	411	ND	0	35,630	35.63	10465	15698	1.57E-05			0	0	0.00E+00	1.57E-05
n-Pentadecane	5,276		5,276	0		0	413	ND	0	5,276	5.28	1550	2325	2.32E-06			0	0	0.00E+00	2.32E-06
C15 as Pentadecane	10,006		10,006	0		0	413	ND	0	10,006	10.01	2939	4408	4.41E-06			0	0	0.00E+00	4.41E-06
n-Hexadecane	2,222	J	2,222	0		0	411	ND	0	2,222	2.22	653	979	9.79E-07			0	0	0.00E+00	9.79E-07
C16 as Hexadecane	1,689	J	1,689	0		0	411	ND	0	1,689	1.69	496	744	7.44E-07			0	0	0.00E+00	7.44E-07
n-Heptadecane	656	J	656	0		0	406	ND	0	656	0.66	193	289	2.89E-07			0	0	0.00E+00	2.89E-07
C17 as Heptadecane	423	ND	211	0		0	406	ND	0	211	0.21	62	93	9.32E-08			0	0	0.00E+00	9.32E-08
n-Octadecane	425	ND	213	0		0	410	ND	0	213	0.21	62	94	9.36E-08			0	0	0.00E+00	9.36E-08
C18 as Octodecane	425	ND	213	0		0	410	ND	0	213	0.21	62	94	9.36E-08			0	0	0.00E+00	9.36E-08
n-Nonadecane	423	ND	211	0		0	411	ND	0	211	0.21	62	93	9.31E-08			0	0	0.00E+00	9.31E-08
C19 as Nonadecane	423	ND	211	0		0	411	ND	0	211	0.21	62	93	9.31E-08			0	0	0.00E+00	9.31E-08
n-Eicosane	418	ND	209	0		0	410	ND	0	209	0.21	61	92	9.20E-08			0	0	0.00E+00	9.20E-08
C20 as Eicosane	418	ND	209	0		0	410	ND	0	209	0.21	61	92	9.20E-08			0	0	0.00E+00	9.20E-08
n-Heneicosane	422	ND	211	0		0	414	ND	0	211	0.21	62	93	9.31E-08			0	0	0.00E+00	9.31E-08
C21 as Heneicosane	422	ND	211	0		0	414	ND	0	211	0.21	62	93	9.31E-08			0	0	0.00E+00	9.31E-08
n-Docosane	423	ND	212	0		0	409	ND	0	212	0.21	62	93	9.33E-08			0	0	0.00E+00	9.33E-08
C22 as Docosane	423	ND	212	0		0	409	ND	0	212	0.21	62	93	9.33E-08			0	0	0.00E+00	9.33E-08
n-Tricosane	422	ND	211	0		0	409	ND	0	211	0.21	62	93	9.30E-08			0	0	0.00E+00	9.30E-08
C23 as Tricosane	422	ND	211	0		0	409	ND	0	211	0.21	62	93	9.30E-08			0	0	0.00E+00	9.30E-08
n-Tetracosane	426	ND	213	0		0	412	ND	0	213	0.21	63	94	9.39E-08			0	0	0.00E+00	9.39E-08
C24 as Tetracosane	426	ND	213	0		0	412	ND	0	213	0.21	63	94	9.39E-08			0	0	0.00E+00	9.39E-08
Total Hydrocarbon	2,195,048		2,191,678			0			0		2191.68	654188	965,618	9.66E-04	0		0	0	0.00E+00	9.66E-04

Bagging Data Form	Vacuum Method		Sample Id	A020 A/B
Equipment type:	Valve		Component ID:	A-1444
Equipment Subtype:	Gate		Plant ID:	Refinery A
Line Size:	6 inches		Date:	7-Mar-17
Phase (G, LL, HL):	HL		Analysis team:	EG/DR
Barometric pressure	30.32 inHg	770.1 mmHg	Sample Pump ID	BU51791
Ambient Temperature:	78.2 °F	25.7 °C	TVA ID	9509
Stream Temperature:	52 °F	11.1 °C	Stream pressure:	psig
Stream Description:	Diesel Mid Pump Around			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
STP = 294.15 K & 760 mmHg

A020A

Time	Bagging Test Measurement Data										
9:10	Pre-Test M21	592	ppmv		Background		ppmv	Pre-Test M21$_{Corr}$	592	ppmv	
10:25	Volume Start	397.5	Liters								
10:30	DGM$_{10L}$ Time	01:16.8	min:sec.frac	DGM Time	1.283	DGM Flow	7.79	DGM Flow$_{STP}$	7.72	liters/minute	
10:30	Vacuum check	0.02	inches H2O								
10:58	DGM$_T$	79.5	°F	26.4	°C	DGM$_P$	2.05	inches H2O vacuum	766.3	mmHg	
10:47	Bag Conc$_{ppm}$	307	ppmv								
11:05	Volume Stop	409.4	Liters	Total Vol	11.9	Liters					
	Sorbent Run Time	40	Minutes		Sorbent Flow	0.297	L/min	Sorbent Flow$_{STP}$	0.295	L/min	
	Sorbent Vol$_{STP}$	11.79	Liters	DGM Vol$_{STP}$	308.77	Liters	Total Run Vol$_{STP}$	320.56	Liters		

A020B

Time	Bagging Test Measurement Data										
11:07	Volume Start	409.4	Liters								
11:15	DGM$_{10L}$ Time	01:27.4	min:sec.frac	DGM Time	1.450	DGM Flow	6.90	DGM Flow$_{STP}$	6.93	liters/minute	
11:15	Vacuum check	0.02	inches H2O								
	DGM$_T$	72	°F	22.2	°C	DGM$_P$	2	inches H2O vacuum	766.4	mmHg	
11:34	Bag Conc$_{ppm}$	370	ppmv								
11:47	Volume Stop	421.4	Liters	Total Vol	12.0	Liters					
	Sorbent Run Time	40	Minutes		Sorbent Flow	0.300	L/min	Sorbent Flow$_{STP}$	0.301	L/min	
	Sorbent Vol$_{STP}$	12.06	Liters	DGM Vol$_{STP}$	277.17	Liters	Total Run Vol$_{STP}$	289.23	Liters		

11:59	Final Screening (ppmv) - equipment	733	ppmv	background		ppmv
Condensate accumulation: starting time			Final time		0	
Organic condensate collected		ml				
Density of organic condensate		g/ml				

Average THC emissions =	1.56E-03 kg/hr
Percent difference THC ER =	28%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.62E-06
C5 as Pentane	1.46E-06
n-Hexane	3.10E-06
C6 as Hexane	5.65E-06
n-Heptane	8.37E-06
C7 as Heptane	1.53E-05
n-Octane	1.19E-05
C8 as Octane	3.44E-05
n-Nonane	2.76E-05
C9 as Nonane	1.29E-04
n-Decane	6.25E-05
C10 as Decane	2.82E-04
n-Undecane	8.89E-05
C11 as Undecane	3.21E-04
n-Dodecane	7.72E-05
C12 as Dodecane	2.87E-04
n-Tridecane	3.60E-05
C13 as Tridecane	1.28E-04
n-Tetradecane	7.27E-06
C14 as tetradecane	2.89E-05
n-Pentadecane	3.11E-07
C15 as Pentadecane	6.94E-07
n-Hexadecane	0.00E+00
C16 as Hexadecane	0.00E+00
n-Heptadecane	1.90E-07
C17 as Heptadecane	6.50E-08
n-Octadecane	1.91E-07
C18 as Octodecane	6.55E-08
n-Nonadecane	1.91E-07
C19 as Nonadecane	6.53E-08
n-Eicosane	1.90E-07
C20 as Eicosane	6.47E-08
n-Heneicosane	1.92E-07
C21 as Heneicosane	6.54E-08
n-Docosane	1.91E-07
C22 as Docosane	6.52E-08
n-Tricosane	1.91E-07
C23 as Tricosane	6.51E-08
n-Tetracosane	1.92E-07
C24 as Tetracosane	6.57E-08
Total Hydrocarbon	1.56E-03

THC:	8.25E-02	lbs/day	1.51E-02 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A020A	#A020A		ND Adj	#A021A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	2,977		2,977	908	ND	0	920	ND	0	2,977	2.98	954	1432	1.43E-06			0	0	0.00E+00	1.43E-06
C5 as Pentane	2,932		2,932	908	ND	0	920	ND	0	2,932	2.93	940	1410	1.41E-06			0	0	0.00E+00	1.41E-06
n-Hexane	5,605		5,605	961	ND	0	973	ND	0	5,605	5.60	1797	2695	2.70E-06			0	0	0.00E+00	2.70E-06
C6 as Hexane	10,264		10,264	961	ND	0	973	ND	0	10,264	10.26	3290	4935	4.94E-06			0	0	0.00E+00	4.94E-06
n-Heptane	13,814		13,814	1,006	ND	0	1018	ND	0	13,814	13.81	4428	6643	6.64E-06			0	0	0.00E+00	6.64E-06
C7 as Heptane	29,318		29,318	1,006	ND	0	1018	ND	0	29,318	29.32	9398	14097	1.41E-05			0	0	0.00E+00	1.41E-05
n-Octane	26,817		26,817	1,075	J	1,075	407	ND	0	25,742	25.74	8252	12378	1.24E-05			0	0	0.00E+00	1.24E-05
C8 as Octane	40,542		40,542	402	ND	0	407	ND	0	40,542	40.54	12996	19494	1.95E-05			0	0	0.00E+00	1.95E-05
n-Nonane	52,394		52,394	405	ND	0	410	ND	0	52,394	52.39	16796	25193	2.52E-05			0	0	0.00E+00	2.52E-05
C9 as Nonane	206,269		206,269	405	ND	0	410	ND	0	206,269	206.27	66122	99183	9.92E-05			0	0	0.00E+00	9.92E-05
n-Decane	124,161		124,161	409	ND	0	414	ND	0	124,161	124.16	39801	59702	5.97E-05			0	0	0.00E+00	5.97E-05
C10 as Decane	517,645		517,645	409	ND	0	414	ND	0	517,645	517.64	165937	248905	2.49E-04			0	0	0.00E+00	2.49E-04
n-Undecane	161,321		161,321	408	ND	0	413	ND	0	161,321	161.32	51713	77570	7.76E-05			0	0	0.00E+00	7.76E-05
C11 as Undecane	547,038		547,038	408	ND	0	413	ND	0	547,038	547.04	175359	263038	2.63E-04			0	0	0.00E+00	2.63E-04
n-Dodecane	133,783		133,783	405	ND	0	410	ND	0	133,783	133.78	42886	64328	6.43E-05			0	0	0.00E+00	6.43E-05
C12 as Dodecane	508,790		508,790	405	ND	0	410	ND	0	508,790	508.79	163098	244647	2.45E-04			0	0	0.00E+00	2.45E-04
n-Tridecane	61,754		61,754	406	ND	0	411	ND	0	61,754	61.75	19796	29694	2.97E-05			0	0	0.00E+00	2.97E-05
C13 as Tridecane	272,428		272,428	406	ND	0	411	ND	0	272,428	272.43	87330	130995	1.31E-04			0	0	0.00E+00	1.31E-04
n-Tetradecane	12,412		12,412	1,520	J	1,520	411	ND	0	10,892	10.89	3492	5237	5.24E-06			0	0	0.00E+00	5.24E-06
C14 as tetradecane	56,521		56,521	873	J	873	411	ND	0	55,648	55.65	17838	26758	2.68E-05			0	0	0.00E+00	2.68E-05
n-Pentadecane	1,059	J	1,059	1,954	J	1,954	413	ND	0	-896	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	1,893	J	1,893	2,911	J	2,911	413	ND	0	-1,017	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	838	ND	419	838	J	838	411	ND	0	-419	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	168	ND	84	1,016	J	1,016	411	ND	0	-932	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	829	ND	414	401	ND	0	406	ND	0	414	0.41	133	199	1.99E-07			0	0	0.00E+00	1.99E-07
C17 as Heptadecane	166	ND	83	401	ND	0	406	ND	0	83	0.08	27	40	3.98E-08			0	0	0.00E+00	3.98E-08
n-Octadecane	838	ND	419	405	ND	0	410	ND	0	419	0.42	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
C18 as Octodecane	168	ND	84	405	ND	0	410	ND	0	84	0.08	27	40	4.03E-08			0	0	0.00E+00	4.03E-08
n-Nonadecane	839	ND	420	406	ND	0	411	ND	0	420	0.42	135	202	2.02E-07			0	0	0.00E+00	2.02E-07
C19 as Nonadecane	168	ND	84	406	ND	0	411	ND	0	84	0.08	27	40	4.04E-08			0	0	0.00E+00	4.04E-08
n-Eicosane	837	ND	419	405	ND	0	410	ND	0	419	0.42	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
C20 as Eicosane	167	ND	84	405	ND	0	410	ND	0	84	0.08	27	40	4.03E-08			0	0	0.00E+00	4.03E-08
n-Heneicosane	845	ND	423	409	ND	0	414	ND	0	423	0.42	135	203	2.03E-07			0	0	0.00E+00	2.03E-07
C21 as Heneicosane	169	ND	85	409	ND	0	414	ND	0	85	0.08	27	41	4.06E-08			0	0	0.00E+00	4.06E-08
n-Docosane	836	ND	418	404	ND	0	409	ND	0	418	0.42	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
C22 as Docosane	167	ND	84	404	ND	0	409	ND	0	84	0.08	27	40	4.02E-08			0	0	0.00E+00	4.02E-08
n-Tricosane	836	ND	418	404	ND	0	409	ND	0	418	0.42	134	201	2.01E-07			0	0	0.00E+00	2.01E-07
C23 as Tricosane	167	ND	84	404	ND	0	409	ND	0	84	0.08	27	40	4.02E-08			0	0	0.00E+00	4.02E-08
n-Tetracosane	842	ND	421	407	ND	0	412	ND	0	421	0.42	135	202	2.02E-07			0	0	0.00E+00	2.02E-07
C24 as Tetracosane	168	ND	84	407	ND	0	412	ND	0	84	0.08	27	40	4.05E-08			0	0	0.00E+00	4.05E-08
Total Hydrocarbon	2,798,785		2,794,261	26889		10,187			0		2787.34	893511	#######	1.34E-03	0		0	0	0.00E+00	1.34E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A020B	#A020B		ND Adj	#A021A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	4,161		4,161	908	ND	0	920	ND	0	4,161	4.16	1203	1805	1.81E-06			0	0	0.00E+00	1.81E-06
C5 as Pentane	3,504	J	3,504	908	ND	0	920	ND	0	3,504	3.50	1013	1520	1.52E-06			0	0	0.00E+00	1.52E-06
n-Hexane	8,085		8,085	961	ND	0	973	ND	0	8,085	8.09	2338	3508	3.51E-06			0	0	0.00E+00	3.51E-06
C6 as Hexane	14,658		14,658	961	ND	0	973	ND	0	14,658	14.66	4240	6359	6.36E-06			0	0	0.00E+00	6.36E-06
n-Heptane	23,265		23,265	1,006	ND	0	1018	ND	0	23,265	23.26	6729	10093	1.01E-05			0	0	0.00E+00	1.01E-05
C7 as Heptane	38,040		38,040	1,006	ND	0	1018	ND	0	38,040	38.04	11002	16503	1.65E-05			0	0	0.00E+00	1.65E-05
n-Octane	27,499		27,499	1,075	J	1,075	407	ND	0	26,424	26.42	7643	11464	1.15E-05			0	0	0.00E+00	1.15E-05
C8 as Octane	113,488		113,488	402	ND	0	407	ND	0	113,488	113.49	32824	49236	4.92E-05			0	0	0.00E+00	4.92E-05
n-Nonane	69,367		69,367	405	ND	0	410	ND	0	69,367	69.37	20063	30095	3.01E-05			0	0	0.00E+00	3.01E-05
C9 as Nonane	363,943		363,943	405	ND	0	410	ND	0	363,943	363.94	105263	157894	1.58E-04			0	0	0.00E+00	1.58E-04
n-Decane	150,391		150,391	409	ND	0	414	ND	0	150,391	150.39	43498	65246	6.52E-05			0	0	0.00E+00	6.52E-05
C10 as Decane	724,799		724,799	409	ND	0	414	ND	0	724,799	724.80	209633	314449	3.14E-04			0	0	0.00E+00	3.14E-04
n-Undecane	231,081		231,081	408	ND	0	413	ND	0	231,081	231.08	66835	100253	1.00E-04			0	0	0.00E+00	1.00E-04
C11 as Undecane	875,242		875,242	408	ND	0	413	ND	0	875,242	875.24	253145	379718	3.80E-04			0	0	0.00E+00	3.80E-04
n-Dodecane	207,399		207,399	405	ND	0	410	ND	0	207,399	207.40	59986	89979	9.00E-05			0	0	0.00E+00	9.00E-05
C12 as Dodecane	758,299		758,299	405	ND	0	410	ND	0	758,299	758.30	219322	328983	3.29E-04			0	0	0.00E+00	3.29E-04
n-Tridecane	97,627		97,627	406	ND	0	411	ND	0	97,627	97.63	28237	42355	4.24E-05			0	0	0.00E+00	4.24E-05
C13 as Tridecane	288,312		288,312	406	ND	0	411	ND	0	288,312	288.31	83388	125082	1.25E-04			0	0	0.00E+00	1.25E-04
n-Tetradecane	22,946		22,946	1,520	J	1,520	411	ND	0	21,427	21.43	6197	9296	9.30E-06			0	0	0.00E+00	9.30E-06
C14 as tetradecane	72,362		72,362	873	J	873	411	ND	0	71,489	71.49	20677	31015	3.10E-05			0	0	0.00E+00	3.10E-05
n-Pentadecane	3,388	J	3,388	1,954	J	1,954	413	ND	0	1,434	1.43	415	622	6.22E-07			0	0	0.00E+00	6.22E-07
C15 as Pentadecane	6,110	J	6,110	2,911	J	2,911	413	ND	0	3,199	3.20	925	1388	1.39E-06			0	0	0.00E+00	1.39E-06
n-Hexadecane	833	ND	416	838	J	838	411	ND	0	-422	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	416	ND	208	1,016	J	1,016	411	ND	0	-808	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	832	ND	416	401	ND	0	406	ND	0	416	0.42	120	180	1.80E-07			0	0	0.00E+00	1.80E-07
C17 as Heptadecane	416	ND	208	401	ND	0	406	ND	0	208	0.21	60	90	9.02E-08			0	0	0.00E+00	9.02E-08
n-Octadecane	836	ND	418	405	ND	0	410	ND	0	418	0.42	121	181	1.81E-07			0	0	0.00E+00	1.81E-07
C18 as Octodecane	418	ND	209	405	ND	0	410	ND	0	209	0.21	60	91	9.07E-08			0	0	0.00E+00	9.07E-08
n-Nonadecane	831	ND	416	406	ND	0	411	ND	0	416	0.42	120	180	1.80E-07			0	0	0.00E+00	1.80E-07
C19 as Nonadecane	416	ND	208	406	ND	0	411	ND	0	208	0.21	60	90	9.02E-08			0	0	0.00E+00	9.02E-08
n-Eicosane	822	ND	411	405	ND	0	410	ND	0	411	0.41	119	178	1.78E-07			0	0	0.00E+00	1.78E-07
C20 as Eicosane	411	ND	205	405	ND	0	410	ND	0	205	0.21	59	89	8.91E-08			0	0	0.00E+00	8.91E-08
n-Heneicosane	831	ND	415	409	ND	0	414	ND	0	415	0.42	120	180	1.80E-07			0	0	0.00E+00	1.80E-07
C21 as Heneicosane	415	ND	208	409	ND	0	414	ND	0	208	0.21	60	90	9.01E-08			0	0	0.00E+00	9.01E-08
n-Docosane	833	ND	416	404	ND	0	409	ND	0	416	0.42	120	181	1.81E-07			0	0	0.00E+00	1.81E-07
C22 as Docosane	416	ND	208	404	ND	0	409	ND	0	208	0.21	60	90	9.03E-08			0	0	0.00E+00	9.03E-08
n-Tricosane	830	ND	415	404	ND	0	409	ND	0	415	0.42	120	180	1.80E-07			0	0	0.00E+00	1.80E-07
C23 as Tricosane	415	ND	208	404	ND	0	409	ND	0	208	0.21	60	90	9.01E-08			0	0	0.00E+00	9.01E-08
n-Tetracosane	838	ND	419	407	ND	0	412	ND	0	419	0.42	121	182	1.82E-07			0	0	0.00E+00	1.82E-07
C24 as Tetracosane	419	ND	210	407	ND	0	412	ND	0	210	0.21	61	91	9.09E-08			0	0	0.00E+00	9.09E-08
Total Hydrocarbon	4,115,195		4,109,581	26889		10,187			0		4100.62	1314498	#######	1.78E-03	0		0	0	0.00E+00	1.78E-03

Bagging Data Form — Vacuum Method

Sample Id A022 A/B

WSPA — Western States Petroleum Association

Equipment type:	Valve	**Component ID:**	A-1008
Equipment Subtype:	Gate	**Plant ID:**	Refinery A
Line Size:	4 *inches*	**Date:**	8-Mar-17
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	30.26 *inHg* 768.6 *mmHg*	**Sample Pump ID**	BU51791
Ambient Temperature:	67 °F 19.4 °C	**TVA ID**	9509
Stream Temperature:	°F -17.8 °C	**Stream pressure:**	*psig*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 Ton = 2,000 pounds

Stream Description: *HE 4149 Kerosene Shell Side Inlet*

A022A

Time	Bagging Test Measurement Data									
9:20	Pre-Test M21	367	*ppmv*	Background		*ppmv*	Pre-Test $M21_{Corr}$		367	*ppmv*
10:20	Volume Start	421.4	*Liters*							
10:25	DGM_{10L} Time	01:17.2	*min:sec.frac*	DGM Time	1.283	DGM Flow 7.79	$DGM\ Flow_{STP}$		7.67	*liters/minute*
10:25	Vacuum check	0.03	*inches H2O*							
10:47	DGM_T	82	°F	27.8	°C	DGM_P 2	*inches H2O vacuum*		764.9	*mmHg*
10:51	$Bag\ Conc_{ppm}$	36	*ppmv*							
11:00	Volume Stop	433.5	*Liters*	Total Vol	12.1	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.303 *L/min*	$Sorbent\ Flow_{STP}$		0.298	*L/min*
	$Sorbent\ Vol_{STP}$	11.91	*Liters*	$DGM\ Vol_{STP}$	306.77	*Liters*	$Total\ Run\ Vol_{STP}$	318.68	*Liters*	

A022B

Time	Bagging Test Measurement Data									
11:03	Volume Start	433.5	*Liters*							
11:07	DGM_{10L} Time	01:20.1	*min:sec.frac*	DGM Time	1.333	DGM Flow 7.50	$DGM\ Flow_{STP}$		7.36	*liters/minute*
11:07	Vacuum check	0.01	*inches H2O*							
11:24	DGM_T	84	°F	28.9	°C	DGM_P 1.95	*inches H2O vacuum*		765.0	*mmHg*
11:40	$Bag\ Conc_{ppm}$	38.3	*ppmv*							
11:43	Volume Stop	445.7	*Liters*	Total Vol	12.2	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.305 *L/min*	$Sorbent\ Flow_{STP}$		0.299	*L/min*
	$Sorbent\ Vol_{STP}$	11.96	*Liters*	$DGM\ Vol_{STP}$	294.22	*Liters*	$Total\ Run\ Vol_{STP}$	306.18	*Liters*	

11:55 **Final Screening (ppmv) - equipment** 628 *ppmv* **background** *ppmv*

Condensate accumulation: starting time — Final time — 0
Organic condensate collected *ml*
Density of organic condensate *g/ml*

Average THC emissions =	9.55E-05 kg/hr
Percent difference THC ER =	0.9%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	8.82E-08
C5 as Pentane	1.58E-07
n-Hexane	7.97E-08
C6 as Hexane	2.29E-07
n-Heptane	3.71E-07
C7 as Heptane	8.55E-07
n-Octane	9.37E-07
C8 as Octane	3.44E-06
n-Nonane	3.27E-06
C9 as Nonane	1.72E-05
n-Decane	8.17E-06
C10 as Decane	3.51E-05
n-Undecane	4.47E-06
C11 as Undecane	1.79E-05
n-Dodecane	0.00E+00
C12 as Dodecane	0.00E+00
n-Tridecane	0.00E+00
C13 as Tridecane	0.00E+00
n-Tetradecane	0.00E+00
C14 as tetradecane	0.00E+00
n-Pentadecane	0.00E+00
C15 as Pentadecane	0.00E+00
n-Hexadecane	2.35E-07
C16 as Hexadecane	1.13E-06
n-Heptadecane	2.84E-07
C17 as Heptadecane	5.30E-07
n-Octadecane	6.69E-08
C18 as Octodecane	1.25E-07
n-Nonadecane	6.67E-08
C19 as Nonadecane	6.67E-08
n-Eicosane	6.61E-08
C20 as Eicosane	6.61E-08
n-Heneicosane	6.68E-08
C21 as Heneicosane	6.68E-08
n-Docosane	6.67E-08
C22 as Docosane	6.67E-08
n-Tricosane	6.65E-08
C23 as Tricosane	6.65E-08
n-Tetracosane	6.71E-08
C24 as Tetracosane	6.71E-08
Total Hydrocarbon	9.55E-05

THC: 5.06E-03 lbs/day 9.23E-04 tons/yr

#A022A

Component	ANALYTICAL RESULTS #A022A µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A023A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	369	ND	185	894	ND	0	920	ND	0	185	0.18	59	88	8.83E-08			0	0	0.00E+00	8.83E-08
C5 as Pentane	477	J	477	894	ND	0	920	ND	0	477	0.48	152	228	2.28E-07			0	0	0.00E+00	2.28E-07
n-Hexane	142	J	142	945	ND	0	973	ND	0	142	0.14	45	68	6.78E-08			0	0	0.00E+00	6.78E-08
C6 as Hexane	242	J	242	945	ND	0	973	ND	0	242	0.24	77	116	1.16E-07			0	0	0.00E+00	1.16E-07
n-Heptane	888	J	888	989	ND	0	1018	ND	0	888	0.89	283	424	4.24E-07			0	0	0.00E+00	4.24E-07
C7 as Heptane	2,095	J	2,095	989	ND	0	1018	ND	0	2,095	2.10	668	1001	1.00E-06			0	0	0.00E+00	1.00E-06
n-Octane	2,118		2,118	396	ND	0	407	ND	0	2,118	2.12	675	1012	1.01E-06			0	0	0.00E+00	1.01E-06
C8 as Octane	5,301		5,301	396	ND	0	407	ND	0	5,301	5.30	1689	2534	2.53E-06			0	0	0.00E+00	2.53E-06
n-Nonane	6,902		6,902	399	ND	0	410	ND	0	6,902	6.90	2200	3299	3.30E-06			0	0	0.00E+00	3.30E-06
C9 as Nonane	30,500		30,500	399	ND	0	410	ND	0	30,500	30.50	9720	14580	1.46E-05			0	0	0.00E+00	1.46E-05
n-Decane	18,092		18,092	402	ND	0	414	ND	0	18,092	18.09	5765	8648	8.65E-06			0	0	0.00E+00	8.65E-06
C10 as Decane	76,683		76,683	555	J	555	414	ND	0	76,128	76.13	24260	36391	3.64E-05			0	0	0.00E+00	3.64E-05
n-Undecane	16,068		16,068	7015		7,015	413	ND	0	9,052	9.05	2885	4327	4.33E-06			0	0	0.00E+00	4.33E-06
C11 as Undecane	55,304		55,304	17987		17,987	413	ND	0	37,317	37.32	11892	17838	1.78E-05			0	0	0.00E+00	1.78E-05
n-Dodecane	11,482		11,482	39226		39,226	410	ND	0	-27,744	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C12 as Dodecane	40,566		40,566	97924		97,924	410	ND	0	-57,358	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Tridecane	6,051		6,051	66031		66,031	411	ND	0	-59,980	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C13 as Tridecane	21,243		21,243	188818		188,818	411	ND	0	-167,576	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Tetradecane	2,328		2,328	40050		40,050	411	ND	0	-37,722	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C14 as tetradecane	5,047		5,047	154044		154,044	411	ND	0	-148,996	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Pentadecane	1,897		1,897	9254		9,254	413	ND	0	-7,357	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	4,959		4,959	41613		41,613	413	ND	0	-36,655	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	1,691		1,691	957	J	957	411	ND	0	734	0.73	234	351	3.51E-07			0	0	0.00E+00	3.51E-07
C16 as Hexadecane	7,679		7,679	2966	J	2,966	411	ND	0	4,713	4.71	1502	2253	2.25E-06			0	0	0.00E+00	2.25E-06
n-Heptadecane	680	J	680	394	ND	0	406	ND	0	680	0.68	217	325	3.25E-07			0	0	0.00E+00	3.25E-07
C17 as Heptadecane	2,023	J	2,023	394	ND	0	406	ND	0	2,023	2.02	645	967	9.67E-07			0	0	0.00E+00	9.67E-07
n-Octadecane	165	ND	82	399	ND	0	410	ND	0	82	0.08	26	39	3.94E-08			0	0	0.00E+00	3.94E-08
C18 as Octodecane	327	J	327	399	ND	0	410	ND	0	327	0.33	104	156	1.56E-07			0	0	0.00E+00	1.56E-07
n-Nonadecane	165	ND	83	400	ND	0	411	ND	0	83	0.08	26	39	3.95E-08			0	0	0.00E+00	3.95E-08
C19 as Nonadecane	165	ND	83	400	ND	0	411	ND	0	83	0.08	26	39	3.95E-08			0	0	0.00E+00	3.95E-08
n-Eicosane	165	ND	82	399	ND	0	410	ND	0	82	0.08	26	39	3.94E-08			0	0	0.00E+00	3.94E-08
C20 as Eicosane	165	ND	82	399	ND	0	410	ND	0	82	0.08	26	39	3.94E-08			0	0	0.00E+00	3.94E-08
n-Heneicosane	166	ND	83	402	ND	0	414	ND	0	83	0.08	26	40	3.97E-08			0	0	0.00E+00	3.97E-08
C21 as Heneicosane	166	ND	83	402	ND	0	414	ND	0	83	0.08	26	40	3.97E-08			0	0	0.00E+00	3.97E-08
n-Docosane	164	ND	82	398	ND	0	409	ND	0	82	0.08	26	39	3.93E-08			0	0	0.00E+00	3.93E-08
C22 as Docosane	164	ND	82	398	ND	0	409	ND	0	82	0.08	26	39	3.93E-08			0	0	0.00E+00	3.93E-08
n-Tricosane	164	ND	82	398	ND	0	409	ND	0	82	0.08	26	39	3.93E-08			0	0	0.00E+00	3.93E-08
C23 as Tricosane	164	ND	82	398	ND	0	409	ND	0	82	0.08	26	39	3.93E-08			0	0	0.00E+00	3.93E-08
n-Tetracosane	166	ND	83	401	ND	0	412	ND	0	83	0.08	26	40	3.96E-08			0	0	0.00E+00	3.96E-08
C24 as Tetracosane	166	ND	83	401	ND	0	412	ND	0	83	0.08	26	40	3.96E-08			0	0	0.00E+00	3.96E-08
Total Hydrocarbon	323,297		322,040	680467		666,439			0		198.99	63413	95,120	9.51E-05	0		0	0	0.00E+00	9.51E-05

#A022B

Component	ANALYTICAL RESULTS #A022B µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A023A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	384	ND	192	894	ND	0	920	ND	0	192	0.19	59	88	8.81E-08			0	0	0.00E+00	8.81E-08
C5 as Pentane	384	ND	192	894	ND	0	920	ND	0	192	0.19	59	88	8.81E-08			0	0	0.00E+00	8.81E-08
n-Hexane	399	ND	199	945	ND	0	973	ND	0	199	0.20	61	92	9.15E-08			0	0	0.00E+00	9.15E-08
C6 as Hexane	744	J	744	945	ND	0	973	ND	0	744	0.74	228	342	3.42E-07			0	0	0.00E+00	3.42E-07
n-Heptane	692	J	692	989	ND	0	1018	ND	0	692	0.69	212	318	3.18E-07			0	0	0.00E+00	3.18E-07
C7 as Heptane	1,544	J	1,544	989	ND	0	1018	ND	0	1,544	1.54	473	709	7.09E-07			0	0	0.00E+00	7.09E-07
n-Octane	1,875	J	1,875	396	ND	0	407	ND	0	1,875	1.87	574	861	8.61E-07			0	0	0.00E+00	8.61E-07
C8 as Octane	9,446		9,446	396	ND	0	407	ND	0	9,446	9.45	2892	4339	4.34E-06			0	0	0.00E+00	4.34E-06
n-Nonane	7,045		7,045	399	ND	0	410	ND	0	7,045	7.05	2157	3236	3.24E-06			0	0	0.00E+00	3.24E-06
C9 as Nonane	43,297		43,297	399	ND	0	410	ND	0	43,297	43.30	13257	19885	1.99E-05			0	0	0.00E+00	1.99E-05
n-Decane	16,736		16,736	402	ND	0	414	ND	0	16,736	16.74	5124	7687	7.69E-06			0	0	0.00E+00	7.69E-06
C10 as Decane	74,368		74,368	555	J	555	414	ND	0	73,813	73.81	22600	33900	3.39E-05			0	0	0.00E+00	3.39E-05
n-Undecane	17,063		17,063	7015		7,015	413	ND	0	10,048	10.05	3076	4615	4.61E-06			0	0	0.00E+00	4.61E-06
C11 as Undecane	57,286		57,286	17987		17,987	413	ND	0	39,300	39.30	12033	18049	1.80E-05			0	0	0.00E+00	1.80E-05
n-Dodecane	12,805		12,805	39226		39,226	410	ND	0	-26,420	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C12 as Dodecane	40,823		40,823	97924		97,924	410	ND	0	-57,101	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Tridecane	6,850		6,850	66031		66,031	411	ND	0	-59,181	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C13 as Tridecane	17,542		17,542	188818		188,818	411	ND	0	-171,277	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Tetradecane	2,941	J	2,941	40050		40,050	411	ND	0	-37,108	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C14 as tetradecane	4,491		4,491	154044		154,044	411	ND	0	-149,552	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Pentadecane	1,616	J	1,616	9254		9,254	413	ND	0	-7,638	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	1,570	J	1,570	41613		41,613	413	ND	0	-40,043	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	1,216	J	1,216	957	J	957	411	ND	0	259	0.26	79	119	1.19E-07			0	0	0.00E+00	1.19E-07
C16 as Hexadecane	1,097	J	1,097	2966	J	2,966	411	ND	0	-1,869	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	531	J	531	394	ND	0	406	ND	0	531	0.53	163	244	2.44E-07			0	0	0.00E+00	2.44E-07
C17 as Heptadecane	409	ND	205	394	ND	0	406	ND	0	205	0.20	63	94	9.39E-08			0	0	0.00E+00	9.39E-08
n-Octadecane	411	ND	206	399	ND	0	410	ND	0	206	0.21	63	94	9.44E-08			0	0	0.00E+00	9.44E-08
C18 as Octodecane	411	ND	206	399	ND	0	410	ND	0	206	0.21	63	94	9.44E-08			0	0	0.00E+00	9.44E-08
n-Nonadecane	409	ND	204	400	ND	0	411	ND	0	204	0.20	63	94	9.39E-08			0	0	0.00E+00	9.39E-08
C19 as Nonadecane	409	ND	204	400	ND	0	411	ND	0	204	0.20	63	94	9.39E-08			0	0	0.00E+00	9.39E-08
n-Eicosane	404	ND	202	399	ND	0	410	ND	0	202	0.20	62	93	9.28E-08			0	0	0.00E+00	9.28E-08
C20 as Eicosane	404	ND	202	399	ND	0	410	ND	0	202	0.20	62	93	9.28E-08			0	0	0.00E+00	9.28E-08
n-Heneicosane	409	ND	204	402	ND	0	414	ND	0	204	0.20	63	94	9.38E-08			0	0	0.00E+00	9.38E-08
C21 as Heneicosane	409	ND	204	402	ND	0	414	ND	0	204	0.20	63	94	9.38E-08			0	0	0.00E+00	9.38E-08
n-Docosane	409	ND	205	398	ND	0	409	ND	0	205	0.20	63	94	9.40E-08			0	0	0.00E+00	9.40E-08
C22 as Docosane	409	ND	205	398	ND	0	409	ND	0	205	0.20	63	94	9.40E-08			0	0	0.00E+00	9.40E-08
n-Tricosane	408	ND	204	398	ND	0	409	ND	0	204	0.20	63	94	9.38E-08			0	0	0.00E+00	9.38E-08
C23 as Tricosane	408	ND	204	398	ND	0	409	ND	0	204	0.20	63	94	9.38E-08			0	0	0.00E+00	9.38E-08
n-Tetracosane	412	ND	206	401	ND	0	412	ND	0	206	0.21	63	95	9.47E-08			0	0	0.00E+00	9.47E-08
C24 as Tetracosane	412	ND	206	401	ND	0	412	ND	0	206	0.21	63	95	9.47E-08			0	0	0.00E+00	9.47E-08
Total Hydrocarbon	328,880		325,230			666,439			0		208.98	66598	95,979	9.60E-05	0		0	0	0.00E+00	9.60E-05

Bagging Data Form — Vacuum Method

Sample Id: A025 A/B

WSPA — Western States Petroleum Association

Equipment type:	Pump P-3942			Component ID:	A-1722
Equipment Subtype:	Connector - Threaded			Plant ID:	Refinery A
Line Size:	1 inches			Date:	8-Mar-17
Phase (G, LL, HL):	HL			Analysis team:	EG/DR
Barometric pressure	30.19 inHg	766.8	mmHg	Sample Pump ID	BU51791
Ambient Temperature:	79.3 °F	26.3	°C	TVA ID	9509
Stream Temperature:	°F	-17.8	°C	Stream pressure:	psig
Stream Description:	Depentanizer Bottoms				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A025A

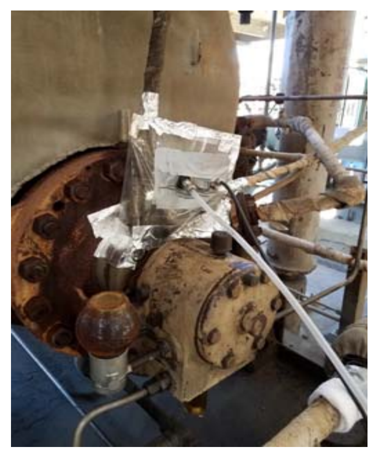
Time	Bagging Test Measurement Data										
14:00	Pre-Test M21	115	ppmv	Background		ppmv		Pre-Test M21$_{Corr}$	115	ppmv	
14:49	Volume Start	445.7	Liters								
14:51	DGM$_{10L}$ Time	01:23.0	min:sec.frac	DGM Time	1.383	DGM Flow	7.23	DGM Flow$_{STP}$	7.14	liters/minute	
14:51	Vacuum check	0.02	inches H2O								
15:17	DGM$_T$	79	°F	26.1	°C	DGM$_P$	1.85	inches H2O vacuum	763.4	mmHg	
15:24	Bag Conc$_{ppm}$	45	ppmv								
15:29	Volume Stop	458.0	Liters	Total Vol	12.3	Liters					
	Sorbent Run Time	40	Minutes			Sorbent Flow	0.308	L/min	Sorbent Flow$_{STP}$	0.304	L/min
	Sorbent Vol$_{STP}$	12.15	Liters	DGM Vol$_{STP}$	285.62	Liters	Total Run Vol$_{STP}$	297.77	Liters		

A025B

Time	Bagging Test Measurement Data										
15:31	Volume Start	458.0	Liters								
15:35	DGM$_{10L}$ Time	01:24.9	min:sec.frac	DGM Time	1.417	DGM Flow	7.06	DGM Flow$_{STP}$	6.97	liters/minute	
15:35	Vacuum check	0.015	inches H2O								
14:07	DGM$_T$	79	°F	26.1	°C	DGM$_P$	1.8	inches H2O vacuum	763.5	mmHg	
16:10	Bag Conc$_{ppm}$	45	ppmv								
16:11	Volume Stop	470.0	Liters	Total Vol	12.0	Liters					
	Sorbent Run Time	40	Minutes			Sorbent Flow	0.300	L/min	Sorbent Flow$_{STP}$	0.296	L/min
	Sorbent Vol$_{STP}$	11.85	Liters	DGM Vol$_{STP}$	278.94	Liters	Total Run Vol$_{STP}$	290.79	Liters		

16:27	Final Screening (ppmv) - equipment	154	ppmv	background		ppmv
Condensate accumulation: starting time				Final time		0
Organic condensate collected		ml				
Density of organic condensate		g/ml				

Average THC emissions =	2.59E-04 kg/hr
Percent difference THC ER =	39%
Acceptable?	No



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	5.95E-08
C5 as Pentane	1.18E-07
n-Hexane	8.27E-08
C6 as Hexane	1.32E-06
n-Heptane	6.46E-08
C7 as Heptane	2.77E-07
n-Octane	6.44E-07
C8 as Octane	3.04E-06
n-Nonane	3.89E-06
C9 as Nonane	1.62E-05
n-Decane	6.87E-06
C10 as Decane	3.20E-05
n-Undecane	7.47E-06
C11 as Undecane	3.02E-05
n-Dodecane	6.91E-06
C12 as Dodecane	3.48E-05
n-Tridecane	8.21E-06
C13 as Tridecane	2.82E-05
n-Tetradecane	7.18E-06
C14 as tetradecane	2.43E-05
n-Pentadecane	5.83E-06
C15 as Pentadecane	1.92E-05
n-Hexadecane	3.42E-06
C16 as Hexadecane	1.04E-05
n-Heptadecane	1.90E-06
C17 as Heptadecane	3.08E-06
n-Octadecane	6.84E-07
C18 as Octodecane	6.53E-07
n-Nonadecane	4.70E-07
C19 as Nonadecane	2.00E-07
n-Eicosane	2.01E-07
C20 as Eicosane	1.11E-07
n-Heneicosane	1.13E-07
C21 as Heneicosane	8.37E-08
n-Docosane	9.81E-08
C22 as Docosane	2.12E-07
n-Tricosane	6.33E-08
C23 as Tricosane	6.33E-08
n-Tetracosane	6.39E-08
C24 as Tetracosane	6.39E-08
Total Hydrocarbon	2.59E-04

THC:	1.37E-02	lbs/day	2.50E-03	tons/yr

#A025A

Component	ANALYTICAL RESULTS #A025A µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A026A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	152	ND	76	384	ND	0	920	ND	0	76	0.08	23	34	3.40E-08			0	0	0.00E+00	3.40E-08
C5 as Pentane	336	J	336	384	ND	0	920	ND	0	336	0.34	100	150	1.50E-07			0	0	0.00E+00	1.50E-07
n-Hexane	173	J	173	399	ND	0	973	ND	0	173	0.17	51	77	7.71E-08			0	0	0.00E+00	7.71E-08
C6 as Hexane	4,607		4,607	399	ND	0	973	ND	0	4,607	4.61	1372	2058	2.06E-06			0	0	0.00E+00	2.06E-06
n-Heptane	165	ND	83	417	ND	0	1018	ND	0	83	0.08	25	37	3.69E-08			0	0	0.00E+00	3.69E-08
C7 as Heptane	1,034	J	1,034	417	ND	0	1018	ND	0	1,034	1.03	308	462	4.62E-07			0	0	0.00E+00	4.62E-07
n-Octane	1,808		1,808	406	ND	0	407	ND	0	1,808	1.81	538	808	8.08E-07			0	0	0.00E+00	8.08E-07
C8 as Octane	6,151		6,151	406	ND	0	407	ND	0	6,151	6.15	1832	2747	2.75E-06			0	0	0.00E+00	2.75E-06
n-Nonane	9,988		9,988	409	ND	0	410	ND	0	9,988	9.99	2974	4461	4.46E-06			0	0	0.00E+00	4.46E-06
C9 as Nonane	37,898		37,898	409	ND	0	410	ND	0	37,898	37.90	11285	16928	1.69E-05			0	0	0.00E+00	1.69E-05
n-Decane	17,122		17,122	412	ND	0	414	ND	0	17,122	17.12	5099	7648	7.65E-06			0	0	0.00E+00	7.65E-06
C10 as Decane	83,643		83,643	412	ND	0	414	ND	0	83,643	83.64	24907	37360	3.74E-05			0	0	0.00E+00	3.74E-05
n-Undecane	18,622		18,622	411	ND	0	413	ND	0	18,622	18.62	5545	8318	8.32E-06			0	0	0.00E+00	8.32E-06
C11 as Undecane	75,891		75,891	411	ND	0	413	ND	0	75,891	75.89	22598	33897	3.39E-05			0	0	0.00E+00	3.39E-05
n-Dodecane	17,025		17,025	408	ND	0	410	ND	0	17,025	17.03	5070	7604	7.60E-06			0	0	0.00E+00	7.60E-06
C12 as Dodecane	87,762		87,762	408	ND	0	410	ND	0	87,762	87.76	26133	39199	3.92E-05			0	0	0.00E+00	3.92E-05
n-Tridecane	20,531		20,531	409	ND	0	411	ND	0	20,531	20.53	6113	9170	9.17E-06			0	0	0.00E+00	9.17E-06
C13 as Tridecane	75,363		75,363	409	ND	0	411	ND	0	75,363	75.36	22441	33662	3.37E-05			0	0	0.00E+00	3.37E-05
n-Tetradecane	20,195		20,195	409	ND	0	411	ND	0	20,195	20.20	6014	9020	9.02E-06			0	0	0.00E+00	9.02E-06
C14 as tetradecane	67,913		67,913	409	ND	0	411	ND	0	67,913	67.91	20223	30334	3.03E-05			0	0	0.00E+00	3.03E-05
n-Pentadecane	16,790		16,790	411	ND	0	413	ND	0	16,790	16.79	4999	7499	7.50E-06			0	0	0.00E+00	7.50E-06
C15 as Pentadecane	59,282		59,282	411	ND	0	413	ND	0	59,282	59.28	17652	26478	2.65E-05			0	0	0.00E+00	2.65E-05
n-Hexadecane	10,462		10,462	461	J	461	411	ND	0	10,001	10.00	2978	4467	4.47E-06			0	0	0.00E+00	4.47E-06
C16 as Hexadecane	35,221		35,221	409	ND	0	411	ND	0	35,221	35.22	10488	15732	1.57E-05			0	0	0.00E+00	1.57E-05
n-Heptadecane	5,727		5,727	404	ND	0	406	ND	0	5,727	5.73	1705	2558	2.56E-06			0	0	0.00E+00	2.56E-06
C17 as Heptadecane	11,284		11,284	404	ND	0	406	ND	0	11,284	11.28	3360	5040	5.04E-06			0	0	0.00E+00	5.04E-06
n-Octadecane	2,030	J	2,030	409	ND	0	410	ND	0	2,030	2.03	604	907	9.07E-07			0	0	0.00E+00	9.07E-07
C18 as Octodecane	1,969	J	1,969	409	ND	0	410	ND	0	1,969	1.97	586	880	8.80E-07			0	0	0.00E+00	8.80E-07
n-Nonadecane	1,432	J	1,432	409	ND	0	411	ND	0	1,432	1.43	426	640	6.40E-07			0	0	0.00E+00	6.40E-07
C19 as Nonadecane	692	J	692	409	ND	0	411	ND	0	692	0.69	206	309	3.09E-07			0	0	0.00E+00	3.09E-07
n-Eicosane	700	J	700	408	ND	0	410	ND	0	700	0.70	208	313	3.13E-07			0	0	0.00E+00	3.13E-07
C20 as Eicosane	298	J	298	408	ND	0	410	ND	0	298	0.30	89	133	1.33E-07			0	0	0.00E+00	1.33E-07
n-Heneicosane	305	J	305	412	ND	0	414	ND	0	305	0.31	91	136	1.36E-07			0	0	0.00E+00	1.36E-07
C21 as Heneicosane	172	J	172	412	ND	0	414	ND	0	172	0.17	51	77	7.68E-08			0	0	0.00E+00	7.68E-08
n-Docosane	236	J	236	408	ND	0	409	ND	0	236	0.24	70	105	1.05E-07			0	0	0.00E+00	1.05E-07
C22 as Docosane	745	J	745	408	ND	0	409	ND	0	745	0.74	222	333	3.33E-07			0	0	0.00E+00	3.33E-07
n-Tricosane	162	ND	81	408	ND	0	409	ND	0	81	0.08	24	36	3.61E-08			0	0	0.00E+00	3.61E-08
C23 as Tricosane	162	ND	81	408	ND	0	409	ND	0	81	0.08	24	36	3.61E-08			0	0	0.00E+00	3.61E-08
n-Tetracosane	163	ND	81	410	ND	0	412	ND	0	81	0.08	24	36	3.64E-08			0	0	0.00E+00	3.64E-08
C24 as Tetracosane	163	ND	81	410	ND	0	412	ND	0	81	0.08	24	36	3.64E-08			0	0	0.00E+00	3.64E-08
Total Hydrocarbon	694,375		693,891	16356		461			0		693.43	206483	309,725	3.10E-04	0		0	0	0.00E+00	3.10E-04

#A025B

Component	ANALYTICAL RESULTS #A025B µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A026A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	390	ND	195	384	ND	0	920	ND	0	195	0.20	57	85	8.51E-08			0	0	0.00E+00	8.51E-08
C5 as Pentane	390	ND	195	384	ND	0	920	ND	0	195	0.20	57	85	8.51E-08			0	0	0.00E+00	8.51E-08
n-Hexane	405	ND	203	399	ND	0	973	ND	0	203	0.20	59	88	8.84E-08			0	0	0.00E+00	8.84E-08
C6 as Hexane	1,352	J	1,352	399	ND	0	973	ND	0	1,352	1.35	393	590	5.90E-07			0	0	0.00E+00	5.90E-07
n-Heptane	424	ND	212	417	ND	0	1018	ND	0	212	0.21	62	92	9.24E-08			0	0	0.00E+00	9.24E-08
C7 as Heptane	424	ND	212	417	ND	0	1018	ND	0	212	0.21	62	92	9.24E-08			0	0	0.00E+00	9.24E-08
n-Octane	1,103	J	1,103	406	ND	0	407	ND	0	1,103	1.10	321	481	4.81E-07			0	0	0.00E+00	4.81E-07
C8 as Octane	7,629		7,629	406	ND	0	407	ND	0	7,629	7.63	2218	3328	3.33E-06			0	0	0.00E+00	3.33E-06
n-Nonane	7,623		7,623	409	ND	0	410	ND	0	7,623	7.62	2217	3325	3.33E-06			0	0	0.00E+00	3.33E-06
C9 as Nonane	35,421		35,421	409	ND	0	410	ND	0	35,421	35.42	10300	15450	1.55E-05			0	0	0.00E+00	1.55E-05
n-Decane	13,974		13,974	412	ND	0	414	ND	0	13,974	13.97	4063	6095	6.10E-06			0	0	0.00E+00	6.10E-06
C10 as Decane	61,007		61,007	412	ND	0	414	ND	0	61,007	61.01	17740	26610	2.66E-05			0	0	0.00E+00	2.66E-05
n-Undecane	15,191		15,191	411	ND	0	413	ND	0	15,191	15.19	4418	6626	6.63E-06			0	0	0.00E+00	6.63E-06
C11 as Undecane	60,838		60,838	411	ND	0	413	ND	0	60,838	60.84	17691	26537	2.65E-05			0	0	0.00E+00	2.65E-05
n-Dodecane	14,247		14,247	408	ND	0	410	ND	0	14,247	14.25	4143	6214	6.21E-06			0	0	0.00E+00	6.21E-06
C12 as Dodecane	69,470		69,470	408	ND	0	410	ND	0	69,470	69.47	20201	30302	3.03E-05			0	0	0.00E+00	3.03E-05
n-Tridecane	16,614		16,614	409	ND	0	411	ND	0	16,614	16.61	4831	7247	7.25E-06			0	0	0.00E+00	7.25E-06
C13 as Tridecane	52,040		52,040	409	ND	0	411	ND	0	52,040	52.04	15133	22699	2.27E-05			0	0	0.00E+00	2.27E-05
n-Tetradecane	12,221		12,221	409	ND	0	411	ND	0	12,221	12.22	3554	5331	5.33E-06			0	0	0.00E+00	5.33E-06
C14 as tetradecane	42,093		42,093	409	ND	0	411	ND	0	42,093	42.09	12240	18360	1.84E-05			0	0	0.00E+00	1.84E-05
n-Pentadecane	9,545		9,545	411	ND	0	413	ND	0	9,545	9.55	2776	4163	4.16E-06			0	0	0.00E+00	4.16E-06
C15 as Pentadecane	27,552		27,552	411	ND	0	413	ND	0	27,552	27.55	8012	12018	1.20E-05			0	0	0.00E+00	1.20E-05
n-Hexadecane	5,898		5,898	461	J	461	411	ND	0	5,437	5.44	1581	2372	2.37E-06			0	0	0.00E+00	2.37E-06
C16 as Hexadecane	11,691		11,691	409	ND	0	411	ND	0	11,691	11.69	3400	5099	5.10E-06			0	0	0.00E+00	5.10E-06
n-Heptadecane	2,869	J	2,869	404	ND	0	406	ND	0	2,869	2.87	834	1251	1.25E-06			0	0	0.00E+00	1.25E-06
C17 as Heptadecane	2,584	J	2,584	404	ND	0	406	ND	0	2,584	2.58	751	1127	1.13E-06			0	0	0.00E+00	1.13E-06
n-Octadecane	1,060	J	1,060	409	ND	0	410	ND	0	1,060	1.06	308	462	4.62E-07			0	0	0.00E+00	4.62E-07
C18 as Octodecane	976	J	976	409	ND	0	410	ND	0	976	0.98	284	426	4.26E-07			0	0	0.00E+00	4.26E-07
n-Nonadecane	687	J	687	409	ND	0	411	ND	0	687	0.69	200	299	2.99E-07			0	0	0.00E+00	2.99E-07
C19 as Nonadecane	416	ND	208	409	ND	0	411	ND	0	208	0.21	60	91	9.07E-08			0	0	0.00E+00	9.07E-08
n-Eicosane	411	ND	205	408	ND	0	410	ND	0	205	0.21	60	90	8.96E-08			0	0	0.00E+00	8.96E-08
C20 as Eicosane	411	ND	205	408	ND	0	410	ND	0	205	0.21	60	90	8.96E-08			0	0	0.00E+00	8.96E-08
n-Heneicosane	415	ND	208	412	ND	0	414	ND	0	208	0.21	60	91	9.06E-08			0	0	0.00E+00	9.06E-08
C21 as Heneicosane	415	ND	208	412	ND	0	414	ND	0	208	0.21	60	91	9.06E-08			0	0	0.00E+00	9.06E-08
n-Docosane	416	ND	208	408	ND	0	409	ND	0	208	0.21	61	91	9.08E-08			0	0	0.00E+00	9.08E-08
C22 as Docosane	416	ND	208	408	ND	0	409	ND	0	208	0.21	61	91	9.08E-08			0	0	0.00E+00	9.08E-08
n-Tricosane	415	ND	208	408	ND	0	409	ND	0	208	0.21	60	91	9.06E-08			0	0	0.00E+00	9.06E-08
C23 as Tricosane	415	ND	208	408	ND	0	409	ND	0	208	0.21	60	91	9.06E-08			0	0	0.00E+00	9.06E-08
n-Tetracosane	419	ND	210	410	ND	0	412	ND	0	210	0.21	61	91	9.14E-08			0	0	0.00E+00	9.14E-08
C24 as Tetracosane	419	ND	210	410	ND	0	412	ND	0	210	0.21	61	91	9.14E-08			0	0	0.00E+00	9.14E-08
Total Hydrocarbon	480,287		476,986	16356		461			0		476.52	141895	207,853	2.08E-04	0		0	0	0.00E+00	2.08E-04

Bagging Data Form **Vacuum Method** **Sample Id** **A027 A/B**

WSPA Western States Petroleum Association

Equipment type:	Pump P9668			**Component ID:**	A-1728
Equipment Subtype:	Connector - Threaded			**Plant ID:**	Refinery A
Line Size:	1 *inches*			**Date:**	9-Mar-17
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR
Barometric pressure	30.17 *inHg*	766.3 *mmHg*		**Sample Pump ID**	BU51791
Ambient Temperature:	76.4 *°F*	24.7 *°C*		**TVA ID**	9509
Stream Temperature:	170 *°F*	76.7 *°C*		**Stream pressure:**	500 *psig*
Stream Description:	*M-5239 P-9668 Feed Charge Pump*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A027A

Time	Bagging Test Measurement Data										
10:05	Pre-Test M21	604	*ppmv*		Background		*ppmv*	Pre-Test $M21_{Corr}$	604	*ppmv*	
11:34	Volume Start	470.0	*Liters*								
11:38	DGM_{10L} Time	01:17.2	*min:sec.frac*	DGM Time	1.283	DGM Flow	7.79	$DGM\ Flow_{STP}$	7.48	*liters/minute*	
11:38	Vacuum check	0.001	*inches H2O*								
11:59	DGM_T	94	*°F*	34.4	*°C*	DGM_P	2	*inches H2O vacuum*	762.6	*mmHg*	
12:10	$Bag\ Conc_{ppm}$	114	*ppmv*								
12:14	Volume Stop	482.3	*Liters*	Total Vol	12.3	*Liters*					
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.308	*L/min*	$Sorbent\ Flow_{STP}$	0.295	*L/min*	
	$Sorbent\ Vol_{STP}$	11.81	*Liters*	$DGM\ Vol_{STP}$	299.22	*Liters*	$Total\ Run\ Vol_{STP}$	311.03	*Liters*		

A027B

Time	Bagging Test Measurement Data										
12:16	Volume Start	482.3	*Liters*								
12:20	DGM_{10L} Time	01:19.2	*min:sec.frac*	DGM Time	1.317	DGM Flow	7.59	$DGM\ Flow_{STP}$	7.31	*liters/minute*	
12:20	Vacuum check	0.001	*inches H2O*								
12:48	DGM_T	93	*°F*	33.9	*°C*	DGM_P	1.9	*inches H2O vacuum*	762.8	*mmHg*	
12:48	$Bag\ Conc_{ppm}$	120	*ppmv*								
12:58	Volume Stop	494.8	*Liters*	Total Vol	12.5	*Liters*					
	Sorbent Run Time	42	*Minutes*		Sorbent Flow	0.298	*L/min*	$Sorbent\ Flow_{STP}$	0.286	*L/min*	
	$Sorbent\ Vol_{STP}$	12.02	*Liters*	$DGM\ Vol_{STP}$	306.86	*Liters*	$Total\ Run\ Vol_{STP}$	318.88	*Liters*		

13:15	**Final Screening (ppmv) - equipment**	675 *ppmv*	**background**	*ppmv*	
Condensate accumulation: starting time		Final time		0	
Organic condensate collected	*ml*				
Density of organic condensate	*g/ml*				

Average THC emissions =	5.18E-04	kg/hr
Percent difference THC ER =	8%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	1.00E-07
C5 as Pentane	9.36E-08
n-Hexane	6.36E-08
C6 as Hexane	3.08E-07
n-Heptane	9.16E-08
C7 as Heptane	3.89E-07
n-Octane	9.23E-08
C8 as Octane	4.34E-07
n-Nonane	9.44E-07
C9 as Nonane	3.37E-05
n-Decane	9.13E-06
C10 as Decane	1.33E-04
n-Undecane	1.24E-05
C11 as Undecane	1.46E-04
n-Dodecane	9.20E-06
C12 as Dodecane	1.01E-04
n-Tridecane	9.10E-06
C13 as Tridecane	3.99E-05
n-Tetradecane	3.47E-06
C14 as tetradecane	1.45E-05
n-Pentadecane	1.09E-06
C15 as Pentadecane	3.11E-06
n-Hexadecane	0.00E+00
C16 as Hexadecane	0.00E+00
n-Heptadecane	0.00E+00
C17 as Heptadecane	1.20E-07
n-Octadecane	6.47E-08
C18 as Octodecane	6.47E-08
n-Nonadecane	6.44E-08
C19 as Nonadecane	6.44E-08
n-Eicosane	6.36E-08
C20 as Eicosane	6.36E-08
n-Heneicosane	6.43E-08
C21 as Heneicosane	6.43E-08
n-Docosane	6.45E-08
C22 as Docosane	6.45E-08
n-Tricosane	6.43E-08
C23 as Tricosane	6.43E-08
n-Tetracosane	6.49E-08
C24 as Tetracosane	6.49E-08
Total Hydrocarbon	5.18E-04

THC:	**2.74E-02**	**lbs/day**	**5.01E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A027A	#A027A		ND Adj	#A028A		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	246	J	246	372	ND	0	920	ND	0	246	0.25	76	115	1.15E-07			0	0	0.00E+00	1.15E-07
C5 as Pentane	218	J	218	372	ND	0	920	ND	0	218	0.22	68	102	1.02E-07			0	0	0.00E+00	1.02E-07
n-Hexane	426	J	426	454	J	454	973	ND	0	-28	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C6 as Hexane	1,131	J	1,131	386	ND	0	973	ND	0	1,131	1.13	352	528	5.28E-07			0	0	0.00E+00	5.28E-07
n-Heptane	194	J	194	403	ND	0	1018	ND	0	194	0.19	60	91	9.07E-08			0	0	0.00E+00	9.07E-08
C7 as Heptane	1,467	J	1,467	403	ND	0	1018	ND	0	1,467	1.47	456	685	6.85E-07			0	0	0.00E+00	6.85E-07
n-Octane	199	J	199	399	ND	0	407	ND	0	199	0.20	62	93	9.30E-08			0	0	0.00E+00	9.30E-08
C8 as Octane	1,166	J	1,166	399	ND	0	407	ND	0	1,166	1.17	363	544	5.44E-07			0	0	0.00E+00	5.44E-07
n-Nonane	1,458	J	1,458	394	ND	0	410	ND	0	1,458	1.46	453	680	6.80E-07			0	0	0.00E+00	6.80E-07
C9 as Nonane	74,286		74,286	394	ND	0	410	ND	0	74,286	74.29	23105	34658	3.47E-05			0	0	0.00E+00	3.47E-05
n-Decane	19,307		19,307	394	ND	0	414	ND	0	19,307	19.31	6005	9007	9.01E-06			0	0	0.00E+00	9.01E-06
C10 as Decane	280,024		280,024	394	ND	0	414	ND	0	280,024	280.02	87096	130644	1.31E-04			0	0	0.00E+00	1.31E-04
n-Undecane	25,657		25,657	393	ND	0	413	ND	0	25,657	25.66	7980	11970	1.20E-05			0	0	0.00E+00	1.20E-05
C11 as Undecane	300,624		300,624	393	ND	0	413	ND	0	300,624	300.62	93503	140255	1.40E-04			0	0	0.00E+00	1.40E-04
n-Dodecane	18,521		18,521	396	ND	0	410	ND	0	18,521	18.52	5761	8641	8.64E-06			0	0	0.00E+00	8.64E-06
C12 as Dodecane	205,067		205,067	396	ND	0	410	ND	0	205,067	205.07	63782	95673	9.57E-05			0	0	0.00E+00	9.57E-05
n-Tridecane	17,967		17,967	399	ND	0	411	ND	0	17,967	17.97	5588	8382	8.38E-06			0	0	0.00E+00	8.38E-06
C13 as Tridecane	79,175		79,175	399	ND	0	411	ND	0	79,175	79.18	24626	36939	3.69E-05			0	0	0.00E+00	3.69E-05
n-Tetradecane	6,888		6,888	827	J	827	411	ND	0	6,061	6.06	1885	2828	2.83E-06			0	0	0.00E+00	2.83E-06
C14 as tetradecane	27,463		27,463	552	J	552	411	ND	0	26,911	26.91	8370	12555	1.26E-05			0	0	0.00E+00	1.26E-05
n-Pentadecane	2,410		2,410	1043	J	1,043	413	ND	0	1,367	1.37	425	638	6.38E-07			0	0	0.00E+00	6.38E-07
C15 as Pentadecane	5,944		5,944	900	J	900	413	ND	0	5,044	5.04	1569	2353	2.35E-06			0	0	0.00E+00	2.35E-06
n-Hexadecane	687	J	687	1111	J	1,111	411	ND	0	-423	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	911	J	911	1042	J	1,042	411	ND	0	-131	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	381	J	381	603	J	603	406	ND	0	-222	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	318	J	318	396	ND	0	406	ND	0	318	0.32	99	148	1.48E-07			0	0	0.00E+00	1.48E-07
n-Octadecane	163	ND	82	398	ND	0	410	ND	0	82	0.08	25	38	3.80E-08			0	0	0.00E+00	3.80E-08
C18 as Octodecane	163	ND	82	398	ND	0	410	ND	0	82	0.08	25	38	3.80E-08			0	0	0.00E+00	3.80E-08
n-Nonadecane	162	ND	81	396	ND	0	411	ND	0	81	0.08	25	38	3.78E-08			0	0	0.00E+00	3.78E-08
C19 as Nonadecane	162	ND	81	396	ND	0	411	ND	0	81	0.08	25	38	3.78E-08			0	0	0.00E+00	3.78E-08
n-Eicosane	160	ND	80	391	ND	0	410	ND	0	80	0.08	25	37	3.74E-08			0	0	0.00E+00	3.74E-08
C20 as Eicosane	160	ND	80	391	ND	0	410	ND	0	80	0.08	25	37	3.74E-08			0	0	0.00E+00	3.74E-08
n-Heneicosane	162	ND	81	396	ND	0	414	ND	0	81	0.08	25	38	3.78E-08			0	0	0.00E+00	3.78E-08
C21 as Heneicosane	162	ND	81	396	ND	0	414	ND	0	81	0.08	25	38	3.78E-08			0	0	0.00E+00	3.78E-08
n-Docosane	162	ND	81	396	ND	0	409	ND	0	81	0.08	25	38	3.79E-08			0	0	0.00E+00	3.79E-08
C22 as Docosane	162	ND	81	396	ND	0	409	ND	0	81	0.08	25	38	3.79E-08			0	0	0.00E+00	3.79E-08
n-Tricosane	162	ND	81	395	ND	0	409	ND	0	81	0.08	25	38	3.78E-08			0	0	0.00E+00	3.78E-08
C23 as Tricosane	162	ND	81	395	ND	0	409	ND	0	81	0.08	25	38	3.78E-08			0	0	0.00E+00	3.78E-08
n-Tetracosane	164	ND	82	399	ND	0	412	ND	0	82	0.08	25	38	3.82E-08			0	0	0.00E+00	3.82E-08
C24 as Tetracosane	164	ND	82	399	ND	0	412	ND	0	82	0.08	25	38	3.82E-08			0	0	0.00E+00	3.82E-08
Total Hydrocarbon			1,073,271			6,532			0		1067.54	332039	498,059	4.98E-04	0		0	0	0.00E+00	4.98E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A027B	#A027B		ND Adj	#A028A		ND Adj	#A024A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	374	ND	187	372	ND	0	920	ND	0	187	0.19	60	85	8.53E-08			0	0	0.00E+00	8.53E-08
C5 as Pentane	374	ND	187	372	ND	0	920	ND	0	187	0.19	60	85	8.53E-08			0	0	0.00E+00	8.53E-08
n-Hexane	733	J	733	454	J	454	973	ND	0	279	0.28	89	127	1.27E-07			0	0	0.00E+00	1.27E-07
C6 as Hexane	389	ND	195	386	ND	0	973	ND	0	195	0.19	62	89	8.86E-08			0	0	0.00E+00	8.86E-08
n-Heptane	407	ND	203	403	ND	0	1018	ND	0	203	0.20	65	93	9.26E-08			0	0	0.00E+00	9.26E-08
C7 as Heptane	407	ND	203	403	ND	0	1018	ND	0	203	0.20	65	93	9.26E-08			0	0	0.00E+00	9.26E-08
n-Octane	402	ND	201	399	ND	0	407	ND	0	201	0.20	64	92	9.17E-08			0	0	0.00E+00	9.17E-08
C8 as Octane	712	J	712	399	ND	0	407	ND	0	712	0.71	227	324	3.24E-07			0	0	0.00E+00	3.24E-07
n-Nonane	2,651	J	2,651	394	ND	0	410	ND	0	2,651	2.65	845	1208	1.21E-06			0	0	0.00E+00	1.21E-06
C9 as Nonane	71,805		71,805	394	ND	0	410	ND	0	71,805	71.80	22897	32711	3.27E-05			0	0	0.00E+00	3.27E-05
n-Decane	20,293		20,293	394	ND	0	414	ND	0	20,293	20.29	6471	9244	9.24E-06			0	0	0.00E+00	9.24E-06
C10 as Decane	295,399		295,399	394	ND	0	414	ND	0	295,399	295.40	94198	134569	1.35E-04			0	0	0.00E+00	1.35E-04
n-Undecane	28,153		28,153	393	ND	0	413	ND	0	28,153	28.15	8978	12825	1.28E-05			0	0	0.00E+00	1.28E-05
C11 as Undecane	331,344		331,344	393	ND	0	413	ND	0	331,344	331.34	105660	150943	1.51E-04			0	0	0.00E+00	1.51E-04
n-Dodecane	21,419		21,419	396	ND	0	410	ND	0	21,419	21.42	6830	9757	9.76E-06			0	0	0.00E+00	9.76E-06
C12 as Dodecane	233,992		233,992	396	ND	0	410	ND	0	233,992	233.99	74616	106595	1.07E-04			0	0	0.00E+00	1.07E-04
n-Tridecane	21,568		21,568	399	ND	0	411	ND	0	21,568	21.57	6878	9825	9.83E-06			0	0	0.00E+00	9.83E-06
C13 as Tridecane	94,007		94,007	399	ND	0	411	ND	0	94,007	94.01	29978	42825	4.28E-05			0	0	0.00E+00	4.28E-05
n-Tetradecane	9,871		9,871	827	J	827	411	ND	0	9,045	9.04	2884	4120	4.12E-06			0	0	0.00E+00	4.12E-06
C14 as tetradecane	36,463		36,463	552	J	552	411	ND	0	35,911	35.91	11451	16359	1.64E-05			0	0	0.00E+00	1.64E-05
n-Pentadecane	4,450		4,450	1043	J	1,043	413	ND	0	3,407	3.41	1086	1552	1.55E-06			0	0	0.00E+00	1.55E-06
C15 as Pentadecane	9,378		9,378	900	J	900	413	ND	0	8,478	8.48	2703	3862	3.86E-06			0	0	0.00E+00	3.86E-06
n-Hexadecane	920	J	920	1111	J	1,111	411	ND	0	-191	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	438	J	438	1042	J	1,042	411	ND	0	-604	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	403	J	403	603	J	603	406	ND	0	-200	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	399	ND	200	396	ND	0	406	ND	0	200	0.20	64	91	9.09E-08			0	0	0.00E+00	9.09E-08
n-Octadecane	401	ND	201	398	ND	0	410	ND	0	201	0.20	64	91	9.14E-08			0	0	0.00E+00	9.14E-08
C18 as Octodecane	401	ND	201	398	ND	0	410	ND	0	201	0.20	64	91	9.14E-08			0	0	0.00E+00	9.14E-08
n-Nonadecane	399	ND	200	396	ND	0	411	ND	0	200	0.20	64	91	9.09E-08			0	0	0.00E+00	9.09E-08
C19 as Nonadecane	399	ND	200	396	ND	0	411	ND	0	200	0.20	64	91	9.09E-08			0	0	0.00E+00	9.09E-08
n-Eicosane	394	ND	197	391	ND	0	410	ND	0	197	0.20	63	90	8.98E-08			0	0	0.00E+00	8.98E-08
C20 as Eicosane	394	ND	197	391	ND	0	410	ND	0	197	0.20	63	90	8.98E-08			0	0	0.00E+00	8.98E-08
n-Heneicosane	399	ND	199	396	ND	0	414	ND	0	199	0.20	64	91	9.08E-08			0	0	0.00E+00	9.08E-08
C21 as Heneicosane	399	ND	199	396	ND	0	414	ND	0	199	0.20	64	91	9.08E-08			0	0	0.00E+00	9.08E-08
n-Docosane	400	ND	200	396	ND	0	409	ND	0	200	0.20	64	91	9.10E-08			0	0	0.00E+00	9.10E-08
C22 as Docosane	400	ND	200	396	ND	0	409	ND	0	200	0.20	64	91	9.10E-08			0	0	0.00E+00	9.10E-08
n-Tricosane	399	ND	199	395	ND	0	409	ND	0	199	0.20	64	91	9.08E-08			0	0	0.00E+00	9.08E-08
C23 as Tricosane	399	ND	199	395	ND	0	409	ND	0	199	0.20	64	91	9.08E-08			0	0	0.00E+00	9.08E-08
n-Tetracosane	402	ND	201	399	ND	0	412	ND	0	201	0.20	64	92	9.17E-08			0	0	0.00E+00	9.17E-08
C24 as Tetracosane	402	ND	201	399	ND	0	412	ND	0	201	0.20	64	92	9.17E-08			0	0	0.00E+00	9.17E-08
Total Hydrocarbon			1,188,170			6,532			0		1182.63	367836	538,748	5.39E-04	0		0	0	0.00E+00	5.39E-04

Bagging Data Form	Vacuum Method			Sample Id	A029 A/B
Equipment type:	Pump			Component ID:	A-1730
Equipment Subtype:	Connector - Threaded			Plant ID:	Refinery A
Line Size:		*inches*		Date:	9-Mar-17
Phase (G, LL, HL):	HL			Analysis team:	EG/DR
Barometric pressure	30.13 *inHg*	765.3	*mmHg*	Sample Pump ID	BU51791
Ambient Temperature:	78.4 *°F*	25.8	*°C*	TVA ID	9509
Stream Temperature:	*°F*	-17.8	*°C*	Stream pressure:	*psig*
Stream Description:	*M-5240-P9669 Feed Charge Pump*				

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A029A

Time	Bagging Test Measurement Data									
13:20	Pre-Test M21	2641	*ppmv*		Background		*ppmv*	Pre-Test M21$_{Corr}$	2641	*ppmv*
14:31	Volume Start	494.8	*Liters*							
14:35	DGM$_{10L}$ Time	01:24.8	*min:sec.frac*	DGM Time	1.417	DGM Flow	7.06	DGM Flow$_{STP}$	6.87	*liters/minute*
14:35	Vacuum check	0.005	*inches H2O*							
15:04	DGM$_T$	86	*°F*	30.0	°C	DGM$_P$	1.9	*inches H2O vacuum*	761.8	*mmHg*
15:08	Bag Conc$_{ppm}$	101	*ppmv*							
15:11	Volume Stop	506.7	*Liters*	Total Vol	11.9	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.298	*L/min*	Sorbent Flow$_{STP}$	0.289	*L/min*
	Sorbent Vol$_{STP}$	11.58	*Liters*	DGM Vol$_{STP}$	274.74	*Liters*	Total Run Vol$_{STP}$	286.32	*Liters*	

A029B

Time	Bagging Test Measurement Data									
15:13	Volume Start	506.7	*Liters*							
15:15	DGM$_{10L}$ Time	01:25.8	*min:sec.frac*	DGM Time	1.433	DGM Flow	6.98	DGM Flow$_{STP}$	6.80	*liters/minute*
15:15	Vacuum check	0.005	*inches H2O*							
15:22	DGM$_T$	85	*°F*	29.4	°C	DGM$_P$	1.8	*inches H2O vacuum*	761.9	*mmHg*
15:43	Bag Conc$_{ppm}$	112	*ppmv*							
15:53	Volume Stop	518.8	*Liters*	Total Vol	12.1	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.302	*L/min*	Sorbent Flow$_{STP}$	0.295	*L/min*
	Sorbent Vol$_{STP}$	11.80	*Liters*	DGM Vol$_{STP}$	272.11	*Liters*	Total Run Vol$_{STP}$	283.91	*Liters*	

16:50	**Final Screening (ppmv) - equipment**	2,730	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time			Final time		0	
Organic condensate collected		*ml*				
Density of organic condensate		*g/ml*				

Average THC emissions =	5.87E-04 kg/hr
Percent difference THC ER =	38%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	5.81E-08
C5 as Pentane	5.81E-08
n-Hexane	4.44E-08
C6 as Hexane	1.18E-07
n-Heptane	6.31E-08
C7 as Heptane	1.61E-07
n-Octane	6.24E-08
C8 as Octane	3.84E-07
n-Nonane	6.61E-07
C9 as Nonane	3.51E-05
n-Decane	7.59E-06
C10 as Decane	1.02E-04
n-Undecane	9.36E-06
C11 as Undecane	1.06E-04
n-Dodecane	9.80E-06
C12 as Dodecane	1.12E-04
n-Tridecane	2.01E-05
C13 as Tridecane	9.24E-05
n-Tetradecane	1.42E-05
C14 as tetradecane	5.47E-05
n-Pentadecane	4.86E-06
C15 as Pentadecane	1.55E-05
n-Hexadecane	2.62E-07
C16 as Hexadecane	2.22E-07
n-Heptadecane	0.00E+00
C17 as Heptadecane	6.19E-08
n-Octadecane	6.22E-08
C18 as Octodecane	6.22E-08
n-Nonadecane	6.19E-08
C19 as Nonadecane	6.19E-08
n-Eicosane	6.12E-08
C20 as Eicosane	6.12E-08
n-Heneicosane	6.19E-08
C21 as Heneicosane	6.19E-08
n-Docosane	6.20E-08
C22 as Docosane	6.20E-08
n-Tricosane	6.18E-08
C23 as Tricosane	6.18E-08
n-Tetracosane	6.24E-08
C24 as Tetracosane	6.24E-08
Total Hydrocarbon	5.87E-04

THC:	3.11E-02	lbs/day	5.67E-03 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A029A	#A029A		ND Adj	#A028A		ND Adj	#A024		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	157	ND	79	372	ND	0	920	ND	0	79	0.08	23	34	3.38E-08			0	0	0.00E+00	3.38E-08
C5 as Pentane	157	ND	79	372	ND	0	920	ND	0	79	0.08	23	34	3.38E-08			0	0	0.00E+00	3.38E-08
n-Hexane	202	J	202	454	J	454	973	ND	0	-252	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C6 as Hexane	348	J	348	386	ND	0	973	ND	0	348	0.35	100	150	1.50E-07			0	0	0.00E+00	1.50E-07
n-Heptane	171	ND	85	403	ND	0	1018	ND	0	85	0.09	24	37	3.67E-08			0	0	0.00E+00	3.67E-08
C7 as Heptane	543	J	543	403	ND	0	1018	ND	0	543	0.54	155	233	2.33E-07			0	0	0.00E+00	2.33E-07
n-Octane	169	ND	85	399	ND	0	407	ND	0	85	0.08	24	36	3.63E-08			0	0	0.00E+00	3.63E-08
C8 as Octane	399	J	399	399	ND	0	407	ND	0	399	0.40	114	171	1.71E-07			0	0	0.00E+00	1.71E-07
n-Nonane	1,093	J	1,093	394	ND	0	410	ND	0	1,093	1.09	313	470	4.70E-07			0	0	0.00E+00	4.70E-07
C9 as Nonane	47,515		47,515	394	ND	0	410	ND	0	47,515	47.51	13604	20406	2.04E-05			0	0	0.00E+00	2.04E-05
n-Decane	10,779		10,779	394	ND	0	414	ND	0	10,779	10.78	3086	4630	4.63E-06			0	0	0.00E+00	4.63E-06
C10 as Decane	155,517		155,517	394	ND	0	414	ND	0	155,517	155.52	44527	66791	6.68E-05			0	0	0.00E+00	6.68E-05
n-Undecane	17,948		17,948	393	ND	0	413	ND	0	17,948	17.95	5139	7708	7.71E-06			0	0	0.00E+00	7.71E-06
C11 as Undecane	210,663		210,663	393	ND	0	413	ND	0	210,663	210.66	60316	90474	9.05E-05			0	0	0.00E+00	9.05E-05
n-Dodecane	22,128		22,128	396	ND	0	410	ND	0	22,128	22.13	6336	9504	9.50E-06			0	0	0.00E+00	9.50E-06
C12 as Dodecane	253,689		253,689	396	ND	0	410	ND	0	253,689	253.69	72635	108953	1.09E-04			0	0	0.00E+00	1.09E-04
n-Tridecane	42,813		42,813	399	ND	0	411	ND	0	42,813	42.81	12258	18387	1.84E-05			0	0	0.00E+00	1.84E-05
C13 as Tridecane	192,633		192,633	399	ND	0	411	ND	0	192,633	192.63	55154	82731	8.27E-05			0	0	0.00E+00	8.27E-05
n-Tetradecane	25,811		25,811	827	J	827	411	ND	0	24,985	24.98	7154	10730	1.07E-05			0	0	0.00E+00	1.07E-05
C14 as tetradecane	98,032		98,032	552	J	552	411	ND	0	97,480	97.48	27910	41865	4.19E-05			0	0	0.00E+00	4.19E-05
n-Pentadecane	7,303		7,303	1043	J	1,043	413	ND	0	6,260	6.26	1792	2688	2.69E-06			0	0	0.00E+00	2.69E-06
C15 as Pentadecane	22,635		22,635	900	J	900	413	ND	0	21,736	21.74	6223	9335	9.33E-06			0	0	0.00E+00	9.33E-06
n-Hexadecane	944	J	944	1111	J	1,111	411	ND	0	-166	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	1,150	J	1,150	1042	J	1,042	411	ND	0	107	0.11	31	46	4.60E-08			0	0	0.00E+00	4.60E-08
n-Heptadecane	177	J	177	603	J	603	406	ND	0	-427	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	168	ND	84	396	ND	0	406	ND	0	84	0.08	24	36	3.60E-08			0	0	0.00E+00	3.60E-08
n-Octadecane	169	ND	84	398	ND	0	410	ND	0	84	0.08	24	36	3.62E-08			0	0	0.00E+00	3.62E-08
C18 as Octodecane	169	ND	84	398	ND	0	410	ND	0	84	0.08	24	36	3.62E-08			0	0	0.00E+00	3.62E-08
n-Nonadecane	168	ND	84	396	ND	0	411	ND	0	84	0.08	24	36	3.60E-08			0	0	0.00E+00	3.60E-08
C19 as Nonadecane	168	ND	84	396	ND	0	411	ND	0	84	0.08	24	36	3.60E-08			0	0	0.00E+00	3.60E-08
n-Eicosane	166	ND	83	391	ND	0	410	ND	0	83	0.08	24	36	3.56E-08			0	0	0.00E+00	3.56E-08
C20 as Eicosane	166	ND	83	391	ND	0	410	ND	0	83	0.08	24	36	3.56E-08			0	0	0.00E+00	3.56E-08
n-Heneicosane	168	ND	84	396	ND	0	414	ND	0	84	0.08	24	36	3.60E-08			0	0	0.00E+00	3.60E-08
C21 as Heneicosane	168	ND	84	396	ND	0	414	ND	0	84	0.08	24	36	3.60E-08			0	0	0.00E+00	3.60E-08
n-Docosane	168	ND	84	396	ND	0	409	ND	0	84	0.08	24	36	3.61E-08			0	0	0.00E+00	3.61E-08
C22 as Docosane	168	ND	84	396	ND	0	409	ND	0	84	0.08	24	36	3.61E-08			0	0	0.00E+00	3.61E-08
n-Tricosane	167	ND	84	395	ND	0	409	ND	0	84	0.08	24	36	3.60E-08			0	0	0.00E+00	3.60E-08
C23 as Tricosane	167	ND	84	395	ND	0	409	ND	0	84	0.08	24	36	3.60E-08			0	0	0.00E+00	3.60E-08
n-Tetracosane	169	ND	85	399	ND	0	412	ND	0	85	0.08	24	36	3.63E-08			0	0	0.00E+00	3.63E-08
C24 as Tetracosane	169	ND	85	399	ND	0	412	ND	0	85	0.08	24	36	3.63E-08			0	0	0.00E+00	3.63E-08
Total Hydrocarbon			1,113,908			6,532			0		1108.22	317302	475,953	4.76E-04	0		0	0	0.00E+00	4.76E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID ANALYTICAL RESULTS					COMBINED
#A029B	#A029B		ND Adj	#A028A		ND Adj	#A024		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE				ND Adj			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	387	ND	193	372	ND	0	920	ND	0	193	0.19	55	82	8.24E-08			0	0	0.00E+00	8.24E-08
C5 as Pentane	387	ND	193	372	ND	0	920	ND	0	193	0.19	55	82	8.24E-08			0	0	0.00E+00	8.24E-08
n-Hexane	663	J	663	454	J	454	973	ND	0	209	0.21	59	89	8.89E-08			0	0	0.00E+00	8.89E-08
C6 as Hexane	402	ND	201	386	ND	0	973	ND	0	201	0.20	57	86	8.56E-08			0	0	0.00E+00	8.56E-08
n-Heptane	420	ND	210	403	ND	0	1018	ND	0	210	0.21	60	89	8.94E-08			0	0	0.00E+00	8.94E-08
C7 as Heptane	420	ND	210	403	ND	0	1018	ND	0	210	0.21	60	89	8.94E-08			0	0	0.00E+00	8.94E-08
n-Octane	416	ND	208	399	ND	0	407	ND	0	208	0.21	59	89	8.85E-08			0	0	0.00E+00	8.85E-08
C8 as Octane	1,401	J	1,401	399	ND	0	407	ND	0	1,401	1.40	398	597	5.97E-07			0	0	0.00E+00	5.97E-07
n-Nonane	2,000	J	2,000	394	ND	0	410	ND	0	2,000	2.00	568	852	8.52E-07			0	0	0.00E+00	8.52E-07
C9 as Nonane	116,810		116,810	394	ND	0	410	ND	0	116,810	116.81	33163	49745	4.97E-05			0	0	0.00E+00	4.97E-05
n-Decane	24,764		24,764	394	ND	0	414	ND	0	24,764	24.76	7031	10546	1.05E-05			0	0	0.00E+00	1.05E-05
C10 as Decane	320,313		320,313	394	ND	0	414	ND	0	320,313	320.31	90939	136408	1.36E-04			0	0	0.00E+00	1.36E-04
n-Undecane	25,877		25,877	393	ND	0	413	ND	0	25,877	25.88	7347	11020	1.10E-05			0	0	0.00E+00	1.10E-05
C11 as Undecane	286,798		286,798	393	ND	0	413	ND	0	286,798	286.80	81424	122136	1.22E-04			0	0	0.00E+00	1.22E-04
n-Dodecane	23,719		23,719	396	ND	0	410	ND	0	23,719	23.72	6734	10101	1.01E-05			0	0	0.00E+00	1.01E-05
C12 as Dodecane	271,581		271,581	396	ND	0	410	ND	0	271,581	271.58	77104	115656	1.16E-04			0	0	0.00E+00	1.16E-04
n-Tridecane	51,363		51,363	399	ND	0	411	ND	0	51,363	51.36	14582	21874	2.19E-05			0	0	0.00E+00	2.19E-05
C13 as Tridecane	239,863		239,863	399	ND	0	411	ND	0	239,863	239.86	68099	102148	1.02E-04			0	0	0.00E+00	1.02E-04
n-Tetradecane	42,475		42,475	827	J	827	411	ND	0	41,648	41.65	11824	17736	1.77E-05			0	0	0.00E+00	1.77E-05
C14 as tetradecane	159,020		159,020	552	J	552	411	ND	0	158,468	158.47	44990	67485	6.75E-05			0	0	0.00E+00	6.75E-05
n-Pentadecane	17,575		17,575	1043	J	1,043	413	ND	0	16,532	16.53	4694	7040	7.04E-06			0	0	0.00E+00	7.04E-06
C15 as Pentadecane	51,674		51,674	900	J	900	413	ND	0	50,774	50.77	14415	21623	2.16E-05			0	0	0.00E+00	2.16E-05
n-Hexadecane	2,341	J	2,341	1111	J	1,111	411	ND	0	1,231	1.23	349	524	5.24E-07			0	0	0.00E+00	5.24E-07
C16 as Hexadecane	1,976	J	1,976	1042	J	1,042	411	ND	0	934	0.93	265	398	3.98E-07			0	0	0.00E+00	3.98E-07
n-Heptadecane	412	ND	206	603	J	603	406	ND	0	-397	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	412	ND	206	396	ND	0	406	ND	0	206	0.21	59	88	8.78E-08			0	0	0.00E+00	8.78E-08
n-Octadecane	414	ND	207	398	ND	0	410	ND	0	207	0.21	59	88	8.83E-08			0	0	0.00E+00	8.83E-08
C18 as Octodecane	414	ND	207	398	ND	0	410	ND	0	207	0.21	59	88	8.83E-08			0	0	0.00E+00	8.83E-08
n-Nonadecane	412	ND	206	396	ND	0	411	ND	0	206	0.21	59	88	8.78E-08			0	0	0.00E+00	8.78E-08
C19 as Nonadecane	412	ND	206	396	ND	0	411	ND	0	206	0.21	59	88	8.78E-08			0	0	0.00E+00	8.78E-08
n-Eicosane	407	ND	204	391	ND	0	410	ND	0	204	0.20	58	87	8.68E-08			0	0	0.00E+00	8.68E-08
C20 as Eicosane	407	ND	204	391	ND	0	410	ND	0	204	0.20	58	87	8.68E-08			0	0	0.00E+00	8.68E-08
n-Heneicosane	412	ND	206	396	ND	0	414	ND	0	206	0.21	58	88	8.77E-08			0	0	0.00E+00	8.77E-08
C21 as Heneicosane	412	ND	206	396	ND	0	414	ND	0	206	0.21	58	88	8.77E-08			0	0	0.00E+00	8.77E-08
n-Docosane	413	ND	206	396	ND	0	409	ND	0	206	0.21	59	88	8.79E-08			0	0	0.00E+00	8.79E-08
C22 as Docosane	413	ND	206	396	ND	0	409	ND	0	206	0.21	59	88	8.79E-08			0	0	0.00E+00	8.79E-08
n-Tricosane	412	ND	206	395	ND	0	409	ND	0	206	0.21	58	88	8.77E-08			0	0	0.00E+00	8.77E-08
C23 as Tricosane	412	ND	206	395	ND	0	409	ND	0	206	0.21	58	88	8.77E-08			0	0	0.00E+00	8.77E-08
n-Tetracosane	416	ND	208	399	ND	0	412	ND	0	208	0.21	59	89	8.85E-08			0	0	0.00E+00	8.85E-08
C24 as Tetracosane	416	ND	208	399	ND	0	412	ND	0	208	0.21	59	89	8.85E-08			0	0	0.00E+00	8.85E-08
Total Hydrocarbon			1,644,726			6,532			0		1638.59	469156	697,811	6.98E-04	0		0	0	0.00E+00	6.98E-04

Bagging Data Form — Vacuum Method

Sample Id: AO30A/B

WSPA Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	A-1050	
Equipment Subtype:	Bull Plug		**Plant ID:**	Refinery A	
Line Size:	1	inches	**Date:**	10-Mar-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.13 inHg	765.3 mmHg	**Sample Pump ID**	BU51791	
Ambient Temperature:	80 °F	26.7 °C	**TVA ID**	9509	
Stream Temperature:	310 °F	154.4 °C	**Stream pressure:**		psig
Stream Description:	HE 4637 Kerosene Tube side Inlet				

REPEAT Sorbent Tube cracked upon receipt.

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds
STP = 294.15 K & 760 mmHg

A030A

Time	Bagging Test Measurement Data										
10:20	Pre-Test M21	6727	ppmv			Background		ppmv	Pre-Test $M21_{Corr}$	6727	ppmv
10:55	Volume Start	518.8	Liters								
11:58	DGM_{10L} Time	01:18.8	min:sec.frac	DGM Time	1.317	DGM Flow	7.59		$DGM\ Flow_{STP}$	7.39	liters/minute
11:58	Vacuum check	0.095	inches H2O								
11:24	DGM_T	86	°F	30.0	°C	DGM_P	2	inches H2O vacuum		761.6	mmHg
11:35	$Bag\ Conc_{ppm}$	614	ppmv								
11:35	Volume Stop	530.9	Liters	Total Vol	12.1	Liters					
	Sorbent Run Time	40	Minutes			Sorbent Flow	0.303	L/min	$Sorbent\ Flow_{STP}$	0.294	L/min
	$Sorbent\ Vol_{STP}$	11.77	Liters	$DGM\ Vol_{STP}$	295.53	Liters			$Total\ Run\ Vol_{STP}$	307.30	Liters

A030B

Time	Bagging Test Measurement Data										
11:37	Volume Start	530.9	Liters								
11:40	DGM_{10L} Time	01:20.5	min:sec.frac	DGM Time	1.350	DGM Flow	7.41		$DGM\ Flow_{STP}$	7.19	liters/minute
11:40	Vacuum check	0.09	inches H2O								
11:42	DGM_T	87	°F	30.6	°C	DGM_P	1.95	inches H2O vacuum		761.7	mmHg
12:13	$Bag\ Conc_{ppm}$	625	ppmv								
12:17	Volume Stop	543.1	Liters	Total Vol	12.2	Liters					
	Sorbent Run Time	40	Minutes			Sorbent Flow	0.305	L/min	$Sorbent\ Flow_{STP}$	0.296	L/min
	$Sorbent\ Vol_{STP}$	11.85	Liters	$DGM\ Vol_{STP}$	287.74	Liters			$Total\ Run\ Vol_{STP}$	299.59	Liters

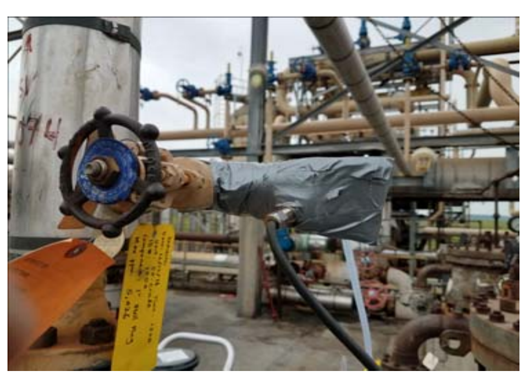
12:28	**Final Screening (ppmv) - equipment**	5,120	ppmv	**background**	ppmv
Condensate accumulation: starting time			Final time		0
Organic condensate collected		ml			
Density of organic condensate		g/ml			

Average THC emissions =	2.13E-03 kg/hr
Percent difference THC ER =	3%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.01E-07
C5 as Pentane	1.59E-07
n-Hexane	2.56E-06
C6 as Hexane	4.03E-06
n-Heptane	1.68E-05
C7 as Heptane	2.59E-05
n-Octane	3.84E-05
C8 as Octane	1.33E-04
n-Nonane	1.67E-04
C9 as Nonane	5.54E-04
n-Decane	1.31E-04
C10 as Decane	5.36E-04
n-Undecane	7.55E-05
C11 as Undecane	2.50E-04
n-Dodecane	3.35E-05
C12 as Dodecane	1.14E-04
n-Tridecane	1.09E-05
C13 as Tridecane	3.20E-05
n-Tetradecane	0.00E+00
C14 as tetradecane	0.00E+00
n-Pentadecane	0.00E+00
C15 as Pentadecane	0.00E+00
n-Hexadecane	0.00E+00
C16 as Hexadecane	0.00E+00
n-Heptadecane	0.00E+00
C17 as Heptadecane	6.47E-08
n-Octadecane	1.87E-07
C18 as Octodecane	6.52E-08
n-Nonadecane	1.87E-07
C19 as Nonadecane	6.50E-08
n-Eicosane	1.86E-07
C20 as Eicosane	6.44E-08
n-Heneicosane	1.88E-07
C21 as Heneicosane	6.51E-08
n-Docosane	1.87E-07
C22 as Docosane	6.49E-08
n-Tricosane	1.86E-07
C23 as Tricosane	6.48E-08
n-Tetracosane	1.88E-07
C24 as Tetracosane	6.54E-08
Total Hydrocarbon	2.13E-03

THC: 1.13E-01 lbs/day 2.05E-02 tons/yr



#A030A

Component	ANALYTICAL RESULTS #A030A µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A031A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	686	J	686	381	ND	0	920	ND	0	686	0.69	211	316	3.16E-07			0	0	0.00E+00	3.16E-07
C5 as Pentane	504	J	504	381	ND	0	920	ND	0	504	0.50	155	232	2.32E-07			0	0	0.00E+00	2.32E-07
n-Hexane	5,849		5,849	395	ND	0	973	ND	0	5,849	5.85	1798	2696	2.70E-06			0	0	0.00E+00	2.70E-06
C6 as Hexane	9,361		9,361	395	ND	0	973	ND	0	9,361	9.36	2877	4315	4.32E-06			0	0	0.00E+00	4.32E-06
n-Heptane	39,185		39,185	413	ND	0	1018	ND	0	39,185	39.19	12042	18063	1.81E-05			0	0	0.00E+00	1.81E-05
C7 as Heptane	60,356		60,356	413	ND	0	1018	ND	0	60,356	60.36	18547	27821	2.78E-05			0	0	0.00E+00	2.78E-05
n-Octane	89,189		89,189	409	ND	0	407	ND	0	89,189	89.19	27408	41112	4.11E-05			0	0	0.00E+00	4.11E-05
C8 as Octane	209,953		209,953	409	ND	0	407	ND	0	209,953	209.95	64519	96779	9.68E-05			0	0	0.00E+00	9.68E-05
n-Nonane	382,335		382,335	403	ND	0	410	ND	0	382,335	382.34	117493	176239	1.76E-04			0	0	0.00E+00	1.76E-04
C9 as Nonane	1,190,462		1,190,462	403	ND	0	410	ND	0	1,190,462	1190.46	365832	548748	5.49E-04			0	0	0.00E+00	5.49E-04
n-Decane	298,107		298,107	403	ND	0	414	ND	0	298,107	298.11	91609	137413	1.37E-04			0	0	0.00E+00	1.37E-04
C10 as Decane	1,265,703		1,265,703	403	ND	0	414	ND	0	1,265,703	1265.70	388953	583430	5.83E-04			0	0	0.00E+00	5.83E-04
n-Undecane	158,503		158,503	402	ND	0	413	ND	0	158,503	158.50	48708	73062	7.31E-05			0	0	0.00E+00	7.31E-05
C11 as Undecane	548,766		548,766	402	ND	0	413	ND	0	548,766	548.77	168637	252956	2.53E-04			0	0	0.00E+00	2.53E-04
n-Dodecane	68,771		68,771	405	ND	0	410	ND	0	68,771	68.77	21134	31700	3.17E-05			0	0	0.00E+00	3.17E-05
C12 as Dodecane	259,483		259,483	431	J	431	410	ND	0	259,051	259.05	79607	119411	1.19E-04			0	0	0.00E+00	1.19E-04
n-Tridecane	22,990		22,990	945	J	945	411	ND	0	22,045	22.05	6775	10162	1.02E-05			0	0	0.00E+00	1.02E-05
C13 as Tridecane	88,839		88,839	4930		4,930	411	ND	0	83,909	83.91	25785	38678	3.87E-05			0	0	0.00E+00	3.87E-05
n-Tetradecane	6,845	J	6,845	8131		8,131	411	ND	0	-1,285	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C14 as tetradecane	16,139		16,139	25304		25,304	411	ND	0	-9,165	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Pentadecane	1,440	J	1,440	14873		14,873	413	ND	0	-13,433	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	883	J	883	30467		30,467	413	ND	0	-29,585	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	824	ND	412	4789		4,789	411	ND	0	-4,377	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	165	ND	82	3715	J	3,715	411	ND	0	-3,633	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	815	ND	407	969	J	969	406	ND	0	-562	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	163	ND	81	406	ND	0	406	ND	0	81	0.08	25	38	3.76E-08			0	0	0.00E+00	3.76E-08
n-Octadecane	824	ND	412	408	ND	0	410	ND	0	412	0.41	127	190	1.90E-07			0	0	0.00E+00	1.90E-07
C18 as Octodecane	165	ND	82	408	ND	0	410	ND	0	82	0.08	25	38	3.80E-08			0	0	0.00E+00	3.80E-08
n-Nonadecane	826	ND	413	406	ND	0	411	ND	0	413	0.41	127	190	1.90E-07			0	0	0.00E+00	1.90E-07
C19 as Nonadecane	165	ND	83	406	ND	0	411	ND	0	83	0.08	25	38	3.81E-08			0	0	0.00E+00	3.81E-08
n-Eicosane	824	ND	412	401	ND	0	410	ND	0	412	0.41	127	190	1.90E-07			0	0	0.00E+00	1.90E-07
C20 as Eicosane	165	ND	82	401	ND	0	410	ND	0	82	0.08	25	38	3.80E-08			0	0	0.00E+00	3.80E-08
n-Heneicosane	831	ND	416	405	ND	0	414	ND	0	416	0.42	128	192	1.92E-07			0	0	0.00E+00	1.92E-07
C21 as Heneicosane	166	ND	83	405	ND	0	414	ND	0	83	0.08	26	38	3.83E-08			0	0	0.00E+00	3.83E-08
n-Docosane	822	ND	411	406	ND	0	409	ND	0	411	0.41	126	189	1.89E-07			0	0	0.00E+00	1.89E-07
C22 as Docosane	164	ND	82	406	ND	0	409	ND	0	82	0.08	25	38	3.79E-08			0	0	0.00E+00	3.79E-08
n-Tricosane	822	ND	411	405	ND	0	409	ND	0	411	0.41	126	189	1.89E-07			0	0	0.00E+00	1.89E-07
C23 as Tricosane	164	ND	82	405	ND	0	409	ND	0	82	0.08	25	38	3.79E-08			0	0	0.00E+00	3.79E-08
n-Tetracosane	828	ND	414	409	ND	0	412	ND	0	414	0.41	127	191	1.91E-07			0	0	0.00E+00	1.91E-07
C24 as Tetracosane	166	ND	83	409	ND	0	412	ND	0	83	0.08	25	38	3.81E-08			0	0	0.00E+00	3.81E-08
Total Hydrocarbon			4,728,799			94,554			0		4696.28	1443179	#######	2.16E-03	0		0	0	0.00E+00	2.16E-03

#A030B

Component	ANALYTICAL RESULTS #A030B µg/m³	Flag	ND Adj µg/m³	BACKGROUND #A031A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #A024A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID ANALYTICAL RESULTS µg	Flag	ND Adj µg	µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	636	J	636	381	ND	0	920	ND	0	636	0.64	190	286	2.86E-07			0	0	0.00E+00	2.86E-07
C5 as Pentane	384	ND	192	381	ND	0	920	ND	0	192	0.19	57	86	8.62E-08			0	0	0.00E+00	8.62E-08
n-Hexane	5,409		5,409	395	ND	0	973	ND	0	5,409	5.41	1621	2431	2.43E-06			0	0	0.00E+00	2.43E-06
C6 as Hexane	8,336		8,336	395	ND	0	973	ND	0	8,336	8.34	2497	3746	3.75E-06			0	0	0.00E+00	3.75E-06
n-Heptane	34,693		34,693	413	ND	0	1018	ND	0	34,693	34.69	10394	15590	1.56E-05			0	0	0.00E+00	1.56E-05
C7 as Heptane	53,383		53,383	413	ND	0	1018	ND	0	53,383	53.38	15993	23990	2.40E-05			0	0	0.00E+00	2.40E-05
n-Octane	79,564		79,564	409	ND	0	407	ND	0	79,564	79.56	23836	35755	3.58E-05			0	0	0.00E+00	3.58E-05
C8 as Octane	377,413		377,413	409	ND	0	407	ND	0	377,413	377.41	113069	169604	1.70E-04			0	0	0.00E+00	1.70E-04
n-Nonane	350,541		350,541	403	ND	0	410	ND	0	350,541	350.54	105018	157528	1.58E-04			0	0	0.00E+00	1.58E-04
C9 as Nonane	1,243,057		1,243,057	403	ND	0	410	ND	0	1,243,057	1243.06	372408	558612	5.59E-04			0	0	0.00E+00	5.59E-04
n-Decane	278,964		278,964	403	ND	0	414	ND	0	278,964	278.96	83575	125362	1.25E-04			0	0	0.00E+00	1.25E-04
C10 as Decane	1,087,998		1,087,998	403	ND	0	414	ND	0	1,087,998	1088.00	325953	488930	4.89E-04			0	0	0.00E+00	4.89E-04
n-Undecane	173,304		173,304	402	ND	0	413	ND	0	173,304	173.30	51920	77880	7.79E-05			0	0	0.00E+00	7.79E-05
C11 as Undecane	551,488		551,488	402	ND	0	413	ND	0	551,488	551.49	165220	247830	2.48E-04			0	0	0.00E+00	2.48E-04
n-Dodecane	78,690		78,690	405	ND	0	410	ND	0	78,690	78.69	23575	35362	3.54E-05			0	0	0.00E+00	3.54E-05
C12 as Dodecane	242,983		242,983	431	J	431	410	ND	0	242,551	242.55	72666	108999	1.09E-04			0	0	0.00E+00	1.09E-04
n-Tridecane	26,734		26,734	945	J	945	411	ND	0	25,788	25.79	7726	11589	1.16E-05			0	0	0.00E+00	1.16E-05
C13 as Tridecane	61,097		61,097	4930		4,930	411	ND	0	56,167	56.17	16827	25241	2.52E-05			0	0	0.00E+00	2.52E-05
n-Tetradecane	6,865	J	6,865	8131		8,131	411	ND	0	-1,266	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C14 as tetradecane	10,650		10,650	25304		25,304	411	ND	0	-14,654	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Pentadecane	1,309	J	1,309	14873		14,873	413	ND	0	-13,564	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C15 as Pentadecane	408	ND	204	30467		30,467	413	ND	0	-30,263	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Hexadecane	819	ND	409	4789		4,789	411	ND	0	-4,380	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C16 as Hexadecane	409	ND	205	3715	J	3,715	411	ND	0	-3,511	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
n-Heptadecane	818	ND	409	969	J	969	406	ND	0	-560	0.00	0	0	0.00E+00			0	0	0.00E+00	0.00E+00
C17 as Heptadecane	409	ND	205	406	ND	0	406	ND	0	205	0.20	61	92	9.19E-08			0	0	0.00E+00	9.19E-08
n-Octadecane	822	ND	411	408	ND	0	410	ND	0	411	0.41	123	185	1.85E-07			0	0	0.00E+00	1.85E-07
C18 as Octodecane	411	ND	206	408	ND	0	410	ND	0	206	0.21	62	92	9.24E-08			0	0	0.00E+00	9.24E-08
n-Nonadecane	818	ND	409	406	ND	0	411	ND	0	409	0.41	122	184	1.84E-07			0	0	0.00E+00	1.84E-07
C19 as Nonadecane	409	ND	204	406	ND	0	411	ND	0	204	0.20	61	92	9.19E-08			0	0	0.00E+00	9.19E-08
n-Eicosane	808	ND	404	401	ND	0	410	ND	0	404	0.40	121	182	1.82E-07			0	0	0.00E+00	1.82E-07
C20 as Eicosane	404	ND	202	401	ND	0	410	ND	0	202	0.20	61	91	9.08E-08			0	0	0.00E+00	9.08E-08
n-Heneicosane	817	ND	409	405	ND	0	414	ND	0	409	0.41	122	184	1.84E-07			0	0	0.00E+00	1.84E-07
C21 as Heneicosane	409	ND	204	405	ND	0	414	ND	0	204	0.20	61	92	9.18E-08			0	0	0.00E+00	9.18E-08
n-Docosane	819	ND	409	406	ND	0	409	ND	0	409	0.41	123	184	1.84E-07			0	0	0.00E+00	1.84E-07
C22 as Docosane	409	ND	205	406	ND	0	409	ND	0	205	0.20	61	92	9.20E-08			0	0	0.00E+00	9.20E-08
n-Tricosane	817	ND	408	405	ND	0	409	ND	0	408	0.41	122	184	1.84E-07			0	0	0.00E+00	1.84E-07
C23 as Tricosane	408	ND	204	405	ND	0	409	ND	0	204	0.20	61	92	9.18E-08			0	0	0.00E+00	9.18E-08
n-Tetracosane	825	ND	412	409	ND	0	412	ND	0	412	0.41	124	185	1.85E-07			0	0	0.00E+00	1.85E-07
C24 as Tetracosane	412	ND	206	409	ND	0	412	ND	0	206	0.21	62	93	9.26E-08			0	0	0.00E+00	9.26E-08
Total Hydrocarbon			4,679,030			94,554			0		4652.67	1429778	#######	2.09E-03	0		0	0	0.00E+00	2.09E-03

Bagging Data Form	**Vacuum Method**		**Sample Id**	**A032A/B**
Equipment type:	Valve		**Component ID:**	A-28
Equipment Subtype:	Gate		**Plant ID:**	Refinery A
Line Size:	10 *inches*		**Date:**	14-Mar-17
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR
Barometric pressure	30.04 *inHg*	763.0 *mmHg*	**Sample Pump ID**	BU51791
Ambient Temperature:	76.6 *°F*	24.8 *°C*	**TVA ID**	9509
Stream Temperature:	*°F*	-17.8 *°C*	**Stream pressure:**	*psig*
Stream Description:	*E4256 Recycled Gas Oil*			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A032A

Time	Bagging Test Measurement Data									
10:00	Pre-Test M21	225	*ppmv*		Background		*ppmv*	Pre-Test $M21_{Corr}$	225	*ppmv*
11:10	Volume Start	543.1	*Liters*							
11:14	DGM_{10L} Time	01:18.7	*min:sec.frac*	DGM Time	1.317	DGM Flow	7.59	DGM $Flow_{STP}$	7.30	*liters/minute*
11:14	Vacuum check	0.14	*inches H2O*							
11:30	DGM_T	91	*°F*	32.8	°C	DGM_P	2.1	*inches H2O vacuum*	759.1	*mmHg*
11:47	Bag $Conc_{ppm}$	42	*ppmv*							
11:50	Volume Stop	555.2	*Liters*	Total Vol	12.1	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.303	*L/min*	Sorbent $Flow_{STP}$	0.291	*L/min*
	Sorbent Vol_{STP}	11.63	*Liters*	DGM Vol_{STP}	291.90	*Liters*	Total Run Vol_{STP}	303.52	*Liters*	

A032B

Time	Bagging Test Measurement Data									
11:53	Volume Start	555.2	*Liters*							
12:03	DGM_{10L} Time	01:20.1	*min:sec.frac*	DGM Time	1.333	DGM Flow	7.50	DGM $Flow_{STP}$	7.12	*liters/minute*
12:03	Vacuum check	0.075	*inches H2O*							
12:31	DGM_T	98	*°F*	36.7	°C	DGM_P	1.95	*inches H2O vacuum*	759.4	*mmHg*
12:28	Bag $Conc_{ppm}$	41.4	*ppmv*							
12:33	Volume Stop	567.3	*Liters*	Total Vol	12.1	*Liters*				
	Sorbent Run Time	40	*Minutes*		Sorbent Flow	0.302	*L/min*	Sorbent $Flow_{STP}$	0.287	*L/min*
	Sorbent Vol_{STP}	11.48	*Liters*	DGM Vol_{STP}	284.73	*Liters*	Total Run Vol_{STP}	296.22	*Liters*	

13:00	**Final Screening (ppmv) - equipment**	438	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time			Final time		0	
Organic condensate collected		*ml*				
Density of organic condensate		*g/ml*				

Average THC emissions =	3.60E-04	kg/hr
Percent difference THC ER =	13%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	6.96E-08
C5 as Pentane	5.06E-07
n-Hexane	3.89E-07
C6 as Hexane	1.79E-06
n-Heptane	8.87E-07
C7 as Heptane	3.37E-06
n-Octane	8.26E-07
C8 as Octane	6.65E-06
n-Nonane	3.77E-07
C9 as Nonane	1.17E-05
n-Decane	3.57E-07
C10 as Decane	2.10E-05
n-Undecane	2.27E-06
C11 as Undecane	3.62E-05
n-Dodecane	1.63E-06
C12 as Dodecane	6.70E-05
n-Tridecane	4.94E-06
C13 as Tridecane	5.17E-05
n-Tetradecane	1.06E-05
C14 as tetradecane	6.23E-05
n-Pentadecane	6.49E-06
C15 as Pentadecane	4.36E-05
n-Hexadecane	3.19E-06
C16 as Hexadecane	1.46E-05
n-Heptadecane	1.47E-06
C17 as Heptadecane	3.84E-06
n-Octadecane	4.65E-07
C18 as Octodecane	6.97E-07
n-Nonadecane	1.84E-07
C19 as Nonadecane	1.07E-07
n-Eicosane	8.38E-08
C20 as Eicosane	6.42E-08
n-Heneicosane	6.45E-08
C21 as Heneicosane	6.45E-08
n-Docosane	6.46E-08
C22 as Docosane	6.46E-08
n-Tricosane	6.45E-08
C23 as Tricosane	6.45E-08
n-Tetracosane	6.51E-08
C24 as Tetracosane	6.51E-08
Total Hydrocarbon	3.60E-04

THC:	**1.90E-02**	**lbs/day**	**3.48E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A032A	#A032A		ND Adj	#A033A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	117	J	117	384	ND	0	920	ND	0	117	0.12	35	53	5.32E-08			0	0	0.00E+00	5.32E-08
C5 as Pentane	1,205		1,205	384	ND	0	920	ND	0	1,205	1.21	366	549	5.49E-07			0	0	0.00E+00	5.49E-07
n-Hexane	913	J	913	399	ND	0	973	ND	0	913	0.91	277	416	4.16E-07			0	0	0.00E+00	4.16E-07
C6 as Hexane	5,665	ND	2,833	399	ND	0	973	ND	0	2,833	2.83	860	1290	1.29E-06			0	0	0.00E+00	1.29E-06
n-Heptane	1,272	J	1,272	417	ND	0	1018	ND	0	1,272	1.27	386	579	5.79E-07			0	0	0.00E+00	5.79E-07
C7 as Heptane	7,816		7,816	417	ND	0	1018	ND	0	7,816	7.82	2372	3558	3.56E-06			0	0	0.00E+00	3.56E-06
n-Octane	1,801	J	1,801	412	ND	0	407	ND	0	1,801	1.80	547	820	8.20E-07			0	0	0.00E+00	8.20E-07
C8 as Octane	16,151		16,151	412	ND	0	407	ND	0	16,151	16.15	4902	7353	7.35E-06			0	0	0.00E+00	7.35E-06
n-Nonane	900	J	900	407	ND	0	410	ND	0	900	0.90	273	410	4.10E-07			0	0	0.00E+00	4.10E-07
C9 as Nonane	28,988		28,988	407	ND	0	410	ND	0	28,988	28.99	8799	13198	1.32E-05			0	0	0.00E+00	1.32E-05
n-Decane	894	J	894	407	ND	0	414	ND	0	894	0.89	271	407	4.07E-07			0	0	0.00E+00	4.07E-07
C10 as Decane	53,319		53,319	407	ND	0	414	ND	0	53,319	53.32	16184	24275	2.43E-05			0	0	0.00E+00	2.43E-05
n-Undecane	5,584		5,584	406	ND	0	413	ND	0	5,584	5.58	1695	2542	2.54E-06			0	0	0.00E+00	2.54E-06
C11 as Undecane	90,342		90,342	406	ND	0	413	ND	0	90,342	90.34	27421	41131	4.11E-05			0	0	0.00E+00	4.11E-05
n-Dodecane	4,176		4,176	409	ND	0	410	ND	0	4,176	4.18	1267	1901	1.90E-06			0	0	0.00E+00	1.90E-06
C12 as Dodecane	163,498		163,498	409	ND	0	410	ND	0	163,498	163.50	49625	74438	7.44E-05			0	0	0.00E+00	7.44E-05
n-Tridecane	12,568		12,568	412	ND	0	411	ND	0	12,568	12.57	3815	5722	5.72E-06			0	0	0.00E+00	5.72E-06
C13 as Tridecane	125,648		125,648	412	ND	0	411	ND	0	125,648	125.65	38137	57205	5.72E-05			0	0	0.00E+00	5.72E-05
n-Tetradecane	24,990		24,990	643	J	643	411	ND	0	24,347	24.35	7390	11085	1.11E-05			0	0	0.00E+00	1.11E-05
C14 as tetradecane	139,684		139,684	411	ND	0	411	ND	0	139,684	139.68	42397	63596	6.36E-05			0	0	0.00E+00	6.36E-05
n-Pentadecane	13,831		13,831	408	ND	0	413	ND	0	13,831	13.83	4198	6297	6.30E-06			0	0	0.00E+00	6.30E-06
C15 as Pentadecane	90,511		90,511	408	ND	0	413	ND	0	90,511	90.51	27472	41208	4.12E-05			0	0	0.00E+00	4.12E-05
n-Hexadecane	6,701		6,701	409	ND	0	411	ND	0	6,701	6.70	2034	3051	3.05E-06			0	0	0.00E+00	3.05E-06
C16 as Hexadecane	29,175		29,175	409	ND	0	411	ND	0	29,175	29.18	8855	13283	1.33E-05			0	0	0.00E+00	1.33E-05
n-Heptadecane	3,551		3,551	409	ND	0	406	ND	0	3,551	3.55	1078	1617	1.62E-06			0	0	0.00E+00	1.62E-06
C17 as Heptadecane	9,147		9,147	409	ND	0	406	ND	0	9,147	9.15	2776	4165	4.16E-06			0	0	0.00E+00	4.16E-06
n-Octadecane	1,541	J	1,541	411	ND	0	410	ND	0	1,541	1.54	468	701	7.01E-07			0	0	0.00E+00	7.01E-07
C18 as Octodecane	2,397		2,397	411	ND	0	410	ND	0	2,397	2.40	727	1091	1.09E-06			0	0	0.00E+00	1.09E-06
n-Nonadecane	608	J	608	409	ND	0	411	ND	0	608	0.61	184	277	2.77E-07			0	0	0.00E+00	2.77E-07
C19 as Nonadecane	269	J	269	409	ND	0	411	ND	0	269	0.27	82	123	1.23E-07			0	0	0.00E+00	1.23E-07
n-Eicosane	169	J	169	404	ND	0	410	ND	0	169	0.17	51	77	7.71E-08			0	0	0.00E+00	7.71E-08
C20 as Eicosane	166	ND	83	404	ND	0	410	ND	0	83	0.08	25	38	3.79E-08			0	0	0.00E+00	3.79E-08
n-Heneicosane	165	ND	82	409	ND	0	414	ND	0	82	0.08	25	38	3.75E-08			0	0	0.00E+00	3.75E-08
C21 as Heneicosane	165	ND	82	409	ND	0	414	ND	0	82	0.08	25	38	3.75E-08			0	0	0.00E+00	3.75E-08
n-Docosane	165	ND	83	409	ND	0	409	ND	0	83	0.08	25	38	3.76E-08			0	0	0.00E+00	3.76E-08
C22 as Docosane	165	ND	83	409	ND	0	409	ND	0	83	0.08	25	38	3.76E-08			0	0	0.00E+00	3.76E-08
n-Tricosane	165	ND	82	408	ND	0	409	ND	0	82	0.08	25	37	3.75E-08			0	0	0.00E+00	3.75E-08
C23 as Tricosane	165	ND	82	408	ND	0	409	ND	0	82	0.08	25	37	3.75E-08			0	0	0.00E+00	3.75E-08
n-Tetracosane	166	ND	83	412	ND	0	412	ND	0	83	0.08	25	38	3.79E-08			0	0	0.00E+00	3.79E-08
C24 as Tetracosane	166	ND	83	412	ND	0	412	ND	0	83	0.08	25	38	3.79E-08			0	0	0.00E+00	3.79E-08
Total Hydrocarbon			841,344			643			0		840.70	255171	382,757	3.83E-04	0		0	0	0.00E+00	3.83E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS					COMBINED EMISSION RATE
#A032B	#A032B		ND Adj	#A033A		ND Adj	#A024A		ND Adj								ND Adj			
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	387	ND	193	384	ND	0	920	ND	0	193	0.19	57	86	8.59E-08			0	0	0.00E+00	8.59E-08
C5 as Pentane	1,042	J	1,042	384	ND	0	920	ND	0	1,042	1.04	309	463	4.63E-07			0	0	0.00E+00	4.63E-07
n-Hexane	815	J	815	399	ND	0	973	ND	0	815	0.82	241	362	3.62E-07			0	0	0.00E+00	3.62E-07
C6 as Hexane	5,169		5,169	399	ND	0	973	ND	0	5,169	5.17	1531	2297	2.30E-06			0	0	0.00E+00	2.30E-06
n-Heptane	2,688	J	2,688	417	ND	0	1018	ND	0	2,688	2.69	796	1194	1.19E-06			0	0	0.00E+00	1.19E-06
C7 as Heptane	7,141		7,141	417	ND	0	1018	ND	0	7,141	7.14	2115	3173	3.17E-06			0	0	0.00E+00	3.17E-06
n-Octane	1,872	J	1,872	412	ND	0	407	ND	0	1,872	1.87	555	832	8.32E-07			0	0	0.00E+00	8.32E-07
C8 as Octane	13,377		13,377	412	ND	0	407	ND	0	13,377	13.38	3962	5944	5.94E-06			0	0	0.00E+00	5.94E-06
n-Nonane	774	J	774	407	ND	0	410	ND	0	774	0.77	229	344	3.44E-07			0	0	0.00E+00	3.44E-07
C9 as Nonane	23,087		23,087	407	ND	0	410	ND	0	23,087	23.09	6839	10258	1.03E-05			0	0	0.00E+00	1.03E-05
n-Decane	691	J	691	407	ND	0	414	ND	0	691	0.69	205	307	3.07E-07			0	0	0.00E+00	3.07E-07
C10 as Decane	40,002		40,002	407	ND	0	414	ND	0	40,002	40.00	11849	17774	1.78E-05			0	0	0.00E+00	1.78E-05
n-Undecane	4,490		4,490	406	ND	0	413	ND	0	4,490	4.49	1330	1995	2.00E-06			0	0	0.00E+00	2.00E-06
C11 as Undecane	70,530		70,530	406	ND	0	413	ND	0	70,530	70.53	20892	31338	3.13E-05			0	0	0.00E+00	3.13E-05
n-Dodecane	3,061	J	3,061	409	ND	0	410	ND	0	3,061	3.06	907	1360	1.36E-06			0	0	0.00E+00	1.36E-06
C12 as Dodecane	134,106		134,106	409	ND	0	410	ND	0	134,106	134.11	39725	59587	5.96E-05			0	0	0.00E+00	5.96E-05
n-Tridecane	9,361		9,361	412	ND	0	411	ND	0	9,361	9.36	2773	4159	4.16E-06			0	0	0.00E+00	4.16E-06
C13 as Tridecane	103,815		103,815	412	ND	0	411	ND	0	103,815	103.82	30752	46128	4.61E-05			0	0	0.00E+00	4.61E-05
n-Tetradecane	23,583		23,583	643	J	643	411	ND	0	22,941	22.94	6795	10193	1.02E-05			0	0	0.00E+00	1.02E-05
C14 as tetradecane	137,078		137,078	411	ND	0	411	ND	0	137,078	137.08	40605	60907	6.09E-05			0	0	0.00E+00	6.09E-05
n-Pentadecane	15,049		15,049	408	ND	0	413	ND	0	15,049	15.05	4458	6687	6.69E-06			0	0	0.00E+00	6.69E-06
C15 as Pentadecane	103,692		103,692	408	ND	0	413	ND	0	103,692	103.69	30715	46073	4.61E-05			0	0	0.00E+00	4.61E-05
n-Hexadecane	7,487		7,487	409	ND	0	411	ND	0	7,487	7.49	2218	3326	3.33E-06			0	0	0.00E+00	3.33E-06
C16 as Hexadecane	35,797		35,797	409	ND	0	411	ND	0	35,797	35.80	10604	15906	1.59E-05			0	0	0.00E+00	1.59E-05
n-Heptadecane	2,958	J	2,958	409	ND	0	406	ND	0	2,958	2.96	876	1314	1.31E-06			0	0	0.00E+00	1.31E-06
C17 as Heptadecane	7,926		7,926	409	ND	0	406	ND	0	7,926	7.93	2348	3522	3.52E-06			0	0	0.00E+00	3.52E-06
n-Octadecane	516	J	516	411	ND	0	410	ND	0	516	0.52	153	229	2.29E-07			0	0	0.00E+00	2.29E-07
C18 as Octodecane	683	J	683	411	ND	0	410	ND	0	683	0.68	202	303	3.03E-07			0	0	0.00E+00	3.03E-07
n-Nonadecane	412	ND	206	409	ND	0	411	ND	0	206	0.21	61	92	9.16E-08			0	0	0.00E+00	9.16E-08
C19 as Nonadecane	412	ND	206	409	ND	0	411	ND	0	206	0.21	61	92	9.16E-08			0	0	0.00E+00	9.16E-08
n-Eicosane	407	ND	204	404	ND	0	410	ND	0	204	0.20	60	91	9.05E-08			0	0	0.00E+00	9.05E-08
C20 as Eicosane	407	ND	204	404	ND	0	410	ND	0	204	0.20	60	91	9.05E-08			0	0	0.00E+00	9.05E-08
n-Heneicosane	412	ND	206	409	ND	0	414	ND	0	206	0.21	61	92	9.15E-08			0	0	0.00E+00	9.15E-08
C21 as Heneicosane	412	ND	206	409	ND	0	414	ND	0	206	0.21	61	92	9.15E-08			0	0	0.00E+00	9.15E-08
n-Docosane	413	ND	206	409	ND	0	409	ND	0	206	0.21	61	92	9.17E-08			0	0	0.00E+00	9.17E-08
C22 as Docosane	413	ND	206	409	ND	0	409	ND	0	206	0.21	61	92	9.17E-08			0	0	0.00E+00	9.17E-08
n-Tricosane	412	ND	206	408	ND	0	409	ND	0	206	0.21	61	91	9.15E-08			0	0	0.00E+00	9.15E-08
C23 as Tricosane	412	ND	206	408	ND	0	409	ND	0	206	0.21	61	91	9.15E-08			0	0	0.00E+00	9.15E-08
n-Tetracosane	416	ND	208	412	ND	0	412	ND	0	208	0.21	62	92	9.24E-08			0	0	0.00E+00	9.24E-08
C24 as Tetracosane	416	ND	208	412	ND	0	412	ND	0	208	0.21	62	92	9.24E-08			0	0	0.00E+00	9.24E-08
Total Hydrocarbon			759,457			643			0		758.81	230317	337,160	3.37E-04	0		0	0	0.00E+00	3.37E-04

Bagging Data Form — Vacuum Method

Sample Id A034A/B

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	A-415
Equipment Subtype:	Gate			**Plant ID:**	Refinery A
Line Size:	1 *inches*			**Date:**	14-Mar-17
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR
Barometric pressure	30.02 *inHg*	762.5 *mmHg*		**Sample Pump ID**	BU51791
Ambient Temperature:	83.4 °F	28.6 °C		**TVA ID**	9509
Stream Temperature:	°F	-17.8 °C		**Stream pressure:**	*psig*
Stream Description:	*Light Gas Oil P/A to #4 Gas*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

A034A

Time	Bagging Test Measurement Data								
13:25	Pre-Test M21	121	*ppmv*	Background		*ppmv*	Pre-Test $M21_{Corr}$	121	*ppmv*
14:18	Volume Start	567.3	*Liters*						
14:20	DGM_{10L} Time	01:19.1	*min:sec.frac*	DGM Time	1.317	DGM Flow 7.59	$DGM\ Flow_{STP}$	7.46	*liters/minute*
14:20	Vacuum check	0.015	*inches H2O*						
14:39	DGM_T	79	°F	26.1	°C	DGM_P 1.8	*inches H2O vacuum*	759.1	*mmHg*
14:52	Bag $Conc_{ppm}$	15	*ppmv*						
14:58	Volume Stop	579.3	*Liters*	Total Vol	12.0	*Liters*			
	Sorbent Run Time	40	*Minutes*	Sorbent Flow	0.300	*L/min*	$Sorbent\ Flow_{STP}$	0.295	*L/min*
	Sorbent Vol_{STP}	11.79	*Liters*	DGM Vol_{STP}	298.42	*Liters*	Total Run Vol_{STP}	310.21	*Liters*

A034B

Time	Bagging Test Measurement Data								
15:00	Volume Start	579.3	*Liters*						
15:03	DGM_{10L} Time	01:22.1	*min:sec.frac*	DGM Time	1.367	DGM Flow 7.32	$DGM\ Flow_{STP}$	7.16	*liters/minute*
15:03	Vacuum check	0.008	*inches H2O*						
15:30	DGM_T	81	°F	27.2	°C	DGM_P 1.75	*inches H2O vacuum*	759.2	*mmHg*
15:38	Bag $Conc_{ppm}$	14.7	*ppmv*						
15:40	Volume Stop	591.5	*Liters*	Total Vol	12.2	*Liters*			
	Sorbent Run Time	40	*Minutes*	Sorbent Flow	0.305	*L/min*	$Sorbent\ Flow_{STP}$	0.299	*L/min*
	Sorbent Vol_{STP}	11.94	*Liters*	DGM Vol_{STP}	286.48	*Liters*	Total Run Vol_{STP}	298.42	*Liters*

15:55	**Final Screening (ppmv) - equipment**	107	*ppmv*	**background**		*ppmv*
Condensate accumulation: starting time			Final time		0	
Organic condensate collected		*ml*				
Density of organic condensate		*g/ml*				

Average THC emissions =	6.43E-05 kg/hr
Percent difference THC ER =	7%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.21E-07
C5 as Pentane	1.71E-07
n-Hexane	1.77E-07
C6 as Hexane	2.60E-07
n-Heptane	1.33E-07
C7 as Heptane	5.12E-07
n-Octane	1.23E-07
C8 as Octane	1.10E-06
n-Nonane	1.17E-07
C9 as Nonane	3.91E-06
n-Decane	1.46E-07
C10 as Decane	8.56E-06
n-Undecane	7.33E-07
C11 as Undecane	1.04E-05
n-Dodecane	4.17E-07
C12 as Dodecane	1.01E-05
n-Tridecane	6.00E-07
C13 as Tridecane	7.36E-06
n-Tetradecane	4.38E-07
C14 as tetradecane	6.40E-06
n-Pentadecane	8.52E-07
C15 as Pentadecane	5.45E-06
n-Hexadecane	8.69E-07
C16 as Hexadecane	3.38E-06
n-Heptadecane	2.53E-07
C17 as Heptadecane	8.01E-07
n-Octadecane	6.52E-08
C18 as Octodecane	6.52E-08
n-Nonadecane	6.52E-08
C19 as Nonadecane	6.52E-08
n-Eicosane	6.48E-08
C20 as Eicosane	6.48E-08
n-Heneicosane	6.55E-08
C21 as Heneicosane	6.55E-08
n-Docosane	6.50E-08
C22 as Docosane	6.50E-08
n-Tricosane	6.49E-08
C23 as Tricosane	6.49E-08
n-Tetracosane	6.54E-08
C24 as Tetracosane	6.54E-08
Total Hydrocarbon	6.43E-05

THC:	**3.40E-03**	**lbs/day**	**6.21E-04 tons/yr**

#A034A	ANALYTICAL RESULTS #A034A		ND Adj	BACKGROUND #A035A		ND Adj	TRIP BLANK #A024A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	156	ND	78	393	ND	0	920	ND	0	78	0.08	24	36	3.63E-08			0	0	0.00E+00	3.63E-08
C5 as Pentane	296	J	296	393	ND	0	920	ND	0	296	0.30	92	138	1.38E-07			0	0	0.00E+00	1.38E-07
n-Hexane	295	J	295	409	ND	0	973	ND	0	295	0.29	91	137	1.37E-07			0	0	0.00E+00	1.37E-07
C6 as Hexane	652	J	652	409	ND	0	973	ND	0	652	0.65	202	303	3.03E-07			0	0	0.00E+00	3.03E-07
n-Heptane	169	ND	85	427	ND	0	1018	ND	0	85	0.08	26	39	3.94E-08			0	0	0.00E+00	3.94E-08
C7 as Heptane	1,145	J	1,145	427	ND	0	1018	ND	0	1,145	1.14	355	533	5.33E-07			0	0	0.00E+00	5.33E-07
n-Octane	334	J	334	423	ND	0	407	ND	0	334	0.33	104	155	1.55E-07			0	0	0.00E+00	1.55E-07
C8 as Octane	4,548		4,548	423	ND	0	407	ND	0	4,548	4.55	1411	2116	2.12E-06			0	0	0.00E+00	2.12E-06
n-Nonane	307	J	307	417	ND	0	410	ND	0	307	0.31	95	143	1.43E-07			0	0	0.00E+00	1.43E-07
C9 as Nonane	10,278		10,278	417	ND	0	410	ND	0	10,278	10.28	3188	4782	4.78E-06			0	0	0.00E+00	4.78E-06
n-Decane	427	J	427	417	ND	0	414	ND	0	427	0.43	133	199	1.99E-07			0	0	0.00E+00	1.99E-07
C10 as Decane	22,843		22,843	417	ND	0	414	ND	0	22,843	22.84	7086	10629	1.06E-05			0	0	0.00E+00	1.06E-05
n-Undecane	1,836		1,836	416	ND	0	413	ND	0	1,836	1.84	570	854	8.54E-07			0	0	0.00E+00	8.54E-07
C11 as Undecane	25,967		25,967	416	ND	0	413	ND	0	25,967	25.97	8055	12083	1.21E-05			0	0	0.00E+00	1.21E-05
n-Dodecane	918	J	918	419	ND	0	410	ND	0	918	0.92	285	427	4.27E-07			0	0	0.00E+00	4.27E-07
C12 as Dodecane	24,395		24,395	419	ND	0	410	ND	0	24,395	24.40	7568	11351	1.14E-05			0	0	0.00E+00	1.14E-05
n-Tridecane	1,019	J	1,019	423	ND	0	411	ND	0	1,019	1.02	316	474	4.74E-07			0	0	0.00E+00	4.74E-07
C13 as Tridecane	12,706		12,706	423	ND	0	411	ND	0	12,706	12.71	3942	5912	5.91E-06			0	0	0.00E+00	5.91E-06
n-Tetradecane	2,291		2,291	955	J	955	411	ND	0	1,336	1.34	415	622	6.22E-07			0	0	0.00E+00	6.22E-07
C14 as tetradecane	10,486		10,486	422	ND	0	411	ND	0	10,486	10.49	3253	4880	4.88E-06			0	0	0.00E+00	4.88E-06
n-Pentadecane	1,873		1,873	419	ND	0	413	ND	0	1,873	1.87	581	872	8.72E-07			0	0	0.00E+00	8.72E-07
C15 as Pentadecane	12,633		12,633	419	ND	0	413	ND	0	12,633	12.63	3919	5878	5.88E-06			0	0	0.00E+00	5.88E-06
n-Hexadecane	1,221	J	1,221	420	ND	0	411	ND	0	1,221	1.22	379	568	5.68E-07			0	0	0.00E+00	5.68E-07
C16 as Hexadecane	5,274		5,274	420	ND	0	411	ND	0	5,274	5.27	1636	2454	2.45E-06			0	0	0.00E+00	2.45E-06
n-Heptadecane	414	J	414	419	ND	0	406	ND	0	414	0.41	128	193	1.93E-07			0	0	0.00E+00	1.93E-07
C17 as Heptadecane	741	J	741	419	ND	0	406	ND	0	741	0.74	230	345	3.45E-07			0	0	0.00E+00	3.45E-07
n-Octadecane	167	ND	84	421	ND	0	410	ND	0	84	0.08	26	39	3.89E-08			0	0	0.00E+00	3.89E-08
C18 as Octodecane	167	ND	84	421	ND	0	410	ND	0	84	0.08	26	39	3.89E-08			0	0	0.00E+00	3.89E-08
n-Nonadecane	166	ND	83	419	ND	0	411	ND	0	83	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
C19 as Nonadecane	166	ND	83	419	ND	0	411	ND	0	83	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
n-Eicosane	164	ND	82	414	ND	0	410	ND	0	82	0.08	25	38	3.82E-08			0	0	0.00E+00	3.82E-08
C20 as Eicosane	164	ND	82	414	ND	0	410	ND	0	82	0.08	25	38	3.82E-08			0	0	0.00E+00	3.82E-08
n-Heneicosane	166	ND	83	419	ND	0	414	ND	0	83	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
C21 as Heneicosane	166	ND	83	419	ND	0	414	ND	0	83	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
n-Docosane	167	ND	83	420	ND	0	409	ND	0	83	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
C22 as Docosane	167	ND	83	420	ND	0	409	ND	0	83	0.08	26	39	3.87E-08			0	0	0.00E+00	3.87E-08
n-Tricosane	166	ND	83	419	ND	0	409	ND	0	83	0.08	26	39	3.86E-08			0	0	0.00E+00	3.86E-08
C23 as Tricosane	166	ND	83	419	ND	0	409	ND	0	83	0.08	26	39	3.86E-08			0	0	0.00E+00	3.86E-08
n-Tetracosane	168	ND	84	423	ND	0	412	ND	0	84	0.08	26	39	3.90E-08			0	0	0.00E+00	3.90E-08
C24 as Tetracosane	168	ND	84	423	ND	0	412	ND	0	84	0.08	26	39	3.90E-08			0	0	0.00E+00	3.90E-08
Total Hydrocarbon			144,227			955			0		143.27	44444	66,666	6.67E-05	0		0	0	0.00E+00	6.67E-05

#A034B	ANALYTICAL RESULTS #A034B		ND Adj	BACKGROUND #A035A		ND Adj	TRIP BLANK #A024A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID ANALYTICAL RESULTS		ND Adj			COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg	µg/min	kg/hr	kg/hr
n-Pentane	916	ND	458	393	ND	0	920	ND	0	458	0.46	137	205	2.05E-07			0	0	0.00E+00	2.05E-07
C5 as Pentane	916	ND	458	393	ND	0	920	ND	0	458	0.46	137	205	2.05E-07			0	0	0.00E+00	2.05E-07
n-Hexane	968	ND	484	409	ND	0	973	ND	0	484	0.48	145	217	2.17E-07			0	0	0.00E+00	2.17E-07
C6 as Hexane	968	ND	484	409	ND	0	973	ND	0	484	0.48	145	217	2.17E-07			0	0	0.00E+00	2.17E-07
n-Heptane	1,014	ND	507	427	ND	0	1018	ND	0	507	0.51	151	227	2.27E-07			0	0	0.00E+00	2.27E-07
C7 as Heptane	1,097	J	1,097	427	ND	0	1018	ND	0	1,097	1.10	327	491	4.91E-07			0	0	0.00E+00	4.91E-07
n-Octane	406	ND	203	423	ND	0	407	ND	0	203	0.20	61	91	9.08E-08			0	0	0.00E+00	9.08E-08
C8 as Octane	406	ND	203	423	ND	0	407	ND	0	203	0.20	61	91	9.08E-08			0	0	0.00E+00	9.08E-08
n-Nonane	409	ND	204	417	ND	0	410	ND	0	204	0.20	61	91	9.15E-08			0	0	0.00E+00	9.15E-08
C9 as Nonane	6,764		6,764	417	ND	0	410	ND	0	6,764	6.76	2018	3028	3.03E-06			0	0	0.00E+00	3.03E-06
n-Decane	412	ND	206	417	ND	0	414	ND	0	206	0.21	62	92	9.23E-08			0	0	0.00E+00	9.23E-08
C10 as Decane	14,486		14,486	417	ND	0	414	ND	0	14,486	14.49	4323	6484	6.48E-06			0	0	0.00E+00	6.48E-06
n-Undecane	1,365	J	1,365	416	ND	0	413	ND	0	1,365	1.36	407	611	6.11E-07			0	0	0.00E+00	6.11E-07
C11 as Undecane	19,428		19,428	416	ND	0	413	ND	0	19,428	19.43	5798	8697	8.70E-06			0	0	0.00E+00	8.70E-06
n-Dodecane	909	J	909	419	ND	0	410	ND	0	909	0.91	271	407	4.07E-07			0	0	0.00E+00	4.07E-07
C12 as Dodecane	19,690		19,690	419	ND	0	410	ND	0	19,690	19.69	5876	8814	8.81E-06			0	0	0.00E+00	8.81E-06
n-Tridecane	1,621	J	1,621	423	ND	0	411	ND	0	1,621	1.62	484	726	7.26E-07			0	0	0.00E+00	7.26E-07
C13 as Tridecane	19,687		19,687	423	ND	0	411	ND	0	19,687	19.69	5875	8812	8.81E-06			0	0	0.00E+00	8.81E-06
n-Tetradecane	1,522	J	1,522	955	J	955	411	ND	0	567	0.57	169	254	2.54E-07			0	0	0.00E+00	2.54E-07
C14 as tetradecane	17,699		17,699	422	ND	0	411	ND	0	17,699	17.70	5282	7922	7.92E-06			0	0	0.00E+00	7.92E-06
n-Pentadecane	1,860	J	1,860	419	ND	0	413	ND	0	1,860	1.86	555	832	8.32E-07			0	0	0.00E+00	8.32E-07
C15 as Pentadecane	11,208		11,208	419	ND	0	413	ND	0	11,208	11.21	3345	5017	5.02E-06			0	0	0.00E+00	5.02E-06
n-Hexadecane	2,613	J	2,613	420	ND	0	411	ND	0	2,613	2.61	780	1169	1.17E-06			0	0	0.00E+00	1.17E-06
C16 as Hexadecane	9,631		9,631	420	ND	0	411	ND	0	9,631	9.63	2874	4311	4.31E-06			0	0	0.00E+00	4.31E-06
n-Heptadecane	702	J	702	419	ND	0	406	ND	0	702	0.70	210	314	3.14E-07			0	0	0.00E+00	3.14E-07
C17 as Heptadecane	2,809	J	2,809	419	ND	0	406	ND	0	2,809	2.81	838	1258	1.26E-06			0	0	0.00E+00	1.26E-06
n-Octadecane	409	ND	204	421	ND	0	410	ND	0	204	0.20	61	91	9.15E-08			0	0	0.00E+00	9.15E-08
C18 as Octodecane	409	ND	204	421	ND	0	410	ND	0	204	0.20	61	91	9.15E-08			0	0	0.00E+00	9.15E-08
n-Nonadecane	409	ND	205	419	ND	0	411	ND	0	205	0.20	61	92	9.16E-08			0	0	0.00E+00	9.16E-08
C19 as Nonadecane	409	ND	205	419	ND	0	411	ND	0	205	0.20	61	92	9.16E-08			0	0	0.00E+00	9.16E-08
n-Eicosane	408	ND	204	414	ND	0	410	ND	0	204	0.20	61	91	9.14E-08			0	0	0.00E+00	9.14E-08
C20 as Eicosane	408	ND	204	414	ND	0	410	ND	0	204	0.20	61	91	9.14E-08			0	0	0.00E+00	9.14E-08
n-Heneicosane	412	ND	206	419	ND	0	414	ND	0	206	0.21	62	92	9.23E-08			0	0	0.00E+00	9.23E-08
C21 as Heneicosane	412	ND	206	419	ND	0	414	ND	0	206	0.21	62	92	9.23E-08			0	0	0.00E+00	9.23E-08
n-Docosane	408	ND	204	420	ND	0	409	ND	0	204	0.20	61	91	9.12E-08			0	0	0.00E+00	9.12E-08
C22 as Docosane	408	ND	204	420	ND	0	409	ND	0	204	0.20	61	91	9.12E-08			0	0	0.00E+00	9.12E-08
n-Tricosane	408	ND	204	419	ND	0	409	ND	0	204	0.20	61	91	9.12E-08			0	0	0.00E+00	9.12E-08
C23 as Tricosane	408	ND	204	419	ND	0	409	ND	0	204	0.20	61	91	9.12E-08			0	0	0.00E+00	9.12E-08
n-Tetracosane	410	ND	205	423	ND	0	412	ND	0	205	0.21	61	92	9.19E-08			0	0	0.00E+00	9.19E-08
C24 as Tetracosane	410	ND	205	423	ND	0	412	ND	0	205	0.21	61	92	9.19E-08			0	0	0.00E+00	9.19E-08
Total Hydrocarbon			139,160			955			0		138.20	42873	61,864	6.19E-05	0		0	0	0.00E+00	6.19E-05

Refinery B Sample Results

Bagging Data Form **Vacuum Method** **Sample Id** **B01**

Equipment type:	Connector			**Component ID:**	B-218	
Equipment Subtype:	Plug			**Plant ID:**	Refinery B	
Line Size:	3/4	inches		**Date:**	19-Jul-17	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.94 inHg	760.5	mmHg	**Sample Pump A**	BU51790	
				Sample Pump B	BU51292	
Ambient Temp:	75.8 °F	24.3	°C	**TVA ID**	2337	
Component Temp:	95 °F	35.0	°C	**Stream Pressure/Temp:**	psig	°F
Stream Description:	Heavy Diesel Return					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
10:00	Background	1.6 ppmv	8-sec Dwell	28 ppmv	Total Dwell	2:50 min:sec	Final M21	26.7 ppm
11:00	Initial Bag Vacuum	2 inches H2O	DGM Vac.	2.1 inches H2O	Bag Temp	77 °F	Leak @	Plug

Bag Concentrations (ppmv)

Time	11:29	11:31	11:36
ppmv	12.2	12.1	11.5

Sorbent Tube Sample Collection Parameters

B01A

Time						
11:27	Volume Start	2.9 Liters		Design Sample Flow Rate = 1 liter/min		
11:39	Volume Stop	14.6 Liters	Total Vol	11.7 Liters		
	Sample Run Time	12 Minutes		Sorbent Flow 0.975 L/min	Sorbent $Flow_{STP}$	0.953 L/min

B01B

11:27	Volume Start	3.9 Liters		Design Sample Flow Rate = 1 liter/min		
11:39	Volume Stop	15.5 Liters	Total Vol	11.6 Liters		
	Sample Run Time	12 Minutes		Sorbent Flow 0.967 L/min	Sorbent $Flow_{STP}$	0.945 L/min
	Total ST Vol_{STP}	22.77 Liters	DGM Vol_{STP}	13.10 Liters	Total Run Vol_{STP}	35.88 Liters

Bagging Parameters

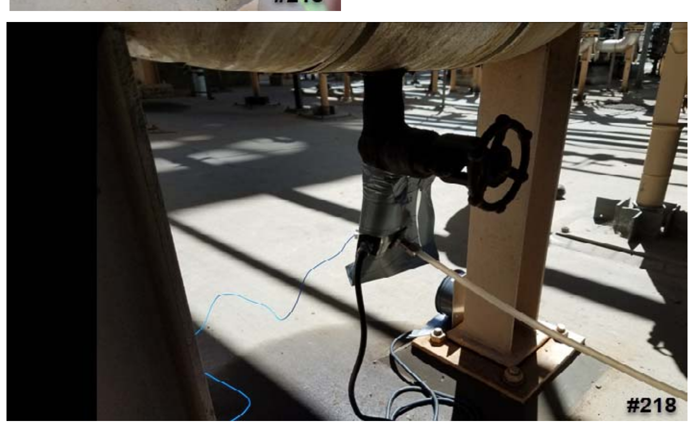
Time							
11:31	Vacuum check	0.18 inches H2O			DGM_P	2 inches H2O vacuum	756.7 mmHg
11:31	DGM_{10L} Time	08:56.9 min:sec.frac	DGM Time	8.950	DGM Flow	1.12	DGM $Flow_{STP}$ 1.09 liters/minute
11:31	Bag Temp.	80 °F	26.7 °C		$Sample_T$	80 °F	26.7 °C

Post-Sample Data

11:55	Post Test M21	8-sec Dwell	10.2 ppmv	Total Dwell	4:00 min:sec	Final M21	25.4 ppm

Condensate accumulation: starting time	N/A hour:min	Final time	N/A hour:min	0:00 hours:min
Organic condensate collected	N/A ml			
Density of organic condensate	N/A g/ml			

Average THC emissions =	2.40E-06 kg/hr
Percent difference THC ER =	3.7%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.08E-08
C5 as Pentane	1.08E-08
n-Hexane	1.12E-08
C6 as Hexane	1.12E-08
n-Heptane	1.18E-08
C7 as Heptane	1.18E-08
n-Octane	1.16E-08
C8 as Octane	1.16E-08
n-Nonane	1.15E-08
C9 as Nonane	3.91E-08
n-Decane	2.64E-08
C10 as Decane	2.79E-07
n-Undecane	5.74E-08
C11 as Undecane	5.86E-07
n-Dodecane	5.30E-08
C12 as Dodecane	6.17E-07
n-Tridecane	4.95E-08
C13 as Tridecane	2.96E-07
n-Tetradecane	2.05E-08
C14 as tetradecane	3.51E-08
n-Pentadecane	1.16E-08
C15 as Pentadecane	1.16E-08
n-Hexadecane	1.15E-08
C16 as Hexadecane	1.15E-08
n-Heptadecane	1.15E-08
C17 as Heptadecane	1.76E-08
n-Octadecane	1.16E-08
C18 as Octodecane	1.16E-08
n-Nonadecane	1.15E-08
C19 as Nonadecane	1.15E-08
n-Eicosane	1.14E-08
C20 as Eicosane	1.14E-08
n-Heneicosane	1.16E-08
C21 as Heneicosane	1.16E-08
n-Docosane	1.15E-08
C22 as Docosane	1.15E-08
n-Tricosane	1.15E-08
C23 as Tricosane	1.15E-08
n-Tetracosane	1.16E-08
C24 as Tetracosane	1.16E-08
Total Hydrocarbon	2.40E-06

THC:	**1.27E-04**	**lbs/day**	**2.32E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B01A	B01A		ND Adj	#B02A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	80	ND	40	161	ND	0	355	ND	0	40	0.04	1	7	7.18E-09	0	0	0.00E+00	7.18E-09
C5 as Pentane	80	ND	40	161	ND	0	355	ND	0	40	0.04	1	7	7.18E-09	0	0	0.00E+00	7.18E-09
n-Hexane	83	ND	42	168	ND	0	375	ND	0	42	0.04	1	7	7.46E-09	0	0	0.00E+00	7.46E-09
C6 as Hexane	83	ND	42	168	ND	0	375	ND	0	42	0.04	1	7	7.46E-09	0	0	0.00E+00	7.46E-09
n-Heptane	87	ND	43	175	ND	0	393	ND	0	43	0.04	2	8	7.79E-09	0	0	0.00E+00	7.79E-09
C7 as Heptane	87	ND	43	175	ND	0	393	ND	0	43	0.04	2	8	7.79E-09	0	0	0.00E+00	7.79E-09
n-Octane	85	ND	42	171	ND	0	160	ND	0	42	0.04	2	8	7.59E-09	0	0	0.00E+00	7.59E-09
C8 as Octane	85	ND	42	171	ND	0	160	ND	0	42	0.04	2	8	7.59E-09	0	0	0.00E+00	7.59E-09
n-Nonane	85	ND	43	172	ND	0	158	ND	0	43	0.04	2	8	7.64E-09	0	0	0.00E+00	7.64E-09
C9 as Nonane	351	J	351	172	ND	0	158	ND	0	351	0.35	13	63	6.29E-08	0	0	0.00E+00	6.29E-08
n-Decane	122	J	122	173	ND	0	158	ND	0	122	0.12	4	22	2.19E-08	0	0	0.00E+00	2.19E-08
C10 as Decane	1876		1,876	173	ND	0	158	ND	0	1,876	1.88	67	337	3.37E-07	0	0	0.00E+00	3.37E-07
n-Undecane	468	J	468	173	ND	0	157	ND	0	468	0.47	17	84	8.40E-08	0	0	0.00E+00	8.40E-08
C11 as Undecane	3394		3,394	195	J	195	157	ND	0	3,199	3.20	115	574	5.74E-07	0	0	0.00E+00	5.74E-07
n-Dodecane	243	J	243	172	ND	0	158	ND	0	243	0.24	9	44	4.36E-08	0	0	0.00E+00	4.36E-08
C12 as Dodecane	3465		3,465	172	ND	0	158	ND	0	3,465	3.47	124	622	6.22E-07	0	0	0.00E+00	6.22E-07
n-Tridecane	265	J	265	172	ND	0	160	ND	0	265	0.27	10	48	4.76E-08	0	0	0.00E+00	4.76E-08
C13 as Tridecane	1484		1,484	172	ND	0	160	ND	0	1,484	1.48	53	266	2.66E-07	0	0	0.00E+00	2.66E-07
n-Tetradecane	142	J	142	172	ND	0	159	ND	0	142	0.14	5	25	2.55E-08	0	0	0.00E+00	2.55E-08
C14 as tetradecane	202	J	202	172	ND	0	159	ND	0	202	0.20	7	36	3.63E-08	0	0	0.00E+00	3.63E-08
n-Pentadecane	86	ND	43	173	ND	0	158	ND	0	43	0.04	2	8	7.69E-09	0	0	0.00E+00	7.69E-09
C15 as Pentadecane	86	ND	43	173	ND	0	158	ND	0	43	0.04	2	8	7.69E-09	0	0	0.00E+00	7.69E-09
n-Hexadecane	85	ND	43	172	ND	0	159	ND	0	43	0.04	2	8	7.65E-09	0	0	0.00E+00	7.65E-09
C16 as Hexadecane	85	ND	43	172	ND	0	159	ND	0	43	0.04	2	8	7.65E-09	0	0	0.00E+00	7.65E-09
n-Heptadecane	84	ND	42	170	ND	0	158	ND	0	42	0.04	2	8	7.56E-09	0	0	0.00E+00	7.56E-09
C17 as Heptadecane	111	J	111	170	ND	0	158	ND	0	111	0.11	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Octadecane	85	ND	43	172	ND	0	159	ND	0	43	0.04	2	8	7.64E-09	0	0	0.00E+00	7.64E-09
C18 as Octodecane	85	ND	43	172	ND	0	159	ND	0	43	0.04	2	8	7.64E-09	0	0	0.00E+00	7.64E-09
n-Nonadecane	85	ND	43	172	ND	0	158	ND	0	43	0.04	2	8	7.66E-09	0	0	0.00E+00	7.66E-09
C19 as Nonadecane	85	ND	43	172	ND	0	158	ND	0	43	0.04	2	8	7.66E-09	0	0	0.00E+00	7.66E-09
n-Eicosane	85	ND	43	172	ND	0	157	ND	0	43	0.04	2	8	7.64E-09	0	0	0.00E+00	7.64E-09
C20 as Eicosane	85	ND	43	172	ND	0	157	ND	0	43	0.04	2	8	7.64E-09	0	0	0.00E+00	7.64E-09
n-Heneicosane	86	ND	43	173	ND	0	158	ND	0	43	0.04	2	8	7.71E-09	0	0	0.00E+00	7.71E-09
C21 as Heneicosane	86	ND	43	173	ND	0	158	ND	0	43	0.04	2	8	7.71E-09	0	0	0.00E+00	7.71E-09
n-Docosane	85	ND	43	171	ND	0	159	ND	0	43	0.04	2	8	7.62E-09	0	0	0.00E+00	7.62E-09
C22 as Docosane	85	ND	43	171	ND	0	159	ND	0	43	0.04	2	8	7.62E-09	0	0	0.00E+00	7.62E-09
n-Tricosane	85	ND	43	171	ND	0	158	ND	0	43	0.04	2	8	7.62E-09	0	0	0.00E+00	7.62E-09
C23 as Tricosane	85	ND	43	171	ND	0	158	ND	0	43	0.04	2	8	7.62E-09	0	0	0.00E+00	7.62E-09
n-Tetracosane	86	ND	43	173	ND	0	160	ND	0	43	0.04	2	8	7.68E-09	0	0	0.00E+00	7.68E-09
C24 as Tetracosane	86	ND	43	173	ND	0	160	ND	0	43	0.04	2	8	7.68E-09	0	0	0.00E+00	7.68E-09
Total Hydrocarbon			13,311			195			0		13.12	471	2,353	2.35E-06	0	0	0.00E+00	2.35E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B01B	B01B		ND Adj	#B02A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	161.4	ND	81	161	ND	0	355	ND	0	81	0.08	3	14	1.45E-08	1.45E-08
C5 as Pentane	161.4	ND	81	161	ND	0	355	ND	0	81	0.08	3	14	1.45E-08	1.45E-08
n-Hexane	167.7	ND	84	168	ND	0	375	ND	0	84	0.08	3	15	1.50E-08	1.50E-08
C6 as Hexane	167.7	ND	84	168	ND	0	375	ND	0	84	0.08	3	15	1.50E-08	1.50E-08
n-Heptane	175.2	ND	88	175	ND	0	393	ND	0	88	0.09	3	16	1.57E-08	1.57E-08
C7 as Heptane	175.2	ND	88	175	ND	0	393	ND	0	88	0.09	3	16	1.57E-08	1.57E-08
n-Octane	173.4	ND	87	171	ND	0	160	ND	0	87	0.09	3	16	1.56E-08	1.56E-08
C8 as Octane	173.4	ND	87	171	ND	0	160	ND	0	87	0.09	3	16	1.56E-08	1.56E-08
n-Nonane	171.0	ND	86	172	ND	0	158	ND	0	86	0.09	3	15	1.53E-08	1.53E-08
C9 as Nonane	171.0	ND	86	172	ND	0	158	ND	0	86	0.09	3	15	1.53E-08	1.53E-08
n-Decane	172.5	J	172	173	ND	0	158	ND	0	172	0.17	6	31	3.09E-08	3.09E-08
C10 as Decane	1239.6	J	1,240	173	ND	0	158	ND	0	1,240	1.24	44	222	2.22E-07	2.22E-07
n-Undecane	171.9	J	172	173	ND	0	157	ND	0	172	0.17	6	31	3.08E-08	3.08E-08
C11 as Undecane	3527.2		3,527	195	J	195	157	ND	0	3,332	3.33	120	598	5.98E-07	5.98E-07
n-Dodecane	348.2	J	348	172	ND	0	158	ND	0	348	0.35	12	62	6.25E-08	6.25E-08
C12 as Dodecane	3410.8		3,411	172	ND	0	158	ND	0	3,411	3.41	122	612	6.12E-07	6.12E-07
n-Tridecane	286.6	J	287	172	ND	0	160	ND	0	287	0.29	10	51	5.14E-08	5.14E-08
C13 as Tridecane	1810.6		1,811	172	ND	0	160	ND	0	1,811	1.81	65	325	3.25E-07	3.25E-07
n-Tetradecane	173.0	ND	86	172	ND	0	159	ND	0	86	0.09	3	16	1.55E-08	1.55E-08
C14 as tetradecane	189.0	J	189	172	ND	0	159	ND	0	189	0.19	7	34	3.39E-08	3.39E-08
n-Pentadecane	171.8	ND	86	173	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
C15 as Pentadecane	171.8	ND	86	173	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
n-Hexadecane	172.2	ND	86	172	ND	0	159	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
C16 as Hexadecane	172.2	ND	86	172	ND	0	159	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
n-Heptadecane	172.1	ND	86	170	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
C17 as Heptadecane	172.1	ND	86	170	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
n-Octadecane	172.9	ND	86	172	ND	0	159	ND	0	86	0.09	3	16	1.55E-08	1.55E-08
C18 as Octodecane	172.9	ND	86	172	ND	0	159	ND	0	86	0.09	3	16	1.55E-08	1.55E-08
n-Nonadecane	172.0	ND	86	172	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
C19 as Nonadecane	172.0	ND	86	172	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
n-Eicosane	170.0	ND	85	172	ND	0	157	ND	0	85	0.08	3	15	1.52E-08	1.52E-08
C20 as Eicosane	170.0	ND	85	172	ND	0	157	ND	0	85	0.08	3	15	1.52E-08	1.52E-08
n-Heneicosane	171.9	ND	86	173	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
C21 as Heneicosane	171.9	ND	86	173	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
n-Docosane	172.2	ND	86	171	ND	0	159	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
C22 as Docosane	172.2	ND	86	171	ND	0	159	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
n-Tricosane	171.8	ND	86	171	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
C23 as Tricosane	171.8	ND	86	171	ND	0	158	ND	0	86	0.09	3	15	1.54E-08	1.54E-08
n-Tetracosane	173.4	ND	87	173	ND	0	160	ND	0	87	0.09	3	16	1.56E-08	1.56E-08
C24 as Tetracosane	173.4	ND	87	173	ND	0	160	ND	0	87	0.09	3	16	1.56E-08	1.56E-08
Total Hydrocarbon			13,812			195			0		13.62	489	2,443	2.44E-06	2.44E-06

Bagging Data Form **Vacuum Method** Sample Id **B03**

Equipment type:	Valve			**Component ID:**	**B-164**		
Equipment Subtype:	GT Valve			**Plant ID:**	Refinery B		
Line Size:	10	*inches*		**Date:**	19-Jul-17		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.92	*inHg*	760.0 *mmHg*	**Sample Pump A**	BU51790		
				Sample Pump B	BU51292		
Ambient Temp:	86.6	°F	30.3 °C	**TVA ID**	2337		
Component Temp:	345	°F	173.9 °C	**Stream Pressure/Temp:**		*psig*	°F
Stream Description:	*Diesel at E-836*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
13:25	Background		*ppmv*	8-sec Dwell	16.2	*ppmv*	Total Dwell	2:54 *min:sec*	Final M21	154 *ppm*
14:18	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	186 °F	Leak @	stem

Bag Concentrations (ppmv)

Time	14:22	14:25	14:37	14:43	14:47	14:56							
ppmv	29.4	104	36	35.7	37.1	38.8							

Sorbent Tube Sample Collection Parameters

B03A

Time									
14:42	Volume Start	14.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:54	Volume Stop	26.2	*Liters*	Total Vol	11.6	*Liters*			
	Sample Run Time	12	*Minutes*		Sorbent Flow	0.967 *L/min*	Sorbent Flow$_{STP}$	0.912	*L/min*

B03B

14:43	Volume Start	15.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:55	Volume Stop	27.0	*Liters*	Total Vol	11.5	*Liters*			
	Sample Run Time	12	*Minutes*		Sorbent Flow	0.958 *L/min*	Sorbent Flow$_{STP}$	0.905	*L/min*
	Total ST Vol$_{STP}$	21.81	*Liters*	DGM Vol$_{STP}$	70.80	*Liters*	Total Run Vol$_{STP}$	92.60	*Liters*

Bagging Parameters

Time										
14:44	Vacuum check	0.005	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	756.6	*mmHg*
14:46	DGM$_{10L}$ Time	01:35.7	*min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$	5.90	*liters/minute*
14:46	Bag Temp.	202	°F	94.4	°C	Sample$_T$	99	°F	37.2	°C

Post-Sample Data

15:08	Post Test M21		8-sec Dwell	98	*ppmv*	Total Dwell	1:53 *min:sec*	Final M21	307 *ppm*
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	4.23E-05	kg/hr
Percent difference THC ER =	0%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.82E-08
C5 as Pentane	2.82E-08
n-Hexane	2.93E-08
C6 as Hexane	2.93E-08
n-Heptane	3.06E-08
C7 as Heptane	3.06E-08
n-Octane	3.01E-08
C8 as Octane	3.01E-08
n-Nonane	5.42E-08
C9 as Nonane	2.64E-07
n-Decane	1.10E-07
C10 as Decane	1.70E-06
n-Undecane	2.15E-07
C11 as Undecane	4.27E-06
n-Dodecane	5.36E-07
C12 as Dodecane	7.21E-06
n-Tridecane	1.42E-06
C13 as Tridecane	9.14E-06
n-Tetradecane	1.13E-06
C14 as tetradecane	8.59E-06
n-Pentadecane	6.48E-07
C15 as Pentadecane	4.43E-06
n-Hexadecane	2.36E-07
C16 as Hexadecane	1.23E-06
n-Heptadecane	1.00E-07
C17 as Heptadecane	2.15E-07
n-Octadecane	5.78E-08
C18 as Octodecane	6.34E-08
n-Nonadecane	5.27E-08
C19 as Nonadecane	3.01E-08
n-Eicosane	4.11E-08
C20 as Eicosane	2.98E-08
n-Heneicosane	3.01E-08
C21 as Heneicosane	3.01E-08
n-Docosane	3.00E-08
C22 as Docosane	3.00E-08
n-Tricosane	3.00E-08
C23 as Tricosane	3.00E-08
n-Tetracosane	3.02E-08
C24 as Tetracosane	3.02E-08
Total Hydrocarbon	4.23E-05

THC:	**2.24E-03**	**lbs/day**	**4.08E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B03A	B03A		ND Adj	#B04A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	81	ND	40	378.63	ND	0	355	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C5 as Pentane	81	ND	40	378.63	ND	0	355	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Hexane	84	ND	42	400.53	ND	0	375	ND	0	42	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C6 as Hexane	84	ND	42	400.53	ND	0	375	ND	0	42	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heptane	88	ND	44	419.26	ND	0	393	ND	0	44	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C7 as Heptane	88	ND	44	419.26	ND	0	393	ND	0	44	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Octane	85	ND	43	167.73	ND	0	160	ND	0	43	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C8 as Octane	85	ND	43	167.73	ND	0	160	ND	0	43	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonane	148	J	148	168.98	ND	0	158	ND	0	148	0.15	14	69	6.85E-08	0	0	0.00E+00	6.85E-08
C9 as Nonane	968		968	168.98	ND	0	158	ND	0	968	0.97	90	448	4.48E-07	0	0	0.00E+00	4.48E-07
n-Decane	223	J	223	170.51	ND	0	158	ND	0	223	0.22	21	103	1.03E-07	0	0	0.00E+00	1.03E-07
C10 as Decane	4126		4,126	170.51	ND	0	158	ND	0	4,126	4.13	382	1911	1.91E-06	0	0	0.00E+00	1.91E-06
n-Undecane	489	J	489	170.07	ND	0	157	ND	0	489	0.49	45	227	2.27E-07	0	0	0.00E+00	2.27E-07
C11 as Undecane	9847		9,847	170.07	ND	0	157	ND	0	9,847	9.85	912	4559	4.56E-06	0	0	0.00E+00	4.56E-06
n-Dodecane	1155		1,155	168.92	ND	0	158	ND	0	1,155	1.16	107	535	5.35E-07	0	0	0.00E+00	5.35E-07
C12 as Dodecane	16228		16,228	168.92	ND	0	158	ND	0	16,228	16.23	1503	7514	7.51E-06	0	0	0.00E+00	7.51E-06
n-Tridecane	3413		3,413	169.32	ND	0	160	ND	0	3,413	3.41	316	1580	1.58E-06	0	0	0.00E+00	1.58E-06
C13 as Tridecane	19559		19,559	169.32	ND	0	160	ND	0	19,559	19.56	1811	9056	9.06E-06	0	0	0.00E+00	9.06E-06
n-Tetradecane	2544		2,544	169.15	ND	0	159	ND	0	2,544	2.54	236	1178	1.18E-06	0	0	0.00E+00	1.18E-06
C14 as tetradecane	17943		17,943	169.15	ND	0	159	ND	0	17,943	17.94	1662	8308	8.31E-06	0	0	0.00E+00	8.31E-06
n-Pentadecane	1432		1,432	170	ND	0	158	ND	0	1,432	1.43	133	663	6.63E-07	0	0	0.00E+00	6.63E-07
C15 as Pentadecane	8720		8,720	170	ND	0	158	ND	0	8,720	8.72	808	4038	4.04E-06	0	0	0.00E+00	4.04E-06
n-Hexadecane	446	J	446	169.08	ND	0	159	ND	0	446	0.45	41	207	2.07E-07	0	0	0.00E+00	2.07E-07
C16 as Hexadecane	1779		1,779	169.08	ND	0	159	ND	0	1,779	1.78	165	824	8.24E-07	0	0	0.00E+00	8.24E-07
n-Heptadecane	259	J	259	167.12	ND	0	158	ND	0	259	0.26	24	120	1.20E-07	0	0	0.00E+00	1.20E-07
C17 as Heptadecane	511	J	511	167.12	ND	0	158	ND	0	511	0.51	47	237	2.37E-07	0	0	0.00E+00	2.37E-07
n-Octadecane	162	J	162	168.98	ND	0	159	ND	0	162	0.16	15	75	7.52E-08	0	0	0.00E+00	7.52E-08
C18 as Octodecane	187	J	187	168.98	ND	0	159	ND	0	187	0.19	17	86	8.64E-08	0	0	0.00E+00	8.64E-08
n-Nonadecane	141	J	141	169.32	ND	0	158	ND	0	141	0.14	13	65	6.53E-08	0	0	0.00E+00	6.53E-08
C19 as Nonadecane	86	ND	43	169.32	ND	0	158	ND	0	43	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Eicosane	92	J	92	168.92	ND	0	157	ND	0	92	0.09	9	43	4.26E-08	0	0	0.00E+00	4.26E-08
C20 as Eicosane	86	ND	43	168.92	ND	0	157	ND	0	43	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Heneicosane	87	ND	43	170.51	ND	0	158	ND	0	43	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C21 as Heneicosane	87	ND	43	170.51	ND	0	158	ND	0	43	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Docosane	86	ND	43	168.58	ND	0	159	ND	0	43	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C22 as Docosane	86	ND	43	168.58	ND	0	159	ND	0	43	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Tricosane	86	ND	43	168.58	ND	0	158	ND	0	43	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C23 as Tricosane	86	ND	43	168.58	ND	0	158	ND	0	43	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Tetracosane	86	ND	43	169.73	ND	0	160	ND	0	43	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C24 as Tetracosane	86	ND	43	169.73	ND	0	160	ND	0	43	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
Total Hydrocarbon			91,140			0			0		91.14	8440	42,199	4.22E-05	0	0	0.00E+00	4.22E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B03B	B03B		ND Adj	#B04A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	163	ND	81	379	ND	0	355	ND	0	81	0.08	8	38	3.77E-08	3.77E-08
C5 as Pentane	163	ND	81	379	ND	0	355	ND	0	81	0.08	8	38	3.77E-08	3.77E-08
n-Hexane	169	ND	85	401	ND	0	375	ND	0	85	0.08	8	39	3.92E-08	3.92E-08
C6 as Hexane	169	ND	85	401	ND	0	375	ND	0	85	0.08	8	39	3.92E-08	3.92E-08
n-Heptane	177	ND	88	419	ND	0	393	ND	0	88	0.09	8	41	4.09E-08	4.09E-08
C7 as Heptane	177	ND	88	419	ND	0	393	ND	0	88	0.09	8	41	4.09E-08	4.09E-08
n-Octane	175	ND	87	168	ND	0	160	ND	0	87	0.09	8	41	4.05E-08	4.05E-08
C8 as Octane	175	ND	87	168	ND	0	160	ND	0	87	0.09	8	41	4.05E-08	4.05E-08
n-Nonane	173	ND	86	169	ND	0	158	ND	0	86	0.09	8	40	3.99E-08	3.99E-08
C9 as Nonane	173	J	173	169	ND	0	158	ND	0	173	0.17	16	80	8.00E-08	8.00E-08
n-Decane	254	J	254	171	ND	0	158	ND	0	254	0.25	24	118	1.18E-07	1.18E-07
C10 as Decane	3236		3,236	171	ND	0	158	ND	0	3,236	3.24	300	1498	1.50E-06	1.50E-06
n-Undecane	438	J	438	170	ND	0	157	ND	0	438	0.44	41	203	2.03E-07	2.03E-07
C11 as Undecane	8607		8,607	170	ND	0	157	ND	0	8,607	8.61	797	3985	3.99E-06	3.99E-06
n-Dodecane	1161	J	1,161	169	ND	0	158	ND	0	1,161	1.16	108	538	5.38E-07	5.38E-07
C12 as Dodecane	14912		14,912	169	ND	0	158	ND	0	14,912	14.91	1381	6904	6.90E-06	6.90E-06
n-Tridecane	2729		2,729	169	ND	0	160	ND	0	2,729	2.73	253	1264	1.26E-06	1.26E-06
C13 as Tridecane	19916		19,916	169	ND	0	160	ND	0	19,916	19.92	1844	9221	9.22E-06	9.22E-06
n-Tetradecane	2351		2,351	169	ND	0	159	ND	0	2,351	2.35	218	1089	1.09E-06	1.09E-06
C14 as tetradecane	19182		19,182	169	ND	0	159	ND	0	19,182	19.18	1776	8881	8.88E-06	8.88E-06
n-Pentadecane	1368	J	1,368	170	ND	0	158	ND	0	1,368	1.37	127	633	6.33E-07	6.33E-07
C15 as Pentadecane	10395		10,395	170	ND	0	158	ND	0	10,395	10.39	963	4813	4.81E-06	4.81E-06
n-Hexadecane	574	J	574	169	ND	0	159	ND	0	574	0.57	53	266	2.66E-07	2.66E-07
C16 as Hexadecane	3521		3,521	169	ND	0	159	ND	0	3,521	3.52	326	1630	1.63E-06	1.63E-06
n-Heptadecane	175	J	175	167	ND	0	158	ND	0	175	0.17	16	81	8.08E-08	8.08E-08
C17 as Heptadecane	416	J	416	167	ND	0	158	ND	0	416	0.42	38	192	1.92E-07	1.92E-07
n-Octadecane	174	ND	87	169	ND	0	159	ND	0	87	0.09	8	40	4.04E-08	4.04E-08
C18 as Octodecane	174	ND	87	169	ND	0	159	ND	0	87	0.09	8	40	4.04E-08	4.04E-08
n-Nonadecane	173	ND	87	169	ND	0	158	ND	0	87	0.09	8	40	4.02E-08	4.02E-08
C19 as Nonadecane	173	ND	87	169	ND	0	158	ND	0	87	0.09	8	40	4.02E-08	4.02E-08
n-Eicosane	171	ND	86	169	ND	0	157	ND	0	86	0.09	8	40	3.97E-08	3.97E-08
C20 as Eicosane	171	ND	86	169	ND	0	157	ND	0	86	0.09	8	40	3.97E-08	3.97E-08
n-Heneicosane	173	ND	87	171	ND	0	158	ND	0	87	0.09	8	40	4.01E-08	4.01E-08
C21 as Heneicosane	173	ND	87	171	ND	0	158	ND	0	87	0.09	8	40	4.01E-08	4.01E-08
n-Docosane	174	ND	87	169	ND	0	159	ND	0	87	0.09	8	40	4.02E-08	4.02E-08
C22 as Docosane	174	ND	87	169	ND	0	159	ND	0	87	0.09	8	40	4.02E-08	4.02E-08
n-Tricosane	173	ND	87	169	ND	0	158	ND	0	87	0.09	8	40	4.01E-08	4.01E-08
C23 as Tricosane	173	ND	87	169	ND	0	158	ND	0	87	0.09	8	40	4.01E-08	4.01E-08
n-Tetracosane	175	ND	87	170	ND	0	160	ND	0	87	0.09	8	41	4.05E-08	4.05E-08
C24 as Tetracosane	175	ND	87	170	ND	0	160	ND	0	87	0.09	8	41	4.05E-08	4.05E-08
Total Hydrocarbon			91,393			0			0		91.39	8463	42,316	4.23E-05	4.23E-05

Bagging Data Form	Vacuum Method		Sample Id	B05
Equipment type:	Pump		Component ID:	B-313
Equipment Subtype:			Plant ID:	Refinery B
Line Size:	8 inches		Date:	20-Jul-17
Phase (G, LL, HL):	HL		Analysis team:	EG/DR
Barometric pressure	29.97 inHg	761.2 mmHg	Sample Pump A	BU51790
			Sample Pump B	BU51292
Ambient Temp:	77.2 °F	25.1 °C	TVA ID	2385
Component Temp:	367 °F	186.1 °C	Stream Pressure/Temp:	150 psig / °F
Stream Description:	From 8D-804 Bottoms Vacuum			

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
10:15	Background	0.9	ppmv	8-sec Dwell	6.1	ppmv	Total Dwell	1:05	min:sec	Final M21	9.8	ppm
11:30	Initial Bag Vacuum	0.001	inches H2O	DGM Vac.	1.9	inches H2O	Bag Temp	240	°F	Leak @	Seal	

Bag Concentrations (ppmv)

Time	11:41	11:47	12:00	12:03	12:08									
ppmv	10.7	11.5	11.7	12	12.1									

Sorbent Tube Sample Collection Parameters

B05A

Time										
11:57	Volume Start	29.2	Liters		Design Sample Flow Rate = 1 liter/min					
12:10	Volume Stop	41.7	Liters	Total Vol	12.5	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.962	L/min	Sorbent Flow$_{STP}$	0.939	L/min

B05B

11:57	Volume Start	29.7	Liters		Design Sample Flow Rate = 1 liter/min					
12:10	Volume Stop	42.2	Liters	Total Vol	12.5	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.962	L/min	Sorbent Flow$_{STP}$	0.939	L/min
	Total ST Vol$_{STP}$	24.43	Liters	DGM Vol$_{STP}$	86.60	Liters	Total Run Vol$_{STP}$	111.03	Liters	

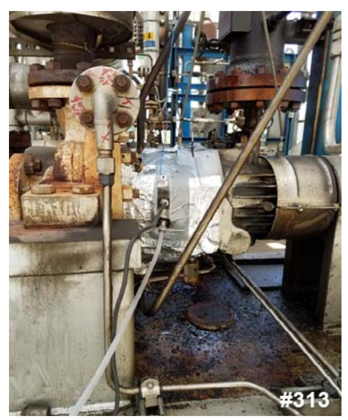
Bagging Parameters

Time											
12:01	Vacuum check	0.01	inches H2O			DGM$_P$	1.8	inches H2O vacuum	757.9	mmHg
12:01	DGM$_{10L}$ Time	01:28.3	min:sec.frac	DGM Time	1.467	DGM Flow	6.82	DGM Flow$_{STP}$	6.66	liters/minute
12:01	Bag Temp.	244	°F	117.8	°C	Sample$_T$	81	°F	27.2	°C

Post-Sample Data

12:24	Post Test M21		8-sec Dwell	4.8	ppmv	Total Dwell	1:15	min:sec	Final M21 50 ppm
Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00	hours:min		
Organic condensate collected	N/A	ml							
Density of organic condensate	N/A	g/ml							

Average THC emissions =	2.62E-06	kg/hr
Percent difference THC ER =	33%	
Acceptable?	No	



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	5.54E-08
C5 as Pentane	5.54E-08
n-Hexane	5.84E-08
C6 as Hexane	5.84E-08
n-Heptane	6.11E-08
C7 as Heptane	6.11E-08
n-Octane	3.04E-08
C8 as Octane	3.04E-08
n-Nonane	3.07E-08
C9 as Nonane	3.07E-08
n-Decane	3.09E-08
C10 as Decane	9.18E-08
n-Undecane	3.09E-08
C11 as Undecane	1.79E-07
n-Dodecane	5.62E-08
C12 as Dodecane	3.42E-07
n-Tridecane	9.29E-08
C13 as Tridecane	3.76E-07
n-Tetradecane	1.20E-07
C14 as tetradecane	1.38E-07
n-Pentadecane	3.08E-08
C15 as Pentadecane	8.43E-08
n-Hexadecane	3.07E-08
C16 as Hexadecane	3.07E-08
n-Heptadecane	3.03E-08
C17 as Heptadecane	3.03E-08
n-Octadecane	3.07E-08
C18 as Octodecane	3.07E-08
n-Nonadecane	3.07E-08
C19 as Nonadecane	3.07E-08
n-Eicosane	3.06E-08
C20 as Eicosane	3.06E-08
n-Heneicosane	3.09E-08
C21 as Heneicosane	4.22E-08
n-Docosane	3.06E-08
C22 as Docosane	4.13E-08
n-Tricosane	3.06E-08
C23 as Tricosane	3.06E-08
n-Tetracosane	3.08E-08
C24 as Tetracosane	3.08E-08
Total Hydrocarbon	2.62E-06

THC:	1.39E-04	lbs/day	2.53E-05	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B05A	B05A		ND Adj	#B06A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75	ND	37	355	ND	0	355	ND	0	37	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C5 as Pentane	75	ND	37	355	ND	0	355	ND	0	37	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Hexane	78	ND	39	375	ND	0	375	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C6 as Hexane	78	ND	39	375	ND	0	375	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Heptane	81	ND	41	393	ND	0	393	ND	0	41	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C7 as Heptane	81	ND	41	393	ND	0	393	ND	0	41	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Octane	79	ND	40	157	ND	0	160	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C8 as Octane	79	ND	40	157	ND	0	160	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Nonane	80	ND	40	158	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C9 as Nonane	80	ND	40	158	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Decane	80	ND	40	160	ND	0	158	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C10 as Decane	173	J	173	160	ND	0	158	ND	0	173	0.17	19	89	8.87E-08	0	0	0.00E+00	8.87E-08
n-Undecane	80	ND	40	159	ND	0	157	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C11 as Undecane	412	J	412	159	ND	0	157	ND	0	412	0.41	46	211	2.11E-07	0	0	0.00E+00	2.11E-07
n-Dodecane	80	ND	40	158	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C12 as Dodecane	816		816	158	ND	0	158	ND	0	816	0.82	91	418	4.18E-07	0	0	0.00E+00	4.18E-07
n-Tridecane	180	J	180	159	ND	0	160	ND	0	180	0.18	20	92	9.21E-08	0	0	0.00E+00	9.21E-08
C13 as Tridecane	966		966	270	J	270	160	ND	0	696	0.70	77	357	3.57E-07	0	0	0.00E+00	3.57E-07
n-Tetradecane	187	J	187	158	ND	0	159	ND	0	187	0.19	21	96	9.61E-08	0	0	0.00E+00	9.61E-08
C14 as tetradecane	350	J	350	158	ND	0	159	ND	0	350	0.35	39	179	1.79E-07	0	0	0.00E+00	1.79E-07
n-Pentadecane	80	ND	40	159	ND	0	158	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C15 as Pentadecane	92	J	92	159	ND	0	158	ND	0	92	0.09	10	47	4.71E-08	0	0	0.00E+00	4.71E-08
n-Hexadecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C16 as Hexadecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heptadecane	79	ND	39	157	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C17 as Heptadecane	79	ND	39	157	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Octadecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C18 as Octodecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Nonadecane	80	ND	40	159	ND	0	158	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C19 as Nonadecane	80	ND	40	159	ND	0	158	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Eicosane	80	ND	40	158	ND	0	157	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C20 as Eicosane	80	ND	40	158	ND	0	157	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heneicosane	80	ND	40	160	ND	0	158	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C21 as Heneicosane	84	J	84	160	ND	0	158	ND	0	84	0.08	9	43	4.32E-08	0	0	0.00E+00	4.32E-08
n-Docosane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C22 as Docosane	81	J	81	158	ND	0	159	ND	0	81	0.08	9	42	4.17E-08	0	0	0.00E+00	4.17E-08
n-Tricosane	80	ND	40	158	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C23 as Tricosane	80	ND	40	158	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tetracosane	80	ND	40	159	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C24 as Tetracosane	80	ND	40	159	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
Total Hydrocarbon			4,534			270			0		4.26	473	2,185	2.18E-06	0	0	0.00E+00	2.18E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
B05B	B05B		ND Adj	#B06A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	357	ND	179	355	ND	0	355	ND	0	179	0.18	20	92	9.16E-08		9.16E-08
C5 as Pentane	357	ND	179	355	ND	0	355	ND	0	179	0.18	20	92	9.16E-08		9.16E-08
n-Hexane	378	ND	189	375	ND	0	375	ND	0	189	0.19	21	97	9.69E-08		9.69E-08
C6 as Hexane	378	ND	189	375	ND	0	375	ND	0	189	0.19	21	97	9.69E-08		9.69E-08
n-Heptane	396	ND	198	393	ND	0	393	ND	0	198	0.20	22	101	1.01E-07		1.01E-07
C7 as Heptane	396	ND	198	393	ND	0	393	ND	0	198	0.20	22	101	1.01E-07		1.01E-07
n-Octane	158	ND	79	157	ND	0	160	ND	0	79	0.08	9	41	4.06E-08		4.06E-08
C8 as Octane	158	ND	79	157	ND	0	160	ND	0	79	0.08	9	41	4.06E-08		4.06E-08
n-Nonane	160	ND	80	158	ND	0	158	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
C9 as Nonane	160	ND	80	158	ND	0	158	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
n-Decane	161	ND	80	160	ND	0	158	ND	0	80	0.08	9	41	4.12E-08		4.12E-08
C10 as Decane	185	J	185	160	ND	0	158	ND	0	185	0.19	21	95	9.50E-08		9.50E-08
n-Undecane	161	ND	80	159	ND	0	157	ND	0	80	0.08	9	41	4.11E-08		4.11E-08
C11 as Undecane	286	J	286	159	ND	0	157	ND	0	286	0.29	32	147	1.47E-07		1.47E-07
n-Dodecane	179	J	179	158	ND	0	158	ND	0	179	0.18	20	92	9.19E-08		9.19E-08
C12 as Dodecane	521	J	521	158	ND	0	158	ND	0	521	0.52	58	267	2.67E-07		2.67E-07
n-Tridecane	183	J	183	159	ND	0	160	ND	0	183	0.18	20	94	9.36E-08		9.36E-08
C13 as Tridecane	1041	J	1,041	270	J	270	160	ND	0	771	0.77	86	395	3.95E-07		3.95E-07
n-Tetradecane	282	J	282	158	ND	0	159	ND	0	282	0.28	31	144	1.44E-07		1.44E-07
C14 as tetradecane	190	J	190	158	ND	0	159	ND	0	190	0.19	21	97	9.71E-08		9.71E-08
n-Pentadecane	160	ND	80	159	ND	0	158	ND	0	80	0.08	9	41	4.11E-08		4.11E-08
C15 as Pentadecane	237	J	237	159	ND	0	158	ND	0	237	0.24	26	122	1.22E-07		1.22E-07
n-Hexadecane	160	ND	80	158	ND	0	159	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
C16 as Hexadecane	160	ND	80	158	ND	0	159	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
n-Heptadecane	158	ND	79	157	ND	0	158	ND	0	79	0.08	9	40	4.04E-08		4.04E-08
C17 as Heptadecane	158	ND	79	157	ND	0	158	ND	0	79	0.08	9	40	4.04E-08		4.04E-08
n-Octadecane	160	ND	80	158	ND	0	159	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
C18 as Octodecane	160	ND	80	158	ND	0	159	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
n-Nonadecane	160	ND	80	159	ND	0	158	ND	0	80	0.08	9	41	4.10E-08		4.10E-08
C19 as Nonadecane	160	ND	80	159	ND	0	158	ND	0	80	0.08	9	41	4.10E-08		4.10E-08
n-Eicosane	159	ND	80	158	ND	0	157	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
C20 as Eicosane	159	ND	80	158	ND	0	157	ND	0	80	0.08	9	41	4.09E-08		4.09E-08
n-Heneicosane	161	ND	80	160	ND	0	158	ND	0	80	0.08	9	41	4.12E-08		4.12E-08
C21 as Heneicosane	161	ND	80	160	ND	0	158	ND	0	80	0.08	9	41	4.12E-08		4.12E-08
n-Docosane	159	ND	80	158	ND	0	159	ND	0	80	0.08	9	41	4.08E-08		4.08E-08
C22 as Docosane	159	ND	80	158	ND	0	159	ND	0	80	0.08	9	41	4.08E-08		4.08E-08
n-Tricosane	159	ND	80	158	ND	0	158	ND	0	80	0.08	9	41	4.08E-08		4.08E-08
C23 as Tricosane	159	ND	80	158	ND	0	158	ND	0	80	0.08	9	41	4.08E-08		4.08E-08
n-Tetracosane	160	ND	80	159	ND	0	160	ND	0	80	0.08	9	41	4.11E-08		4.11E-08
C24 as Tetracosane	160	ND	80	159	ND	0	160	ND	0	80	0.08	9	41	4.11E-08		4.11E-08
Total Hydrocarbon			6,230			270			0		5.96	662	3,054	3.05E-06		3.05E-06

Bagging Data Form	**Vacuum Method**		**Sample Id**	**B07**	
Equipment type:	Valve		**Component ID:**	**B-1124**	
Equipment Subtype:	Gate		**Plant ID:**	Refinery B	
Line Size:	6 *inches*		**Date:**	21-Jul-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.89 *inHg*	759.2 *mmHg*	**Sample Pump A**	BU51790	
			Sample Pump B	BU51292	
Ambient Temp:	82 *°F*	27.8 *°C*	**TVA ID**	2385	
Component Temp:	484 *°F*	251.1 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*SCTGO From G-103 to FV-209*				

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
11:00	Background	0	*ppmv*	8-sec Dwell	16	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	42	*ppm*
11:08	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	2.1	*inches H2O*	Bag Temp	274	*°F*	Leak @	Stem	

Bag Concentrations (ppmv)

Time	11:43	11:48	11:56	12:07	12:12									
ppmv	29.5	33.7	31.9	34.4	35.3									

Sorbent Tube Sample Collection Parameters

B07A

Time										
12:01	Volume Start	44.3	*Liters*		Design Sample Flow Rate = 1 liter/min					
12:14	Volume Stop	56.9	*Liters*	Total Vol	12.6	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969	*L/min*	$\text{Sorbent Flow}_{STP}$	0.944	*L/min*

B07B

12:02	Volume Start	44.3	*Liters*		Design Sample Flow Rate = 1 liter/min					
12:14	Volume Stop	56.8	*Liters*	Total Vol	12.5	*Liters*				
	Sample Run Time	12	*Minutes*		Sorbent Flow	1.042	*L/min*	$\text{Sorbent Flow}_{STP}$	1.015	*L/min*
	$\text{Total ST Vol}_{STP}$	24.45	*Liters*	DGM Vol_{STP}	86.33	*Liters*	$\text{Total Run Vol}_{STP}$	110.77	*Liters*	

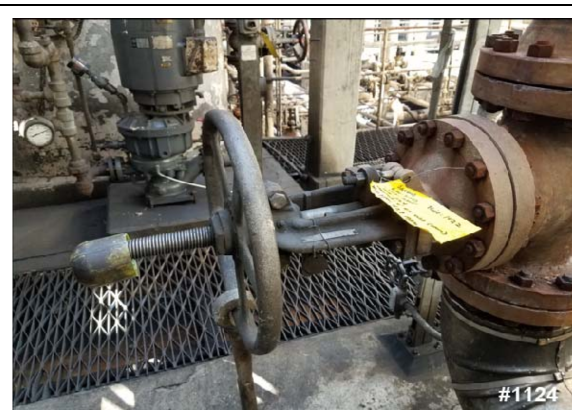
Bagging Parameters

Time											
12:03	Vacuum check	0.005	*inches H2O*			DGM_P	2	*inches H2O vacuum*		755.5	*mmHg*
12:03	DGM_{10L} Time	01:28.3	*min:sec.frac*	DGM Time	1.467	DGM Flow	6.82	DGM Flow_{STP}		6.64	*liters/minute*
12:03	Bag Temp.	285	*°F*	140.6	*°C*	Sample_T	81	*°F*		27.2	*°C*

Post-Sample Data

12:56	Post Test M21		8-sec Dwell	26	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	104	*ppm*
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*			
Organic condensate collected		N/A	*ml*								
Density of organic condensate		N/A	*g/ml*								

Average THC emissions =	2.40E-05 kg/hr
Percent difference THC ER =	10%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	5.90E-08
C5 as Pentane	2.18E-07
n-Hexane	6.22E-08
C6 as Hexane	7.47E-07
n-Heptane	6.51E-08
C7 as Heptane	6.86E-07
n-Octane	7.18E-08
C8 as Octane	2.38E-07
n-Nonane	2.78E-07
C9 as Nonane	1.53E-06
n-Decane	1.54E-07
C10 as Decane	3.57E-06
n-Undecane	1.27E-07
C11 as Undecane	1.33E-06
n-Dodecane	2.19E-07
C12 as Dodecane	4.02E-06
n-Tridecane	4.44E-07
C13 as Tridecane	3.90E-06
n-Tetradecane	5.02E-07
C14 as tetradecane	3.02E-06
n-Pentadecane	2.38E-07
C15 as Pentadecane	1.48E-06
n-Hexadecane	5.99E-08
C16 as Hexadecane	1.82E-07
n-Heptadecane	1.11E-07
C17 as Heptadecane	1.61E-07
n-Octadecane	4.99E-08
C18 as Octodecane	7.33E-08
n-Nonadecane	5.19E-08
C19 as Nonadecane	5.31E-08
n-Eicosane	3.20E-08
C20 as Eicosane	3.20E-08
n-Heneicosane	3.23E-08
C21 as Heneicosane	4.34E-08
n-Docosane	3.22E-08
C22 as Docosane	3.22E-08
n-Tricosane	3.22E-08
C23 as Tricosane	3.22E-08
n-Tetracosane	3.24E-08
C24 as Tetracosane	3.24E-08
Total Hydrocarbon	2.40E-05

THC:	**1.27E-03**	**lbs/day**	**2.32E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B07A	B07A		ND Adj	#B08A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74	ND	37	372.32	ND	0	355	ND	0	37	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C5 as Pentane	181	J	181	372.32	ND	0	355	ND	0	181	0.18	20	92	9.23E-08	0	0	0.00E+00	9.23E-08
n-Hexane	77	ND	39	393.85	ND	0	375	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C6 as Hexane	852		852	393.85	ND	0	375	ND	0	852	0.85	94	436	4.36E-07	0	0	0.00E+00	4.36E-07
n-Heptane	81	ND	40	412.27	ND	0	393	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C7 as Heptane	1163		1,163	412.27	ND	0	393	ND	0	1,163	1.16	129	595	5.95E-07	0	0	0.00E+00	5.95E-07
n-Octane	194	J	194	164.93	ND	0	160	ND	0	194	0.19	21	99	9.91E-08	0	0	0.00E+00	9.91E-08
C8 as Octane	589	J	589	164.93	ND	0	160	ND	0	589	0.59	65	301	3.01E-07	0	0	0.00E+00	3.01E-07
n-Nonane	555	J	555	166.17	ND	0	158	ND	0	555	0.55	61	284	2.84E-07	0	0	0.00E+00	2.84E-07
C9 as Nonane	3070		3,070	166.17	ND	0	158	ND	0	3,070	3.07	340	1570	1.57E-06	0	0	0.00E+00	1.57E-06
n-Decane	261	J	261	167.67	ND	0	158	ND	0	261	0.26	29	134	1.34E-07	0	0	0.00E+00	1.34E-07
C10 as Decane	6860		6,860	167.67	ND	0	158	ND	0	6,860	6.86	760	3507	3.51E-06	0	0	0.00E+00	3.51E-06
n-Undecane	238	J	238	167.23	ND	0	157	ND	0	238	0.24	26	122	1.22E-07	0	0	0.00E+00	1.22E-07
C11 as Undecane	2245		2,245	167.23	ND	0	157	ND	0	2,245	2.25	249	1148	1.15E-06	0	0	0.00E+00	1.15E-06
n-Dodecane	375	J	375	166.1	ND	0	158	ND	0	375	0.38	42	192	1.92E-07	0	0	0.00E+00	1.92E-07
C12 as Dodecane	7612		7,612	166.1	ND	0	158	ND	0	7,612	7.61	843	3892	3.89E-06	0	0	0.00E+00	3.89E-06
n-Tridecane	912		912	166.5	ND	0	160	ND	0	912	0.91	101	466	4.66E-07	0	0	0.00E+00	4.66E-07
C13 as Tridecane	7611		7,611	290.46	J	290	160	ND	0	7,320	7.32	811	3742	3.74E-06	0	0	0.00E+00	3.74E-06
n-Tetradecane	935		935	166.33	ND	0	159	ND	0	935	0.94	104	478	4.78E-07	0	0	0.00E+00	4.78E-07
C14 as tetradecane	5556		5,556	166.33	ND	0	159	ND	0	5,556	5.56	615	2841	2.84E-06	0	0	0.00E+00	2.84E-06
n-Pentadecane	464	J	464	167.17	ND	0	158	ND	0	464	0.46	51	237	2.37E-07	0	0	0.00E+00	2.37E-07
C15 as Pentadecane	2931		2,931	167.17	ND	0	158	ND	0	2,931	2.93	325	1498	1.50E-06	0	0	0.00E+00	1.50E-06
n-Hexadecane	148	J	148	166.27	ND	0	159	ND	0	148	0.15	16	75	7.55E-08	0	0	0.00E+00	7.55E-08
C16 as Hexadecane	361	J	361	166.27	ND	0	159	ND	0	361	0.36	40	184	1.84E-07	0	0	0.00E+00	1.84E-07
n-Heptadecane	245	J	245	164.33	ND	0	158	ND	0	245	0.25	27	125	1.25E-07	0	0	0.00E+00	1.25E-07
C17 as Heptadecane	453	J	453	164.33	ND	0	158	ND	0	453	0.45	50	232	2.32E-07	0	0	0.00E+00	2.32E-07
n-Octadecane	108	J	108	166.17	ND	0	159	ND	0	108	0.11	12	55	5.54E-08	0	0	0.00E+00	5.54E-08
C18 as Octodecane	200	J	200	166.17	ND	0	159	ND	0	200	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Nonadecane	117	J	117	166.5	ND	0	158	ND	0	117	0.12	13	60	5.96E-08	0	0	0.00E+00	5.96E-08
C19 as Nonadecane	121	J	121	166.5	ND	0	158	ND	0	121	0.12	13	62	6.21E-08	0	0	0.00E+00	6.21E-08
n-Eicosane	79	ND	40	166.1	ND	0	157	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C20 as Eicosane	79	ND	40	166.1	ND	0	157	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heneicosane	80	ND	40	167.67	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C21 as Heneicosane	83	J	83	167.67	ND	0	158	ND	0	83	0.08	9	43	4.26E-08	0	0	0.00E+00	4.26E-08
n-Docosane	79	ND	39	165.77	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C22 as Docosane	79	ND	39	165.77	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tricosane	79	ND	39	165.77	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C23 as Tricosane	79	ND	39	165.77	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tetracosane	79	ND	40	166.9	ND	0	160	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C24 as Tetracosane	79	ND	40	166.9	ND	0	160	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
Total Hydrocarbon			44,914			290			0		44.62	4943	22,814	2.28E-05	0	0	0.00E+00	2.28E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
B07B	B07B		ND Adj	#B08A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	357	ND	179	372	ND	0	355	ND	0	179	0.18	20	99	9.90E-08		9.90E-08
C5 as Pentane	620	J	620	372	ND	0	355	ND	0	620	0.62	69	343	3.43E-07		3.43E-07
n-Hexane	378	ND	189	394	ND	0	375	ND	0	189	0.19	21	105	1.05E-07		1.05E-07
C6 as Hexane	1911		1,911	394	ND	0	375	ND	0	1,911	1.91	212	1058	1.06E-06		1.06E-06
n-Heptane	396	ND	198	412	ND	0	393	ND	0	198	0.20	22	110	1.10E-07		1.10E-07
C7 as Heptane	1402	J	1,402	412	ND	0	393	ND	0	1,402	1.40	155	777	7.77E-07		7.77E-07
n-Octane	161	ND	80	165	ND	0	160	ND	0	80	0.08	9	45	4.46E-08		4.46E-08
C8 as Octane	317	J	317	165	ND	0	160	ND	0	317	0.32	35	175	1.75E-07		1.75E-07
n-Nonane	491	J	491	166	ND	0	158	ND	0	491	0.49	54	272	2.72E-07		2.72E-07
C9 as Nonane	2702		2,702	166	ND	0	158	ND	0	2,702	2.70	299	1497	1.50E-06		1.50E-06
n-Decane	315	J	315	168	ND	0	158	ND	0	315	0.32	35	175	1.75E-07		1.75E-07
C10 as Decane	6577		6,577	168	ND	0	158	ND	0	6,577	6.58	728	3642	3.64E-06		3.64E-06
n-Undecane	238	J	238	167	ND	0	157	ND	0	238	0.24	26	132	1.32E-07		1.32E-07
C11 as Undecane	2729		2,729	167	ND	0	157	ND	0	2,729	2.73	302	1512	1.51E-06		1.51E-06
n-Dodecane	445	J	445	166	ND	0	158	ND	0	445	0.44	49	246	2.46E-07		2.46E-07
C12 as Dodecane	7492		7,492	166	ND	0	158	ND	0	7,492	7.49	830	4149	4.15E-06		4.15E-06
n-Tridecane	761	J	761	167	ND	0	160	ND	0	761	0.76	84	421	4.21E-07		4.21E-07
C13 as Tridecane	7605		7,605	290	J	290	160	ND	0	7,314	7.31	810	4051	4.05E-06		4.05E-06
n-Tetradecane	950	J	950	166	ND	0	159	ND	0	950	0.95	105	526	5.26E-07		5.26E-07
C14 as tetradecane	5770		5,770	166	ND	0	159	ND	0	5,770	5.77	639	3196	3.20E-06		3.20E-06
n-Pentadecane	431	J	431	167	ND	0	158	ND	0	431	0.43	48	239	2.39E-07		2.39E-07
C15 as Pentadecane	2654		2,654	167	ND	0	158	ND	0	2,654	2.65	294	1470	1.47E-06		1.47E-06
n-Hexadecane	160	ND	80	166	ND	0	159	ND	0	80	0.08	9	44	4.43E-08		4.43E-08
C16 as Hexadecane	326	J	326	166	ND	0	159	ND	0	326	0.33	36	181	1.81E-07		1.81E-07
n-Heptadecane	175	J	175	164	ND	0	158	ND	0	175	0.18	19	97	9.70E-08		9.70E-08
C17 as Heptadecane	162	J	162	164	ND	0	158	ND	0	162	0.16	18	90	9.00E-08		9.00E-08
n-Octadecane	160	ND	80	166	ND	0	159	ND	0	80	0.08	9	44	4.44E-08		4.44E-08
C18 as Octodecane	160	ND	80	166	ND	0	159	ND	0	80	0.08	9	44	4.44E-08		4.44E-08
n-Nonadecane	160	ND	80	167	ND	0	158	ND	0	80	0.08	9	44	4.42E-08		4.42E-08
C19 as Nonadecane	160	ND	80	167	ND	0	158	ND	0	80	0.08	9	44	4.42E-08		4.42E-08
n-Eicosane	158	ND	79	166	ND	0	157	ND	0	79	0.08	9	44	4.37E-08		4.37E-08
C20 as Eicosane	158	ND	79	166	ND	0	157	ND	0	79	0.08	9	44	4.37E-08		4.37E-08
n-Heneicosane	160	ND	80	168	ND	0	158	ND	0	80	0.08	9	44	4.42E-08		4.42E-08
C21 as Heneicosane	160	ND	80	168	ND	0	158	ND	0	80	0.08	9	44	4.42E-08		4.42E-08
n-Docosane	160	ND	80	166	ND	0	159	ND	0	80	0.08	9	44	4.43E-08		4.43E-08
C22 as Docosane	160	ND	80	166	ND	0	159	ND	0	80	0.08	9	44	4.43E-08		4.43E-08
n-Tricosane	159	ND	80	166	ND	0	158	ND	0	80	0.08	9	44	4.42E-08		4.42E-08
C23 as Tricosane	159	ND	80	166	ND	0	158	ND	0	80	0.08	9	44	4.42E-08		4.42E-08
n-Tetracosane	161	ND	80	167	ND	0	160	ND	0	80	0.08	9	45	4.46E-08		4.46E-08
C24 as Tetracosane	161	ND	80	167	ND	0	160	ND	0	80	0.08	9	45	4.46E-08		4.46E-08
Total Hydrocarbon			45,917			290			0		45.63	5054	25,270	2.53E-05		2.53E-05

Bagging Data Form — Vacuum Method

Sample Id: B010

Equipment type:	Connector		**Component ID:**	B-1318	
Equipment Subtype:	Plug		**Plant ID:**	Refinery B	
Line Size:	1	*inches*	**Date:**	21-Jul-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.86 *inHg*	758.4 *mmHg*	**Sample Pump A**	BU51790	
			Sample Pump B	BU51292	
Ambient Temp:	91.3 *°F*	32.9 *°C*	**TVA ID**	2385	
Component Temp:	98.9 *°F*	37.2 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Diesel Product Feed Thru E701*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
14:00	Background	4 *ppmv*	8-sec Dwell	330 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	1095 *ppm*
14:25	Initial Bag Vacuum	0.02 *inches H2O*	DGM Vac.	1.9 *inches H2O*	Bag Temp	99 *°F*	Leak @	Plug

Bag Concentrations (ppmv)

Time	14:31	14:32	14:34	14:36	14:47	14:52
ppmv	141	142	140	138	104	100

Sorbent Tube Sample Collection Parameters

B010A

Time						
14:38	Volume Start	70.4 *Liters*		Design Sample Flow Rate = 1 liter/min		
14:51	Volume Stop	82.8 *Liters*	Total Vol	12.4 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.954 *L/min*	Sorbent Flow$_{STP}$	0.910 *L/min*

B010B

Time						
14:38	Volume Start	56.8 *Liters*		Design Sample Flow Rate = 1 liter/min		
14:51	Volume Stop	69.4 *Liters*	Total Vol	12.6 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.969 *L/min*	Sorbent Flow$_{STP}$	0.924 *L/min*
	Total ST Vol$_{STP}$	23.84 *Liters*	DGM Vol$_{STP}$	86.51 *Liters*	Total Run Vol$_{STP}$	110.35 *Liters*

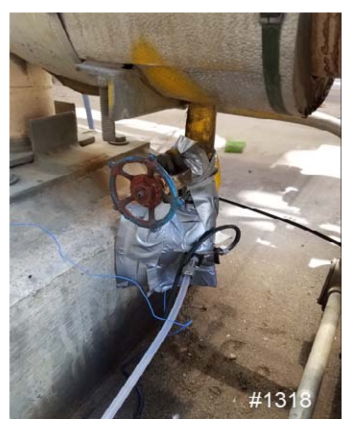
Bagging Parameters

Time							
14:45	Vacuum check	0.015 *inches H2O*			DGM$_P$	1.9 *inches H2O vacuum*	754.9 *mmHg*
14:46	DGM$_{10L}$ Time	01:25.7 *min:sec.frac*	DGM Time	1.433	DGM Flow	6.98	DGM Flow$_{STP}$ 6.65 *liters/minute*
14:46	Bag Temp.	94 *°F*	34.4 *°C*		Sample$_T$	92 *°F*	33.3 *°C*

Post-Sample Data

15:05 Post Test M21	8-sec Dwell	214 *ppmv*	Total Dwell	5:00 *min:sec*	Final M21	614 *ppm*
Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*		
Organic condensate collected	N/A *ml*					
Density of organic condensate	N/A *g/ml*					

Average THC emissions =	1.14E-04 kg/hr
Percent difference THC ER =	5%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	6.81E-08
C5 as Pentane	6.81E-08
n-Hexane	7.20E-08
C6 as Hexane	7.20E-08
n-Heptane	1.10E-07
C7 as Heptane	3.41E-07
n-Octane	3.32E-07
C8 as Octane	1.26E-06
n-Nonane	1.18E-06
C9 as Nonane	5.61E-06
n-Decane	2.59E-06
C10 as Decane	1.53E-05
n-Undecane	6.74E-06
C11 as Undecane	2.30E-05
n-Dodecane	5.53E-06
C12 as Dodecane	2.62E-05
n-Tridecane	3.41E-06
C13 as Tridecane	1.48E-05
n-Tetradecane	8.39E-07
C14 as tetradecane	4.73E-06
n-Pentadecane	2.18E-07
C15 as Pentadecane	1.31E-06
n-Hexadecane	3.04E-08
C16 as Hexadecane	9.09E-08
n-Heptadecane	3.01E-08
C17 as Heptadecane	3.01E-08
n-Octadecane	3.04E-08
C18 as Octodecane	3.04E-08
n-Nonadecane	3.04E-08
C19 as Nonadecane	3.04E-08
n-Eicosane	3.04E-08
C20 as Eicosane	3.04E-08
n-Heneicosane	3.07E-08
C21 as Heneicosane	3.07E-08
n-Docosane	3.03E-08
C22 as Docosane	3.03E-08
n-Tricosane	3.03E-08
C23 as Tricosane	3.03E-08
n-Tetracosane	3.05E-08
C24 as Tetracosane	3.05E-08
Total Hydrocarbon	1.14E-04

THC:	6.05E-03	lbs/day	1.10E-03	tons/yr

B010A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B010A	B010A		ND Adj	#B011A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	180	ND	90	355	ND	0	355	ND	0	90	0.09	10	46	4.59E-08	0	0	0.00E+00	4.59E-08
C5 as Pentane	180	ND	90	355	ND	0	355	ND	0	90	0.09	10	46	4.59E-08	0	0	0.00E+00	4.59E-08
n-Hexane	191	ND	95	375	ND	0	375	ND	0	95	0.10	11	49	4.85E-08	0	0	0.00E+00	4.85E-08
C6 as Hexane	191	ND	95	375	ND	0	375	ND	0	95	0.10	11	49	4.85E-08	0	0	0.00E+00	4.85E-08
n-Heptane	236	J	236	393	ND	0	393	ND	0	236	0.24	26	120	1.20E-07	0	0	0.00E+00	1.20E-07
C7 as Heptane	657	J	657	393	ND	0	393	ND	0	657	0.66	72	334	3.34E-07	0	0	0.00E+00	3.34E-07
n-Octane	676	J	676	157	ND	0	160	ND	0	676	0.68	75	344	3.44E-07	0	0	0.00E+00	3.44E-07
C8 as Octane	2530		2,530	157	ND	0	160	ND	0	2,530	2.53	279	1288	1.29E-06	0	0	0.00E+00	1.29E-06
n-Nonane	2412		2,412	158	ND	0	158	ND	0	2,412	2.41	266	1229	1.23E-06	0	0	0.00E+00	1.23E-06
C9 as Nonane	11012		11,012	158	ND	0	158	ND	0	11,012	11.01	1215	5609	5.61E-06	0	0	0.00E+00	5.61E-06
n-Decane	5285		5,285	160	ND	0	158	ND	0	5,285	5.28	583	2692	2.69E-06	0	0	0.00E+00	2.69E-06
C10 as Decane	29819		29,819	160	ND	0	158	ND	0	29,819	29.82	3291	15187	1.52E-05	0	0	0.00E+00	1.52E-05
n-Undecane	13710		13,710	159	ND	0	157	ND	0	13,710	13.71	1513	6982	6.98E-06	0	0	0.00E+00	6.98E-06
C11 as Undecane	46461		46,461	181	J	181	157	ND	0	46,280	46.28	5107	23571	2.36E-05	0	0	0.00E+00	2.36E-05
n-Dodecane	11289		11,289	158	ND	0	158	ND	0	11,289	11.29	1246	5750	5.75E-06	0	0	0.00E+00	5.75E-06
C12 as Dodecane	51729		51,729	158	ND	0	158	ND	0	51,729	51.73	5708	26346	2.63E-05	0	0	0.00E+00	2.63E-05
n-Tridecane	6961		6,961	159	ND	0	160	ND	0	6,961	6.96	768	3545	3.55E-06	0	0	0.00E+00	3.55E-06
C13 as Tridecane	32231		32,231	321	J	321	160	ND	0	31,910	31.91	3521	16252	1.63E-05	0	0	0.00E+00	1.63E-05
n-Tetradecane	1457		1,457	158	ND	0	159	ND	0	1,457	1.46	161	742	7.42E-07	0	0	0.00E+00	7.42E-07
C14 as tetradecane	10467		10,467	158	ND	0	159	ND	0	10,467	10.47	1155	5331	5.33E-06	0	0	0.00E+00	5.33E-06
n-Pentadecane	334	J	334	159	ND	0	158	ND	0	334	0.33	37	170	1.70E-07	0	0	0.00E+00	1.70E-07
C15 as Pentadecane	1690		1,690	159	ND	0	158	ND	0	1,690	1.69	186	861	8.61E-07	0	0	0.00E+00	8.61E-07
n-Hexadecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C16 as Hexadecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Heptadecane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C17 as Heptadecane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Octadecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C18 as Octodecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Nonadecane	81	ND	40	159	ND	0	158	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C19 as Nonadecane	81	ND	40	159	ND	0	158	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Eicosane	80	ND	40	158	ND	0	157	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C20 as Eicosane	80	ND	40	158	ND	0	157	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Heneicosane	81	ND	41	160	ND	0	158	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C21 as Heneicosane	81	ND	41	160	ND	0	158	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Docosane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C22 as Docosane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tricosane	80	ND	40	158	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C23 as Tricosane	80	ND	40	158	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tetracosane	81	ND	40	159	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C24 as Tetracosane	81	ND	40	159	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
Total Hydrocarbon			230,050			503			0		229.55	25331	116,910	1.17E-04	0	0	0.00E+00	1.17E-04

B010B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B010B	B010B		ND Adj	#B011A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	355	ND	177	355	ND	0	355	ND	0	177	0.18	20	90	9.03E-08	9.03E-08
C5 as Pentane	355	ND	177	355	ND	0	355	ND	0	177	0.18	20	90	9.03E-08	9.03E-08
n-Hexane	375	ND	188	375	ND	0	375	ND	0	188	0.19	21	96	9.55E-08	9.55E-08
C6 as Hexane	375	ND	188	375	ND	0	375	ND	0	188	0.19	21	96	9.55E-08	9.55E-08
n-Heptane	393	ND	196	393	ND	0	393	ND	0	196	0.20	22	100	1.00E-07	1.00E-07
C7 as Heptane	682	J	682	393	ND	0	393	ND	0	682	0.68	75	348	3.48E-07	3.48E-07
n-Octane	629	J	629	157	ND	0	160	ND	0	629	0.63	69	320	3.20E-07	3.20E-07
C8 as Octane	2408		2,408	157	ND	0	160	ND	0	2,408	2.41	266	1226	1.23E-06	1.23E-06
n-Nonane	2239		2,239	158	ND	0	158	ND	0	2,239	2.24	247	1140	1.14E-06	1.14E-06
C9 as Nonane	11003		11,003	158	ND	0	158	ND	0	11,003	11.00	1214	5604	5.60E-06	5.60E-06
n-Decane	4903		4,903	160	ND	0	158	ND	0	4,903	4.90	541	2497	2.50E-06	2.50E-06
C10 as Decane	30254		30,254	160	ND	0	158	ND	0	30,254	30.25	3339	15409	1.54E-05	1.54E-05
n-Undecane	12749		12,749	159	ND	0	157	ND	0	12,749	12.75	1407	6493	6.49E-06	6.49E-06
C11 as Undecane	44069		44,069	181	J	181	157	ND	0	43,887	43.89	4843	22352	2.24E-05	2.24E-05
n-Dodecane	10414		10,414	158	ND	0	158	ND	0	10,414	10.41	1149	5304	5.30E-06	5.30E-06
C12 as Dodecane	50962		50,962	158	ND	0	158	ND	0	50,962	50.96	5624	25955	2.60E-05	2.60E-05
n-Tridecane	6416		6,416	159	ND	0	160	ND	0	6,416	6.42	708	3268	3.27E-06	3.27E-06
C13 as Tridecane	26696		26,696	321	J	321	160	ND	0	26,375	26.38	2910	13433	1.34E-05	1.34E-05
n-Tetradecane	1839		1,839	158	ND	0	159	ND	0	1,839	1.84	203	937	9.37E-07	9.37E-07
C14 as tetradecane	8090		8,090	158	ND	0	159	ND	0	8,090	8.09	893	4120	4.12E-06	4.12E-06
n-Pentadecane	522	J	522	159	ND	0	158	ND	0	522	0.52	58	266	2.66E-07	2.66E-07
C15 as Pentadecane	3461		3,461	159	ND	0	158	ND	0	3,461	3.46	382	1763	1.76E-06	1.76E-06
n-Hexadecane	158	ND	79	158	ND	0	159	ND	0	79	0.08	9	40	4.03E-08	4.03E-08
C16 as Hexadecane	317	J	317	158	ND	0	159	ND	0	317	0.32	35	161	1.61E-07	1.61E-07
n-Heptadecane	157	ND	78	157	ND	0	158	ND	0	78	0.08	9	40	3.99E-08	3.99E-08
C17 as Heptadecane	157	ND	78	157	ND	0	158	ND	0	78	0.08	9	40	3.99E-08	3.99E-08
n-Octadecane	158	ND	79	158	ND	0	159	ND	0	79	0.08	9	40	4.03E-08	4.03E-08
C18 as Octodecane	158	ND	79	158	ND	0	159	ND	0	79	0.08	9	40	4.03E-08	4.03E-08
n-Nonadecane	159	ND	79	159	ND	0	158	ND	0	79	0.08	9	40	4.04E-08	4.04E-08
C19 as Nonadecane	159	ND	79	159	ND	0	158	ND	0	79	0.08	9	40	4.04E-08	4.04E-08
n-Eicosane	158	ND	79	158	ND	0	157	ND	0	79	0.08	9	40	4.03E-08	4.03E-08
C20 as Eicosane	158	ND	79	158	ND	0	157	ND	0	79	0.08	9	40	4.03E-08	4.03E-08
n-Heneicosane	160	ND	80	160	ND	0	158	ND	0	80	0.08	9	41	4.07E-08	4.07E-08
C21 as Heneicosane	160	ND	80	160	ND	0	158	ND	0	80	0.08	9	41	4.07E-08	4.07E-08
n-Docosane	158	ND	79	158	ND	0	159	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
C22 as Docosane	158	ND	79	158	ND	0	159	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
n-Tricosane	158	ND	79	158	ND	0	158	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
C23 as Tricosane	158	ND	79	158	ND	0	158	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
n-Tetracosane	159	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	4.05E-08	4.05E-08
C24 as Tetracosane	159	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	4.05E-08	4.05E-08
Total Hydrocarbon			219,924			503			0		219.42	24213	111,753	1.12E-04	1.12E-04

Bagging Data Form — Vacuum Method

Sample Id: B012

Equipment type:	Pump CP-934	**Component ID:**	B-632
Equipment Subtype:	Plug on Pump Body	**Plant ID:**	Refinery B
Line Size:	8 *inches*	**Date:**	24-Jul-17
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.85 *inHg* / 758.2 *mmHg*	**Sample Pump A**	BU51790
		Sample Pump B	BU51292
Ambient Temp:	66.3 °F / 19.1 °C	**TVA ID**	2149
Component Temp:	95 °F / 35.0 °C	**Stream Pressure/Temp:**	82 *psig* / °F
Stream Description:	*Wet Diesel*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:27	Background	0	*ppmv*	8-sec Dwell	94	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	367 *ppm*
10:57	Initial Bag Vacuum	0.04	*inches H2O*	DGM Vac.	2.1	*inches H2O*	Bag Temp	83	°F	Leak @	Plug on Pump Body

Bag Concentrations (ppmv)

Time	11:12	11:31	11:37	11:44										
ppmv	35	41	40.3	40.7										

Sorbent Tube Sample Collection Parameters

B012A

Time								
11:36	Volume Start	85.3	*Liters*		Design Sample Flow Rate = 1 liter/min			
11:49	Volume Stop	98.4	*Liters*	Total Vol	13.1	*Liters*		
	Sample Run Time	13	*Minutes*		Sorbent Flow 1.008	*L/min*	Sorbent $Flow_{STP}$	0.980 *L/min*

B012B

Time								
11:36	Volume Start	71.2	*Liters*		Design Sample Flow Rate = 1 liter/min			
11:49	Volume Stop	84.6	*Liters*	Total Vol	13.4	*Liters*		
	Sample Run Time	13	*Minutes*		Sorbent Flow 1.031	*L/min*	Sorbent $Flow_{STP}$	1.003 *L/min*
	Total ST Vol_{STP}	25.77	*Liters*	DGM Vol_{STP}	87.20	*Liters*	Total Run Vol_{STP}	112.98 *Liters*

Bagging Parameters

Time										
11:41	Vacuum check	0.02	*inches H2O*			DGM_P	2	*inches H2O vacuum*	754.5	*mmHg*
11:39	DGM_{10L} Time	01:27.5	*min:sec.frac*	DGM Time	1.450	DGM Flow	6.90	DGM $Flow_{STP}$	6.71	*liters/minute*
11:39	Bag Temp.	87	°F	30.6	°C	$Sample_T$	81	°F	27.2	°C

Post-Sample Data

12:22 Post Test M21		8-sec Dwell	370 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21	475 *ppm*
Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected	N/A *ml*						
Density of organic condensate	N/A *g/ml*						

Average THC emissions =	4.05E-05 kg/hr
Percent difference THC ER =	31%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	6.57E-08
C5 as Pentane	6.57E-08
n-Hexane	6.95E-08
C6 as Hexane	6.95E-08
n-Heptane	7.27E-08
C7 as Heptane	7.27E-08
n-Octane	5.40E-08
C8 as Octane	4.84E-07
n-Nonane	5.00E-07
C9 as Nonane	3.22E-06
n-Decane	7.02E-07
C10 as Decane	1.05E-05
n-Undecane	6.25E-07
C11 as Undecane	1.17E-05
n-Dodecane	5.58E-07
C12 as Dodecane	7.18E-06
n-Tridecane	4.64E-07
C13 as Tridecane	2.66E-06
n-Tetradecane	1.95E-07
C14 as tetradecane	6.50E-07
n-Pentadecane	2.94E-08
C15 as Pentadecane	2.94E-08
n-Hexadecane	2.94E-08
C16 as Hexadecane	2.94E-08
n-Heptadecane	2.92E-08
C17 as Heptadecane	2.92E-08
n-Octadecane	2.94E-08
C18 as Octodecane	2.94E-08
n-Nonadecane	2.94E-08
C19 as Nonadecane	2.94E-08
n-Eicosane	2.91E-08
C20 as Eicosane	2.91E-08
n-Heneicosane	2.94E-08
C21 as Heneicosane	2.94E-08
n-Docosane	2.93E-08
C22 as Docosane	2.93E-08
n-Tricosane	2.93E-08
C23 as Tricosane	2.93E-08
n-Tetracosane	2.95E-08
C24 as Tetracosane	2.95E-08
Total Hydrocarbon	4.05E-05

THC:	**2.14E-03**	**lbs/day**	**3.91E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B012A	B012A		ND Adj	#B013A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	171	ND	85	338	ND	0	355	ND	0	85	0.09	10	44	4.45E-08	0	0	0.00E+00	4.45E-08
C5 as Pentane	171	ND	85	338	ND	0	355	ND	0	85	0.09	10	44	4.45E-08	0	0	0.00E+00	4.45E-08
n-Hexane	180	ND	90	358	ND	0	375	ND	0	90	0.09	10	47	4.70E-08	0	0	0.00E+00	4.70E-08
C6 as Hexane	180	ND	90	358	ND	0	375	ND	0	90	0.09	10	47	4.70E-08	0	0	0.00E+00	4.70E-08
n-Heptane	189	ND	94	375	ND	0	393	ND	0	94	0.09	11	49	4.92E-08	0	0	0.00E+00	4.92E-08
C7 as Heptane	189	ND	94	375	ND	0	393	ND	0	94	0.09	11	49	4.92E-08	0	0	0.00E+00	4.92E-08
n-Octane	132	J	132	150	ND	0	160	ND	0	132	0.13	15	69	6.89E-08	0	0	0.00E+00	6.89E-08
C8 as Octane	1331		1,331	150	ND	0	160	ND	0	1,331	1.33	150	694	6.94E-07	0	0	0.00E+00	6.94E-07
n-Nonane	1112		1,112	151	ND	0	158	ND	0	1,112	1.11	126	580	5.80E-07	0	0	0.00E+00	5.80E-07
C9 as Nonane	7495		7,495	151	ND	0	158	ND	0	7,495	7.49	847	3908	3.91E-06	0	0	0.00E+00	3.91E-06
n-Decane	1480		1,480	152	ND	0	158	ND	0	1,480	1.48	167	772	7.72E-07	0	0	0.00E+00	7.72E-07
C10 as Decane	23902		23,902	152	ND	0	158	ND	0	23,902	23.90	2700	12463	1.25E-05	0	0	0.00E+00	1.25E-05
n-Undecane	1331		1,331	152	ND	0	157	ND	0	1,331	1.33	150	694	6.94E-07	0	0	0.00E+00	6.94E-07
C11 as Undecane	25743		25,743	246	J	246	157	ND	0	25,497	25.50	2880	13295	1.33E-05	0	0	0.00E+00	1.33E-05
n-Dodecane	1189		1,189	151	ND	0	158	ND	0	1,189	1.19	134	620	6.20E-07	0	0	0.00E+00	6.20E-07
C12 as Dodecane	15981		15,981	151	ND	0	158	ND	0	15,981	15.98	1805	8333	8.33E-06	0	0	0.00E+00	8.33E-06
n-Tridecane	1018		1,018	151	ND	0	160	ND	0	1,018	1.02	115	531	5.31E-07	0	0	0.00E+00	5.31E-07
C13 as Tridecane	6186		6,186	316	J	316	160	ND	0	5,871	5.87	663	3061	3.06E-06	0	0	0.00E+00	3.06E-06
n-Tetradecane	354	J	354	151	ND	0	159	ND	0	354	0.35	40	185	1.85E-07	0	0	0.00E+00	1.85E-07
C14 as tetradecane	1581		1,581	151	ND	0	159	ND	0	1,581	1.58	179	824	8.24E-07	0	0	0.00E+00	8.24E-07
n-Pentadecane	77	ND	38	152	ND	0	158	ND	0	38	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C15 as Pentadecane	77	ND	38	152	ND	0	158	ND	0	38	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Hexadecane	76	ND	38	151	ND	0	159	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C16 as Hexadecane	76	ND	38	151	ND	0	159	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Heptadecane	75	ND	38	149	ND	0	158	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C17 as Heptadecane	75	ND	38	149	ND	0	158	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Octadecane	76	ND	38	151	ND	0	159	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C18 as Octodecane	76	ND	38	151	ND	0	159	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Nonadecane	76	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C19 as Nonadecane	76	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Eicosane	76	ND	38	151	ND	0	157	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C20 as Eicosane	76	ND	38	151	ND	0	157	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Heneicosane	77	ND	38	152	ND	0	158	ND	0	38	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C21 as Heneicosane	77	ND	38	152	ND	0	158	ND	0	38	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Docosane	76	ND	38	151	ND	0	159	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C22 as Docosane	76	ND	38	151	ND	0	159	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Tricosane	76	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C23 as Tricosane	76	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Tetracosane	76	ND	38	152	ND	0	160	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C24 as Tetracosane	76	ND	38	152	ND	0	160	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
Total Hydrocarbon			90,137			562			0		89.57	10120	46,707	4.67E-05	0	0	0.00E+00	4.67E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B012B	B012B		ND Adj	#B013A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	333	ND	167	338	ND	0	355	ND	0	167	0.17	19	87	8.69E-08	8.69E-08
C5 as Pentane	333	ND	167	338	ND	0	355	ND	0	167	0.17	19	87	8.69E-08	8.69E-08
n-Hexane	353	ND	176	358	ND	0	375	ND	0	176	0.18	20	92	9.20E-08	9.20E-08
C6 as Hexane	353	ND	176	358	ND	0	375	ND	0	176	0.18	20	92	9.20E-08	9.20E-08
n-Heptane	369	ND	185	375	ND	0	393	ND	0	185	0.18	21	96	9.63E-08	9.63E-08
C7 as Heptane	369	ND	185	375	ND	0	393	ND	0	185	0.18	21	96	9.63E-08	9.63E-08
n-Octane	150	ND	75	150	ND	0	160	ND	0	75	0.08	8	39	3.91E-08	3.91E-08
C8 as Octane	525	J	525	150	ND	0	160	ND	0	525	0.52	59	273	2.73E-07	2.73E-07
n-Nonane	804	J	804	151	ND	0	158	ND	0	804	0.80	91	419	4.19E-07	4.19E-07
C9 as Nonane	4837		4,837	151	ND	0	158	ND	0	4,837	4.84	546	2522	2.52E-06	2.52E-06
n-Decane	1213	J	1,213	152	ND	0	158	ND	0	1,213	1.21	137	633	6.33E-07	6.33E-07
C10 as Decane	16396		16,396	152	ND	0	158	ND	0	16,396	16.40	1852	8549	8.55E-06	8.55E-06
n-Undecane	1067	J	1,067	152	ND	0	157	ND	0	1,067	1.07	121	557	5.57E-07	5.57E-07
C11 as Undecane	19603		19,603	246	J	246	157	ND	0	19,357	19.36	2187	10093	1.01E-05	1.01E-05
n-Dodecane	950	J	950	151	ND	0	158	ND	0	950	0.95	107	495	4.95E-07	4.95E-07
C12 as Dodecane	11569		11,569	151	ND	0	158	ND	0	11,569	11.57	1307	6032	6.03E-06	6.03E-06
n-Tridecane	763	J	763	151	ND	0	160	ND	0	763	0.76	86	398	3.98E-07	3.98E-07
C13 as Tridecane	4651		4,651	316	J	316	160	ND	0	4,335	4.34	490	2260	2.26E-06	2.26E-06
n-Tetradecane	394	J	394	151	ND	0	159	ND	0	394	0.39	44	205	2.05E-07	2.05E-07
C14 as tetradecane	913	J	913	151	ND	0	159	ND	0	913	0.91	103	476	4.76E-07	4.76E-07
n-Pentadecane	149	ND	74	152	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
C15 as Pentadecane	149	ND	74	152	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
n-Hexadecane	149	ND	75	151	ND	0	159	ND	0	75	0.07	8	39	3.89E-08	3.89E-08
C16 as Hexadecane	149	ND	75	151	ND	0	159	ND	0	75	0.07	8	39	3.89E-08	3.89E-08
n-Heptadecane	149	ND	74	149	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
C17 as Heptadecane	149	ND	74	149	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
n-Octadecane	150	ND	75	151	ND	0	159	ND	0	75	0.07	8	39	3.90E-08	3.90E-08
C18 as Octodecane	150	ND	75	151	ND	0	159	ND	0	75	0.07	8	39	3.90E-08	3.90E-08
n-Nonadecane	149	ND	74	151	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
C19 as Nonadecane	149	ND	74	151	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
n-Eicosane	147	ND	74	151	ND	0	157	ND	0	74	0.07	8	38	3.84E-08	3.84E-08
C20 as Eicosane	147	ND	74	151	ND	0	157	ND	0	74	0.07	8	38	3.84E-08	3.84E-08
n-Heneicosane	149	ND	74	152	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
C21 as Heneicosane	149	ND	74	152	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
n-Docosane	149	ND	75	151	ND	0	159	ND	0	75	0.07	8	39	3.89E-08	3.89E-08
C22 as Docosane	149	ND	75	151	ND	0	159	ND	0	75	0.07	8	39	3.89E-08	3.89E-08
n-Tricosane	149	ND	74	151	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
C23 as Tricosane	149	ND	74	151	ND	0	158	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
n-Tetracosane	150	ND	75	152	ND	0	160	ND	0	75	0.08	8	39	3.91E-08	3.91E-08
C24 as Tetracosane	150	ND	75	152	ND	0	160	ND	0	75	0.08	8	39	3.91E-08	3.91E-08
Total Hydrocarbon			66,304			562			0		65.74	7427	34,280	3.43E-05	3.43E-05

Bagging Data Form — **Vacuum Method** — **Sample Id** **B015**

WSPA — Western States Petroleum Association

Equipment type:	Flange	**Component ID:**	B-1314
Equipment Subtype:		**Plant ID:**	Refinery B
Line Size:	8 *inches*	**Date:**	25-Jul-17
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.85 *inHg* / 758.2 *mmHg*	**Sample Pump A**	BU51790
		Sample Pump B	BU51292
Ambient Temp:	73.7 °F / 23.2 °C	**TVA ID**	2337
Component Temp:	217.5 °F / 103.1 °C	**Stream Pressure/Temp:**	*psig* / °F
Stream Description:	*Dry Diesel*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
ºF= (F-32)*5/9 ºC
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:05	Background	3	*ppmv*	8-sec Dwell	47	*ppmv*	Total Dwell	2:10	*min:sec*	Final M21	103 *ppm*
10:33	Initial Bag Vacuum	0.15	*inches H2O*	DGM Vac.	2.15	*inches H2O*	Bag Temp	217	°F	Leak @	flange

Bag Concentrations (ppmv)

Time	10:38	10:49	10:57	11:00	11:04
ppmv	31	30	35.8	34.4	32.3

Sorbent Tube Sample Collection Parameters

B015A

Time								
10:54	Volume Start	114.9 *Liters*		Design Sample Flow Rate = 1 liter/min				
11:07	Volume Stop	127.0 *Liters*	Total Vol	12.1 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.931 *L/min*	Sorbent Flow$_{STP}$	0.897 *L/min*	

B015B

10:55	Volume Start	88.8 *Liters*		Design Sample Flow Rate = 1 liter/min			
11:07	Volume Stop	101.1 *Liters*	Total Vol	12.3 *Liters*			
	Sample Run Time	12 *Minutes*		Sorbent Flow	1.025 *L/min*	Sorbent Flow$_{STP}$	0.988 *L/min*

Total ST Vol$_{STP}$ 23.53 *Liters* — DGM Vol$_{STP}$ 91.71 *Liters* — Total Run Vol$_{STP}$ 115.24 *Liters*

Bagging Parameters

Time								
10:58	Vacuum check	0.135 *inches H2O*			DGM$_P$	2.1 *inches H2O vacuum*		754.3 *mmHg*
10:58	DGM$_{10L}$ Time	01:21.7 *min:sec.frac*	DGM Time	1.367	DGM Flow	7.32	DGM Flow$_{STP}$	7.05 *liters/minute*
10:58	Bag Temp.	216 °F		102.2 °C	Sample$_T$	85.6 °F		29.8 °C

Post-Sample Data

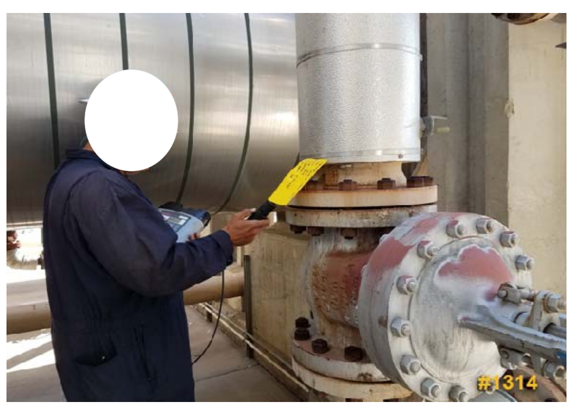
11:20 Post Test M21	8-sec Dwell	24 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21 102 *ppm*
Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*	
Organic condensate collected	N/A *ml*				
Density of organic condensate	N/A *g/ml*				

Average THC emissions =	3.26E-05 kg/hr
Percent difference THC ER =	10%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	4.65E-08
C5 as Pentane	4.65E-08
n-Hexane	4.87E-08
C6 as Hexane	4.87E-08
n-Heptane	5.10E-08
C7 as Heptane	5.10E-08
n-Octane	3.42E-08
C8 as Octane	7.89E-08
n-Nonane	1.59E-07
C9 as Nonane	7.58E-07
n-Decane	3.40E-07
C10 as Decane	2.88E-06
n-Undecane	9.27E-07
C11 as Undecane	3.41E-06
n-Dodecane	9.14E-07
C12 as Dodecane	9.11E-06
n-Tridecane	1.18E-06
C13 as Tridecane	5.56E-06
n-Tetradecane	8.64E-07
C14 as tetradecane	3.48E-06
n-Pentadecane	3.51E-07
C15 as Pentadecane	1.54E-06
n-Hexadecane	3.43E-08
C16 as Hexadecane	8.39E-08
n-Heptadecane	4.61E-08
C17 as Heptadecane	3.41E-08
n-Octadecane	3.44E-08
C18 as Octodecane	3.44E-08
n-Nonadecane	3.44E-08
C19 as Nonadecane	3.44E-08
n-Eicosane	3.43E-08
C20 as Eicosane	3.43E-08
n-Heneicosane	3.46E-08
C21 as Heneicosane	3.46E-08
n-Docosane	3.43E-08
C22 as Docosane	3.43E-08
n-Tricosane	3.42E-08
C23 as Tricosane	3.42E-08
n-Tetracosane	3.45E-08
C24 as Tetracosane	3.45E-08
Total Hydrocarbon	3.26E-05

THC: **1.72E-03** **lbs/day** **3.14E-04 tons/yr**



ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B015A	B015A		ND Adj	#B016A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	185	ND	92	144	ND	0	355	ND	0	92	0.09	11	49	4.91E-08	0	0	0.00E+00	4.91E-08
C5 as Pentane	185	ND	92	144	ND	0	355	ND	0	92	0.09	11	49	4.91E-08	0	0	0.00E+00	4.91E-08
n-Hexane	195	ND	98	150	ND	0	375	ND	0	98	0.10	11	52	5.19E-08	0	0	0.00E+00	5.19E-08
C6 as Hexane	195	ND	98	150	ND	0	375	ND	0	98	0.10	11	52	5.19E-08	0	0	0.00E+00	5.19E-08
n-Heptane	204	ND	102	156	ND	0	393	ND	0	102	0.10	12	54	5.44E-08	0	0	0.00E+00	5.44E-08
C7 as Heptane	204	ND	102	156	ND	0	393	ND	0	102	0.10	12	54	5.44E-08	0	0	0.00E+00	5.44E-08
n-Octane	83	ND	42	152	ND	0	160	ND	0	42	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
C8 as Octane	103	J	103	152	ND	0	160	ND	0	103	0.10	12	55	5.45E-08	0	0	0.00E+00	5.45E-08
n-Nonane	304	J	304	153	ND	0	158	ND	0	304	0.30	35	162	1.62E-07	0	0	0.00E+00	1.62E-07
C9 as Nonane	1394		1,394	153	ND	0	158	ND	0	1,394	1.39	161	742	7.42E-07	0	0	0.00E+00	7.42E-07
n-Decane	662	J	662	155	ND	0	158	ND	0	662	0.66	76	352	3.52E-07	0	0	0.00E+00	3.52E-07
C10 as Decane	5364		5,364	155	ND	0	158	ND	0	5,364	5.36	618	2853	2.85E-06	0	0	0.00E+00	2.85E-06
n-Undecane	1552		1,552	154	ND	0	157	ND	0	1,552	1.55	179	826	8.26E-07	0	0	0.00E+00	8.26E-07
C11 as Undecane	6751		6,751	154	ND	0	157	ND	0	6,751	6.75	778	3591	3.59E-06	0	0	0.00E+00	3.59E-06
n-Dodecane	1727		1,727	153	ND	0	158	ND	0	1,727	1.73	199	918	9.18E-07	0	0	0.00E+00	9.18E-07
C12 as Dodecane	17318		17,318	153	ND	0	158	ND	0	17,318	17.32	1996	9211	9.21E-06	0	0	0.00E+00	9.21E-06
n-Tridecane	2282		2,282	154	ND	0	160	ND	0	2,282	2.28	263	1214	1.21E-06	0	0	0.00E+00	1.21E-06
C13 as Tridecane	11257		11,257	154	ND	0	160	ND	0	11,257	11.26	1297	5987	5.99E-06	0	0	0.00E+00	5.99E-06
n-Tetradecane	1834		1,834	178	J	178	159	ND	0	1,656	1.66	191	881	8.81E-07	0	0	0.00E+00	8.81E-07
C14 as tetradecane	7576		7,576	154	ND	0	159	ND	0	7,576	7.58	873	4030	4.03E-06	0	0	0.00E+00	4.03E-06
n-Pentadecane	789	J	789	154	ND	0	158	ND	0	789	0.79	91	420	4.20E-07	0	0	0.00E+00	4.20E-07
C15 as Pentadecane	3906		3,906	154	ND	0	158	ND	0	3,906	3.91	450	2077	2.08E-06	0	0	0.00E+00	2.08E-06
n-Hexadecane	83	ND	41	153	ND	0	159	ND	0	41	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C16 as Hexadecane	228	J	228	153	ND	0	159	ND	0	228	0.23	26	121	1.21E-07	0	0	0.00E+00	1.21E-07
n-Heptadecane	87	J	87	152	ND	0	158	ND	0	87	0.09	10	46	4.61E-08	0	0	0.00E+00	4.61E-08
C17 as Heptadecane	82	ND	41	152	ND	0	158	ND	0	41	0.04	5	22	2.19E-08	0	0	0.00E+00	2.19E-08
n-Octadecane	83	ND	41	153	ND	0	159	ND	0	41	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C18 as Octodecane	83	ND	41	153	ND	0	159	ND	0	41	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Nonadecane	83	ND	41	154	ND	0	158	ND	0	41	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C19 as Nonadecane	83	ND	41	154	ND	0	158	ND	0	41	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Eicosane	82	ND	41	153	ND	0	157	ND	0	41	0.04	5	22	2.19E-08	0	0	0.00E+00	2.19E-08
C20 as Eicosane	82	ND	41	153	ND	0	157	ND	0	41	0.04	5	22	2.19E-08	0	0	0.00E+00	2.19E-08
n-Heneicosane	83	ND	42	155	ND	0	158	ND	0	42	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
C21 as Heneicosane	83	ND	42	155	ND	0	158	ND	0	42	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
n-Docosane	83	ND	41	153	ND	0	159	ND	0	41	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C22 as Docosane	83	ND	41	153	ND	0	159	ND	0	41	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Tricosane	82	ND	41	153	ND	0	158	ND	0	41	0.04	5	22	2.19E-08	0	0	0.00E+00	2.19E-08
C23 as Tricosane	82	ND	41	153	ND	0	158	ND	0	41	0.04	5	22	2.19E-08	0	0	0.00E+00	2.19E-08
n-Tetracosane	83	ND	42	154	ND	0	160	ND	0	42	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
C24 as Tetracosane	83	ND	42	154	ND	0	160	ND	0	42	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
Total Hydrocarbon			64,421			178			0		64.24	7403	34,170	3.42E-05	0	0	0.00E+00	3.42E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B015B	B015B		ND Adj	#B016A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152	ND	76	144	ND	0	355	ND	0	76	0.08	9	44	4.39E-08	4.39E-08
C5 as Pentane	152	ND	76	144	ND	0	355	ND	0	76	0.08	9	44	4.39E-08	4.39E-08
n-Hexane	158	ND	79	150	ND	0	375	ND	0	79	0.08	9	46	4.56E-08	4.56E-08
C6 as Hexane	158	ND	79	150	ND	0	375	ND	0	79	0.08	9	46	4.56E-08	4.56E-08
n-Heptane	165	ND	83	156	ND	0	393	ND	0	83	0.08	10	48	4.76E-08	4.76E-08
C7 as Heptane	165	ND	83	156	ND	0	393	ND	0	83	0.08	10	48	4.76E-08	4.76E-08
n-Octane	161	ND	80	152	ND	0	160	ND	0	80	0.08	9	46	4.64E-08	4.64E-08
C8 as Octane	179	J	179	152	ND	0	160	ND	0	179	0.18	21	103	1.03E-07	1.03E-07
n-Nonane	272	J	272	153	ND	0	158	ND	0	272	0.27	31	157	1.57E-07	1.57E-07
C9 as Nonane	1345	J	1,345	153	ND	0	158	ND	0	1,345	1.34	155	775	7.75E-07	7.75E-07
n-Decane	570	J	570	155	ND	0	158	ND	0	570	0.57	66	328	3.28E-07	3.28E-07
C10 as Decane	5037		5,037	155	ND	0	158	ND	0	5,037	5.04	581	2903	2.90E-06	2.90E-06
n-Undecane	1784		1,784	154	ND	0	157	ND	0	1,784	1.78	206	1028	1.03E-06	1.03E-06
C11 as Undecane	5622		5,622	154	ND	0	157	ND	0	5,622	5.62	648	3239	3.24E-06	3.24E-06
n-Dodecane	1578	J	1,578	153	ND	0	158	ND	0	1,578	1.58	182	909	9.09E-07	9.09E-07
C12 as Dodecane	15625		15,625	153	ND	0	158	ND	0	15,625	15.62	1801	9003	9.00E-06	9.00E-06
n-Tridecane	1988		1,988	154	ND	0	160	ND	0	1,988	1.99	229	1145	1.15E-06	1.15E-06
C13 as Tridecane	8905		8,905	154	ND	0	160	ND	0	8,905	8.91	1026	5131	5.13E-06	5.13E-06
n-Tetradecane	1647		1,647	178	J	178	159	ND	0	1,468	1.47	169	846	8.46E-07	8.46E-07
C14 as tetradecane	5084		5,084	154	ND	0	159	ND	0	5,084	5.08	586	2929	2.93E-06	2.93E-06
n-Pentadecane	490	J	490	154	ND	0	158	ND	0	490	0.49	56	282	2.82E-07	2.82E-07
C15 as Pentadecane	1755		1,755	154	ND	0	158	ND	0	1,755	1.76	202	1011	1.01E-06	1.01E-06
n-Hexadecane	162	ND	81	153	ND	0	159	ND	0	81	0.08	9	47	4.67E-08	4.67E-08
C16 as Hexadecane	162	ND	81	153	ND	0	159	ND	0	81	0.08	9	47	4.67E-08	4.67E-08
n-Heptadecane	160	ND	80	152	ND	0	158	ND	0	80	0.08	9	46	4.62E-08	4.62E-08
C17 as Heptadecane	160	ND	80	152	ND	0	158	ND	0	80	0.08	9	46	4.62E-08	4.62E-08
n-Octadecane	162	ND	81	153	ND	0	159	ND	0	81	0.08	9	47	4.67E-08	4.67E-08
C18 as Octodecane	162	ND	81	153	ND	0	159	ND	0	81	0.08	9	47	4.67E-08	4.67E-08
n-Nonadecane	162	ND	81	154	ND	0	158	ND	0	81	0.08	9	47	4.68E-08	4.68E-08
C19 as Nonadecane	162	ND	81	154	ND	0	158	ND	0	81	0.08	9	47	4.68E-08	4.68E-08
n-Eicosane	162	ND	81	153	ND	0	157	ND	0	81	0.08	9	47	4.67E-08	4.67E-08
C20 as Eicosane	162	ND	81	153	ND	0	157	ND	0	81	0.08	9	47	4.67E-08	4.67E-08
n-Heneicosane	164	ND	82	155	ND	0	158	ND	0	82	0.08	9	47	4.71E-08	4.71E-08
C21 as Heneicosane	164	ND	82	155	ND	0	158	ND	0	82	0.08	9	47	4.71E-08	4.71E-08
n-Docosane	162	ND	81	153	ND	0	159	ND	0	81	0.08	9	47	4.66E-08	4.66E-08
C22 as Docosane	162	ND	81	153	ND	0	159	ND	0	81	0.08	9	47	4.66E-08	4.66E-08
n-Tricosane	162	ND	81	153	ND	0	158	ND	0	81	0.08	9	47	4.66E-08	4.66E-08
C23 as Tricosane	162	ND	81	153	ND	0	158	ND	0	81	0.08	9	47	4.66E-08	4.66E-08
n-Tetracosane	163	ND	81	154	ND	0	160	ND	0	81	0.08	9	47	4.69E-08	4.69E-08
C24 as Tetracosane	163	ND	81	154	ND	0	160	ND	0	81	0.08	9	47	4.69E-08	4.69E-08
Total Hydrocarbon			53,896			178			0		53.72	6190	30,952	3.10E-05	3.10E-05

Bagging Data Form — Vacuum Method

Sample Id: B017

WSPA — Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	B-322	
Equipment Subtype:	Plug			**Plant ID:**	Refinery B	
Line Size:	2	*inches*		**Date:**	25-Jul-17	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.86	*inHg*	758.4 *mmHg*	**Sample Pump A**	BU51790	
				Sample Pump B	BU51292	
Ambient Temp:	83.4	*°F*	28.6 *°C*	**TVA ID**	2337	
Component Temp:	97	*°F*	36.1 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Slop Oil from 8G-811A/B / HUK Return to TPA from E 845*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
14:26	Background	2	*ppmv*	8-sec Dwell	48	*ppmv*	Total Dwell	2:30	*min:sec*	Final M21	193 *ppm*
14:58	Initial Bag Vacuum	0.02	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	93	*°F*	Leak @	Plug

Bag Concentrations (ppmv)

Time	15:00	15:03	15:04	15:08	15:09	15:10	15:13	15:14	15:17	15:18	15:25	15:33		
ppmv	13.4	16	21.6	23.5	24.1	24.9	25.8	26.1	26.6	27	26.1	26.3		

Sorbent Tube Sample Collection Parameters

B017A

Time									
15:19	Volume Start	127.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
15:32	Volume Stop	139.9	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	$\text{Sorbent Flow}_{STP}$	0.958	*L/min*

B017B

15:19	Volume Start	101.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
15:32	Volume Stop	114.0	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	$\text{Sorbent Flow}_{STP}$	0.958	*L/min*
	$\text{Total ST Vol}_{STP}$	24.92	*Liters*	DGM Vol_{STP}	84.64	*Liters*	$\text{Total Run Vol}_{STP}$	109.55	*Liters*

Bagging Parameters

Time									
15:23	Vacuum check	0.015	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	755.1 *mmHg*
15:23	DGM_{10L} Time	01:28.8	*min:sec.frac*	DGM Time	1.483	DGM Flow	6.74	DGM Flow_{STP}	6.51 *liters/minute*
15:23	Bag Temp.	87	*°F*	30.6	*°C*	Sample_T	85.3	*°F*	29.6 *°C*

Post-Sample Data

15:40	Post Test M21		8-sec Dwell	91	*ppmv*	Total Dwell	2:10 *min:sec*	Final M21	225 *ppm*
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*		
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	1.81E-05	kg/hr
Percent difference THC ER =	8%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	4.02E-08
C5 as Pentane	4.02E-08
n-Hexane	4.22E-08
C6 as Hexane	4.22E-08
n-Heptane	4.42E-08
C7 as Heptane	4.42E-08
n-Octane	2.93E-08
C8 as Octane	9.73E-08
n-Nonane	2.02E-07
C9 as Nonane	1.37E-06
n-Decane	2.50E-07
C10 as Decane	3.74E-06
n-Undecane	4.30E-07
C11 as Undecane	4.53E-06
n-Dodecane	2.74E-07
C12 as Dodecane	3.55E-06
n-Tridecane	2.74E-07
C13 as Tridecane	1.73E-06
n-Tetradecane	2.49E-07
C14 as tetradecane	4.88E-07
n-Pentadecane	4.85E-08
C15 as Pentadecane	7.38E-08
n-Hexadecane	2.93E-08
C16 as Hexadecane	2.93E-08
n-Heptadecane	2.91E-08
C17 as Heptadecane	2.91E-08
n-Octadecane	2.94E-08
C18 as Octodecane	2.94E-08
n-Nonadecane	2.94E-08
C19 as Nonadecane	2.94E-08
n-Eicosane	2.93E-08
C20 as Eicosane	2.93E-08
n-Heneicosane	2.96E-08
C21 as Heneicosane	2.96E-08
n-Docosane	2.93E-08
C22 as Docosane	2.93E-08
n-Tricosane	2.93E-08
C23 as Tricosane	2.93E-08
n-Tetracosane	2.95E-08
C24 as Tetracosane	2.95E-08
Total Hydrocarbon	1.81E-05

THC:	**9.59E-04**	**lbs/day**	**1.75E-04**	**tons/yr**

B017A	ANALYTICAL RESULTS B017A		ND Adj	BACKGROUND #B018A		ND Adj	TRIP BLANK #B028		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#P0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	173	ND	87	145	ND	0	355	ND	0	87	0.09	9	44	4.38E-08	0	0	0.00E+00	4.38E-08
C5 as Pentane	173	ND	87	145	ND	0	355	ND	0	87	0.09	9	44	4.38E-08	0	0	0.00E+00	4.38E-08
n-Hexane	183	ND	92	151	ND	0	375	ND	0	92	0.09	10	46	4.63E-08	0	0	0.00E+00	4.63E-08
C6 as Hexane	183	ND	92	151	ND	0	375	ND	0	92	0.09	10	46	4.63E-08	0	0	0.00E+00	4.63E-08
n-Heptane	192	ND	96	158	ND	0	393	ND	0	96	0.10	11	48	4.85E-08	0	0	0.00E+00	4.85E-08
C7 as Heptane	192	ND	96	158	ND	0	393	ND	0	96	0.10	11	48	4.85E-08	0	0	0.00E+00	4.85E-08
n-Octane	78	ND	39	153	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C8 as Octane	168	J	168	153	ND	0	160	ND	0	168	0.17	18	85	8.49E-08	0	0	0.00E+00	8.49E-08
n-Nonane	406	J	406	155	ND	0	158	ND	0	406	0.41	44	205	2.05E-07	0	0	0.00E+00	2.05E-07
C9 as Nonane	2659		2,659	155	ND	0	158	ND	0	2,659	2.66	291	1345	1.34E-06	0	0	0.00E+00	1.34E-06
n-Decane	498	J	498	156	ND	0	158	ND	0	498	0.50	55	252	2.52E-07	0	0	0.00E+00	2.52E-07
C10 as Decane	6975		6,975	156	ND	0	158	ND	0	6,975	6.97	764	3527	3.53E-06	0	0	0.00E+00	3.53E-06
n-Undecane	515	J	515	156	ND	0	157	ND	0	515	0.51	56	260	2.60E-07	0	0	0.00E+00	2.60E-07
C11 as Undecane	8934		8,934	156	ND	0	157	ND	0	8,934	8.93	979	4517	4.52E-06	0	0	0.00E+00	4.52E-06
n-Dodecane	456	J	456	155	ND	0	158	ND	0	456	0.46	50	231	2.31E-07	0	0	0.00E+00	2.31E-07
C12 as Dodecane	6736		6,736	155	ND	0	158	ND	0	6,736	6.74	738	3406	3.41E-06	0	0	0.00E+00	3.41E-06
n-Tridecane	483	J	483	155	ND	0	160	ND	0	483	0.48	53	244	2.44E-07	0	0	0.00E+00	2.44E-07
C13 as Tridecane	3193		3,193	155	ND	0	160	ND	0	3,193	3.19	350	1614	1.61E-06	0	0	0.00E+00	1.61E-06
n-Tetradecane	620	J	620	155	ND	0	159	ND	0	620	0.62	68	313	3.13E-07	0	0	0.00E+00	3.13E-07
C14 as tetradecane	1219		1,219	155	ND	0	159	ND	0	1,219	1.22	134	616	6.16E-07	0	0	0.00E+00	6.16E-07
n-Pentadecane	114	J	114	156	ND	0	158	ND	0	114	0.11	13	58	5.78E-08	0	0	0.00E+00	5.78E-08
C15 as Pentadecane	214	J	214	156	ND	0	158	ND	0	214	0.21	23	108	1.08E-07	0	0	0.00E+00	1.08E-07
n-Hexadecane	77	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C16 as Hexadecane	77	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heptadecane	77	ND	39	153	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C17 as Heptadecane	77	ND	39	153	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Octadecane	78	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C18 as Octodecane	78	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonadecane	77	ND	39	155	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C19 as Nonadecane	77	ND	39	155	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Eicosane	77	ND	39	155	ND	0	157	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C20 as Eicosane	77	ND	39	155	ND	0	157	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Heneicosane	78	ND	39	156	ND	0	158	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C21 as Heneicosane	78	ND	39	156	ND	0	158	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Docosane	77	ND	39	154	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	77	ND	39	154	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	77	ND	39	154	ND	0	158	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C23 as Tricosane	77	ND	39	154	ND	0	158	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tetracosane	78	ND	39	155	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C24 as Tetracosane	78	ND	39	155	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
Total Hydrocarbon			34,474			0			0		34.47	3777	17,431	1.74E-05	0	0	0.00E+00	1.74E-05

B017B	ANALYTICAL RESULTS B017B		ND Adj	BACKGROUND #B018A		ND Adj	TRIP BLANK #B028		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	145	ND	73	145	ND	0	355	ND	0	73	0.07	8	37	3.67E-08	3.67E-08
C5 as Pentane	145	ND	73	145	ND	0	355	ND	0	73	0.07	8	37	3.67E-08	3.67E-08
n-Hexane	151	ND	75	151	ND	0	375	ND	0	75	0.08	8	38	3.81E-08	3.81E-08
C6 as Hexane	151	ND	75	151	ND	0	375	ND	0	75	0.08	8	38	3.81E-08	3.81E-08
n-Heptane	158	ND	79	158	ND	0	393	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
C7 as Heptane	158	ND	79	158	ND	0	393	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
n-Octane	153	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
C8 as Octane	217	J	217	153	ND	0	160	ND	0	217	0.22	24	110	1.10E-07	1.10E-07
n-Nonane	395	J	395	155	ND	0	158	ND	0	395	0.39	43	200	2.00E-07	2.00E-07
C9 as Nonane	2758		2,758	155	ND	0	158	ND	0	2,758	2.76	302	1394	1.39E-06	1.39E-06
n-Decane	491	J	491	156	ND	0	158	ND	0	491	0.49	54	248	2.48E-07	2.48E-07
C10 as Decane	7815		7,815	156	ND	0	158	ND	0	7,815	7.81	856	3952	3.95E-06	3.95E-06
n-Undecane	1187	J	1,187	156	ND	0	157	ND	0	1,187	1.19	130	600	6.00E-07	6.00E-07
C11 as Undecane	8973		8,973	156	ND	0	157	ND	0	8,973	8.97	983	4537	4.54E-06	4.54E-06
n-Dodecane	628	J	628	155	ND	0	158	ND	0	628	0.63	69	317	3.17E-07	3.17E-07
C12 as Dodecane	7313		7,313	155	ND	0	158	ND	0	7,313	7.31	801	3698	3.70E-06	3.70E-06
n-Tridecane	603	J	603	155	ND	0	160	ND	0	603	0.60	66	305	3.05E-07	3.05E-07
C13 as Tridecane	3667		3,667	155	ND	0	160	ND	0	3,667	3.67	402	1854	1.85E-06	1.85E-06
n-Tetradecane	365	J	365	155	ND	0	159	ND	0	365	0.36	40	184	1.84E-07	1.84E-07
C14 as tetradecane	710	J	710	155	ND	0	159	ND	0	710	0.71	78	359	3.59E-07	3.59E-07
n-Pentadecane	156	ND	78	156	ND	0	158	ND	0	78	0.08	9	39	3.93E-08	3.93E-08
C15 as Pentadecane	156	ND	78	156	ND	0	158	ND	0	78	0.08	9	39	3.93E-08	3.93E-08
n-Hexadecane	155	ND	77	155	ND	0	159	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
C16 as Hexadecane	155	ND	77	155	ND	0	159	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
n-Heptadecane	153	ND	76	153	ND	0	158	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
C17 as Heptadecane	153	ND	76	153	ND	0	158	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
n-Octadecane	155	ND	77	155	ND	0	159	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
C18 as Octodecane	155	ND	77	155	ND	0	159	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
n-Nonadecane	155	ND	77	155	ND	0	158	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
C19 as Nonadecane	155	ND	77	155	ND	0	158	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
n-Eicosane	155	ND	77	155	ND	0	157	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
C20 as Eicosane	155	ND	77	155	ND	0	157	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
n-Heneicosane	156	ND	78	156	ND	0	158	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
C21 as Heneicosane	156	ND	78	156	ND	0	158	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
n-Docosane	154	ND	77	154	ND	0	159	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C22 as Docosane	154	ND	77	154	ND	0	159	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Tricosane	154	ND	77	154	ND	0	158	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C23 as Tricosane	154	ND	77	154	ND	0	158	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Tetracosane	155	ND	78	155	ND	0	160	ND	0	78	0.08	9	39	3.93E-08	3.93E-08
C24 as Tetracosane	155	ND	78	155	ND	0	160	ND	0	78	0.08	9	39	3.93E-08	3.93E-08
Total Hydrocarbon			37,197			0			0		37.20	4075	18,808	1.88E-05	1.88E-05

Bagging Data Form — Vacuum Method

Sample Id B019

Equipment type:	Connector		**Component ID:**	B-286	
Equipment Subtype:	Plug		**Plant ID:**	Refinery B	
Line Size:	2 *inches*		**Date:**	26-Jul-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.99 *inHg*	761.7 *mmHg*	**Sample Pump A**	BU51790	
			Sample Pump B	BU51292	
Ambient Temp:	73.6 *°F*	23.1 *°C*	**TVA ID**	2385	
Component Temp:	94 *°F*	34.4 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*HUK Pump Down - (HUK = Heavy Unicrackate)*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
9:53	Background	1 *ppmv*	8-sec Dwell	71 *ppmv*	Total Dwell	4:00 *min:sec*	Final M21	136 *ppm*
10:17	Initial Bag Vacuum	0.05 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	86 *°F*	Leak @	Plug

Bag Concentrations (ppmv)

Time	10:16	10:18	10:23	10:25	10:26	10:27	10:28	10:35	10:36	10:38	10:42	10:44		
ppmv	20.3	21.6	21.4	21.9	21.9	21.9	21.9	22	21.8	21.8	21.5	21.3		

Sorbent Tube Sample Collection Parameters

B019A

Time						
10:30	Volume Start	141.9 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:43	Volume Stop	155.0 *Liters*	Total Vol	13.1 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 1.008 *L/min*	Sorbent Flow$_{STP}$	0.991 *L/min*

B019B

10:30	Volume Start	115.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:43	Volume Stop	128.9 *Liters*	Total Vol	13.3 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 1.023 *L/min*	Sorbent Flow$_{STP}$	1.006 *L/min*
	Total ST Vol$_{STP}$	25.96 *Liters*	DGM Vol$_{STP}$	89.18 *Liters*	Total Run Vol$_{STP}$	115.13 *Liters*

Bagging Parameters

Time								
10:34	Vacuum check	0.06 *inches H2O*			DGM$_P$	2 *inches H2O vacuum*	758.0	*mmHg*
10:34	DGM$_{10L}$ Time	01:26.5 *min:sec.frac*	DGM Time	1.433	DGM Flow	6.98	DGM Flow$_{STP}$ 6.86	*liters/minute*
10:34	Bag Temp.	93 *°F*	33.9	*°C*	Sample$_T$	77.7 *°F*	25.4	*°C*

Post-Sample Data

10:55 Post Test M21		8-sec Dwell	154 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21 215 *ppm*
Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected	N/A *ml*					
Density of organic condensate	N/A *g/ml*					

Average THC emissions =	9.63E-06 kg/hr
Percent difference THC ER =	4.3%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	4.14E-08
C5 as Pentane	4.14E-08
n-Hexane	4.34E-08
C6 as Hexane	4.34E-08
n-Heptane	4.54E-08
C7 as Heptane	4.54E-08
n-Octane	3.00E-08
C8 as Octane	3.00E-08
n-Nonane	9.68E-08
C9 as Nonane	5.94E-07
n-Decane	1.42E-07
C10 as Decane	1.89E-06
n-Undecane	2.43E-07
C11 as Undecane	2.41E-06
n-Dodecane	2.09E-07
C12 as Dodecane	1.96E-06
n-Tridecane	1.54E-07
C13 as Tridecane	7.02E-07
n-Tetradecane	8.53E-08
C14 as tetradecane	2.19E-07
n-Pentadecane	3.02E-08
C15 as Pentadecane	3.02E-08
n-Hexadecane	3.01E-08
C16 as Hexadecane	3.01E-08
n-Heptadecane	2.98E-08
C17 as Heptadecane	2.98E-08
n-Octadecane	3.01E-08
C18 as Octodecane	3.01E-08
n-Nonadecane	3.01E-08
C19 as Nonadecane	3.01E-08
n-Eicosane	3.00E-08
C20 as Eicosane	3.00E-08
n-Heneicosane	3.03E-08
C21 as Heneicosane	3.03E-08
n-Docosane	3.00E-08
C22 as Docosane	3.00E-08
n-Tricosane	3.00E-08
C23 as Tricosane	3.00E-08
n-Tetracosane	3.02E-08
C24 as Tetracosane	3.02E-08
Total Hydrocarbon	9.63E-06

THC:	**5.10E-04**	**lbs/day**	**9.30E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B019A	B019A		ND Adj	#B020A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	171	ND	85	141	ND	0	355	ND	0	85	0.09	10	45	4.53E-08	0	0	0.00E+00	4.53E-08
C5 as Pentane	171	ND	85	141	ND	0	355	ND	0	85	0.09	10	45	4.53E-08	0	0	0.00E+00	4.53E-08
n-Hexane	180	ND	90	146	ND	0	375	ND	0	90	0.09	10	48	4.79E-08	0	0	0.00E+00	4.79E-08
C6 as Hexane	180	ND	90	146	ND	0	375	ND	0	90	0.09	10	48	4.79E-08	0	0	0.00E+00	4.79E-08
n-Heptane	189	ND	94	153	ND	0	393	ND	0	94	0.09	11	50	5.02E-08	0	0	0.00E+00	5.02E-08
C7 as Heptane	189	ND	94	153	ND	0	393	ND	0	94	0.09	11	50	5.02E-08	0	0	0.00E+00	5.02E-08
n-Octane	77	ND	38	149	ND	0	160	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C8 as Octane	77	ND	38	149	ND	0	160	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Nonane	194	J	194	150	ND	0	158	ND	0	194	0.19	22	103	1.03E-07	0	0	0.00E+00	1.03E-07
C9 as Nonane	1166		1,166	150	ND	0	158	ND	0	1,166	1.17	134	620	6.20E-07	0	0	0.00E+00	6.20E-07
n-Decane	257	J	257	151	ND	0	158	ND	0	257	0.26	30	136	1.36E-07	0	0	0.00E+00	1.36E-07
C10 as Decane	3613		3,613	151	ND	0	158	ND	0	3,613	3.61	416	1920	1.92E-06	0	0	0.00E+00	1.92E-06
n-Undecane	291	J	291	151	ND	0	157	ND	0	291	0.29	34	155	1.55E-07	0	0	0.00E+00	1.55E-07
C11 as Undecane	4678		4,678	151	ND	0	157	ND	0	4,678	4.68	539	2486	2.49E-06	0	0	0.00E+00	2.49E-06
n-Dodecane	288	J	288	150	ND	0	158	ND	0	288	0.29	33	153	1.53E-07	0	0	0.00E+00	1.53E-07
C12 as Dodecane	3585		3,585	150	ND	0	158	ND	0	3,585	3.58	413	1905	1.90E-06	0	0	0.00E+00	1.90E-06
n-Tridecane	251	J	251	150	ND	0	160	ND	0	251	0.25	29	133	1.33E-07	0	0	0.00E+00	1.33E-07
C13 as Tridecane	1253		1,253	150	ND	0	160	ND	0	1,253	1.25	144	666	6.66E-07	0	0	0.00E+00	6.66E-07
n-Tetradecane	157	J	157	150	ND	0	159	ND	0	157	0.16	18	84	8.35E-08	0	0	0.00E+00	8.35E-08
C14 as tetradecane	618	J	618	150	ND	0	159	ND	0	618	0.62	71	329	3.29E-07	0	0	0.00E+00	3.29E-07
n-Pentadecane	77	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C15 as Pentadecane	77	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Hexadecane	76	ND	38	150	ND	0	159	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C16 as Hexadecane	76	ND	38	150	ND	0	159	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Heptadecane	76	ND	38	148	ND	0	158	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C17 as Heptadecane	76	ND	38	148	ND	0	158	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Octadecane	77	ND	38	150	ND	0	159	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C18 as Octodecane	77	ND	38	150	ND	0	159	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Nonadecane	76	ND	38	150	ND	0	158	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C19 as Nonadecane	76	ND	38	150	ND	0	158	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Eicosane	76	ND	38	150	ND	0	157	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C20 as Eicosane	76	ND	38	150	ND	0	157	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heneicosane	77	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C21 as Heneicosane	77	ND	38	151	ND	0	158	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Docosane	76	ND	38	150	ND	0	159	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C22 as Docosane	76	ND	38	150	ND	0	159	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Tricosane	76	ND	38	150	ND	0	158	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C23 as Tricosane	76	ND	38	150	ND	0	158	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tetracosane	77	ND	38	151	ND	0	160	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C24 as Tetracosane	77	ND	38	151	ND	0	160	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
Total Hydrocarbon			17,732			0			0		17.73	2042	9,422	9.42E-06	0	0	0.00E+00	9.42E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B019B	B019B		ND Adj	#B020A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	141	ND	70	141	ND	0	355	ND	0	70	0.07	8	37	3.74E-08	3.74E-08
C5 as Pentane	141	ND	70	141	ND	0	355	ND	0	70	0.07	8	37	3.74E-08	3.74E-08
n-Hexane	146	ND	73	146	ND	0	375	ND	0	73	0.07	8	39	3.89E-08	3.89E-08
C6 as Hexane	146	ND	73	146	ND	0	375	ND	0	73	0.07	8	39	3.89E-08	3.89E-08
n-Heptane	153	ND	76	153	ND	0	393	ND	0	76	0.08	9	41	4.06E-08	4.06E-08
C7 as Heptane	153	ND	76	153	ND	0	393	ND	0	76	0.08	9	41	4.06E-08	4.06E-08
n-Octane	149	ND	74	149	ND	0	160	ND	0	74	0.07	9	40	3.95E-08	3.95E-08
C8 as Octane	149	ND	74	149	ND	0	160	ND	0	74	0.07	9	40	3.95E-08	3.95E-08
n-Nonane	170	J	170	150	ND	0	158	ND	0	170	0.17	20	90	9.04E-08	9.04E-08
C9 as Nonane	1070	J	1,070	150	ND	0	158	ND	0	1,070	1.07	123	568	5.68E-07	5.68E-07
n-Decane	279	J	279	151	ND	0	158	ND	0	279	0.28	32	148	1.48E-07	1.48E-07
C10 as Decane	3508		3,508	151	ND	0	158	ND	0	3,508	3.51	404	1864	1.86E-06	1.86E-06
n-Undecane	623	J	623	151	ND	0	157	ND	0	623	0.62	72	331	3.31E-07	3.31E-07
C11 as Undecane	4379		4,379	151	ND	0	157	ND	0	4,379	4.38	504	2327	2.33E-06	2.33E-06
n-Dodecane	501	J	501	150	ND	0	158	ND	0	501	0.50	58	266	2.66E-07	2.66E-07
C12 as Dodecane	3805		3,805	150	ND	0	158	ND	0	3,805	3.80	438	2022	2.02E-06	2.02E-06
n-Tridecane	330	J	330	150	ND	0	160	ND	0	330	0.33	38	175	1.75E-07	1.75E-07
C13 as Tridecane	1390	J	1,390	150	ND	0	160	ND	0	1,390	1.39	160	739	7.39E-07	7.39E-07
n-Tetradecane	164	J	164	150	ND	0	159	ND	0	164	0.16	19	87	8.71E-08	8.71E-08
C14 as tetradecane	208	J	208	150	ND	0	159	ND	0	208	0.21	24	110	1.10E-07	1.10E-07
n-Pentadecane	151	ND	75	151	ND	0	158	ND	0	75	0.08	9	40	4.01E-08	4.01E-08
C15 as Pentadecane	151	ND	75	151	ND	0	158	ND	0	75	0.08	9	40	4.01E-08	4.01E-08
n-Hexadecane	150	ND	75	150	ND	0	159	ND	0	75	0.08	9	40	3.99E-08	3.99E-08
C16 as Hexadecane	150	ND	75	150	ND	0	159	ND	0	75	0.08	9	40	3.99E-08	3.99E-08
n-Heptadecane	148	ND	74	148	ND	0	158	ND	0	74	0.07	9	39	3.94E-08	3.94E-08
C17 as Heptadecane	148	ND	74	148	ND	0	158	ND	0	74	0.07	9	39	3.94E-08	3.94E-08
n-Octadecane	150	ND	75	150	ND	0	159	ND	0	75	0.07	9	40	3.98E-08	3.98E-08
C18 as Octodecane	150	ND	75	150	ND	0	159	ND	0	75	0.07	9	40	3.98E-08	3.98E-08
n-Nonadecane	150	ND	75	150	ND	0	158	ND	0	75	0.08	9	40	3.99E-08	3.99E-08
C19 as Nonadecane	150	ND	75	150	ND	0	158	ND	0	75	0.08	9	40	3.99E-08	3.99E-08
n-Eicosane	150	ND	75	150	ND	0	157	ND	0	75	0.07	9	40	3.98E-08	3.98E-08
C20 as Eicosane	150	ND	75	150	ND	0	157	ND	0	75	0.07	9	40	3.98E-08	3.98E-08
n-Heneicosane	151	ND	76	151	ND	0	158	ND	0	76	0.08	9	40	4.02E-08	4.02E-08
C21 as Heneicosane	151	ND	76	151	ND	0	158	ND	0	76	0.08	9	40	4.02E-08	4.02E-08
n-Docosane	150	ND	75	150	ND	0	159	ND	0	75	0.07	9	40	3.97E-08	3.97E-08
C22 as Docosane	150	ND	75	150	ND	0	159	ND	0	75	0.07	9	40	3.97E-08	3.97E-08
n-Tricosane	150	ND	75	150	ND	0	158	ND	0	75	0.07	9	40	3.97E-08	3.97E-08
C23 as Tricosane	150	ND	75	150	ND	0	158	ND	0	75	0.07	9	40	3.97E-08	3.97E-08
n-Tetracosane	151	ND	75	151	ND	0	160	ND	0	75	0.08	9	40	4.00E-08	4.00E-08
C24 as Tetracosane	151	ND	75	151	ND	0	160	ND	0	75	0.08	9	40	4.00E-08	4.00E-08
Total Hydrocarbon			18,516			0			0		18.52	2132	9,839	9.84E-06	9.84E-06

Bagging Data Form — Vacuum Method — Sample Id B021

Equipment type:	Pump		**Component ID:**	B-636	
Equipment Subtype:			**Plant ID:**	Refinery B	
Line Size:	10 inches		**Date:**	26-Jul-17	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.96 inHg	761.0 mmHg	**Sample Pump A**	BU51790	
			Sample Pump B	BU51292	
Ambient Temp:	90.2 °F	32.3 °C	**TVA ID**	2385	
Component Temp:	°F	-17.8 °C	**Stream Pressure/Temp:**	-0.15 psig	°F
Stream Description:	*Diesel Transfer*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
14:07	Background	12 ppmv	8-sec Dwell	30 ppmv	Total Dwell	2:30 min:sec	Final M21	115* ppm	
14:49	Initial Bag Vacuum	0.001 inches H2O	DGM Vac.	1.8 inches H2O	Bag Temp	95 °F	Leak @	Seal	

* pulsating

Bag Concentrations (ppmv)

Time	14:51	14:53	14:55	14:56	15:02	15:07	15:10							
ppmv	15.3	15.4	15.1	15.2	14.5	14.2	14.4							

Sorbent Tube Sample Collection Parameters

B021A

Time						
14:58	Volume Start	155.0 Liters		Design Sample Flow Rate = 1 liter/min		
15:11	Volume Stop	167.4 Liters	Total Vol	12.4 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.954 L/min	Sorbent Flow$_{STP}$	0.902 L/min

B021B

Time						
14:59	Volume Start	128.9 Liters		Design Sample Flow Rate = 1 liter/min		
15:11	Volume Stop	141.7 Liters	Total Vol	12.8 Liters		
	Sample Run Time	12 Minutes		Sorbent Flow 1.067 L/min	Sorbent Flow$_{STP}$	1.009 L/min
	Total ST Vol$_{STP}$	23.84 Liters	DGM Vol$_{STP}$	81.98 Liters	Total Run Vol$_{STP}$	105.81 Liters

Bagging Parameters

Time								
15:02	Vacuum check	0.002 inches H2O			DGM$_P$	1.8 inches H2O vacuum		757.6 mmHg
15:03	DGM$_{10L}$ Time	01:30.4 min:sec.frac	DGM Time	1.500	DGM Flow	6.67	DGM Flow$_{STP}$	6.31 liters/minute
15:03	Bag Temp.	101 °F		38.3 °C	Sample$_T$	98.6 °F		37.0 °C

Post-Sample Data

15:25	Post Test M21	8-sec Dwell	57 ppmv	Total Dwell	2:30 min:sec	Final M21 116* ppm
Condensate accumulation: starting time	N/A hour:min	Final time	N/A hour:min		0:00 hours:min	
Organic condensate collected	N/A ml					
Density of organic condensate	N/A g/ml					

* pulsating

Average THC emissions =	3.20E-06 kg/hr
Percent difference THC ER =	23%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	4.13E-08
C5 as Pentane	4.13E-08
n-Hexane	4.34E-08
C6 as Hexane	4.34E-08
n-Heptane	4.63E-08
C7 as Heptane	4.54E-08
n-Octane	8.60E-08
C8 as Octane	2.71E-07
n-Nonane	9.24E-08
C9 as Nonane	8.63E-07
n-Decane	3.07E-08
C10 as Decane	7.23E-07
n-Undecane	3.06E-08
C11 as Undecane	4.46E-08
n-Dodecane	3.04E-08
C12 as Dodecane	3.04E-08
n-Tridecane	3.06E-08
C13 as Tridecane	3.06E-08
n-Tetradecane	3.05E-08
C14 as tetradecane	3.05E-08
n-Pentadecane	3.06E-08
C15 as Pentadecane	3.06E-08
n-Hexadecane	3.05E-08
C16 as Hexadecane	3.05E-08
n-Heptadecane	3.02E-08
C17 as Heptadecane	3.02E-08
n-Octadecane	3.05E-08
C18 as Octodecane	3.05E-08
n-Nonadecane	3.05E-08
C19 as Nonadecane	3.05E-08
n-Eicosane	3.04E-08
C20 as Eicosane	3.04E-08
n-Heneicosane	3.07E-08
C21 as Heneicosane	3.07E-08
n-Docosane	3.04E-08
C22 as Docosane	3.04E-08
n-Tricosane	3.04E-08
C23 as Tricosane	3.04E-08
n-Tetracosane	3.06E-08
C24 as Tetracosane	3.06E-08
Total Hydrocarbon	3.20E-06

THC:	**1.69E-04**	**lbs/day**	**3.09E-05**	**tons/yr**

B021A

ANALYTICAL RESULTS	B021A		ND Adj	BACKGROUND #B022A		ND Adj	TRIP BLANK #B028		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#P0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	180	ND	90	352	ND	0	355	ND	0	90	0.09	10	44	4.40E-08	0	0	0.00E+00	4.40E-08
C5 as Pentane	180	ND	90	352	ND	0	355	ND	0	90	0.09	10	44	4.40E-08	0	0	0.00E+00	4.40E-08
n-Hexane	191	ND	95	372	ND	0	375	ND	0	95	0.10	10	47	4.65E-08	0	0	0.00E+00	4.65E-08
C6 as Hexane	191	ND	95	372	ND	0	375	ND	0	95	0.10	10	47	4.65E-08	0	0	0.00E+00	4.65E-08
n-Heptane	103	J	103	390	ND	0	393	ND	0	103	0.10	11	51	5.05E-08	0	0	0.00E+00	5.05E-08
C7 as Heptane	199	ND	100	390	ND	0	393	ND	0	100	0.10	11	49	4.87E-08	0	0	0.00E+00	4.87E-08
n-Octane	173	J	173	158	ND	0	160	ND	0	173	0.17	18	85	8.45E-08	0	0	0.00E+00	8.45E-08
C8 as Octane	518	J	518	158	ND	0	160	ND	0	518	0.52	55	253	2.53E-07	0	0	0.00E+00	2.53E-07
n-Nonane	186	J	186	156	ND	0	158	ND	0	186	0.19	20	91	9.10E-08	0	0	0.00E+00	9.10E-08
C9 as Nonane	1717		1,717	156	ND	0	158	ND	0	1,717	1.72	182	838	8.38E-07	0	0	0.00E+00	8.38E-07
n-Decane	81	ND	41	156	ND	0	158	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C10 as Decane	1397		1,397	156	ND	0	158	ND	0	1,397	1.40	148	682	6.82E-07	0	0	0.00E+00	6.82E-07
n-Undecane	81	ND	40	156	ND	0	157	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C11 as Undecane	98	J	98	156	ND	0	157	ND	0	98	0.10	10	48	4.78E-08	0	0	0.00E+00	4.78E-08
n-Dodecane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C12 as Dodecane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tridecane	81	ND	41	158	ND	0	160	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C13 as Tridecane	81	ND	41	158	ND	0	160	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Tetradecane	81	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C14 as tetradecane	81	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Pentadecane	81	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C15 as Pentadecane	81	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Hexadecane	81	ND	40	157	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C16 as Hexadecane	81	ND	40	157	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptadecane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C17 as Heptadecane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Octadecane	81	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C18 as Octodecane	81	ND	40	158	ND	0	159	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Nonadecane	81	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C19 as Nonadecane	81	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Eicosane	80	ND	40	155	ND	0	157	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C20 as Eicosane	80	ND	40	155	ND	0	157	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heneicosane	81	ND	41	157	ND	0	158	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C21 as Heneicosane	81	ND	41	157	ND	0	158	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Docosane	81	ND	40	157	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C22 as Docosane	81	ND	40	157	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tricosane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C23 as Tricosane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetracosane	81	ND	41	158	ND	0	160	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C24 as Tetracosane	81	ND	41	158	ND	0	160	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
Total Hydrocarbon			5,793			0			0		5.79	613	2,829	2.83E-06	0	0	0.00E+00	2.83E-06

B021B

ANALYTICAL RESULTS	B021B		ND Adj	BACKGROUND #B022A		ND Adj	TRIP BLANK #B028		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146	ND	73	352	ND	0	355	ND	0	73	0.07	8	39	3.87E-08	3.87E-08
C5 as Pentane	146	ND	73	352	ND	0	355	ND	0	73	0.07	8	39	3.87E-08	3.87E-08
n-Hexane	152	ND	76	372	ND	0	375	ND	0	76	0.08	8	40	4.02E-08	4.02E-08
C6 as Hexane	152	ND	76	372	ND	0	375	ND	0	76	0.08	8	40	4.02E-08	4.02E-08
n-Heptane	159	ND	79	390	ND	0	393	ND	0	79	0.08	8	42	4.20E-08	4.20E-08
C7 as Heptane	159	ND	79	390	ND	0	393	ND	0	79	0.08	8	42	4.20E-08	4.20E-08
n-Octane	165	J	165	158	ND	0	160	ND	0	165	0.17	18	88	8.75E-08	8.75E-08
C8 as Octane	547	J	547	158	ND	0	160	ND	0	547	0.55	58	289	2.89E-07	2.89E-07
n-Nonane	177	J	177	156	ND	0	158	ND	0	177	0.18	19	94	9.37E-08	9.37E-08
C9 as Nonane	1678		1,678	156	ND	0	158	ND	0	1,678	1.68	178	888	8.88E-07	8.88E-07
n-Decane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	42	4.16E-08	4.16E-08
C10 as Decane	1445	J	1,445	156	ND	0	158	ND	0	1,445	1.45	153	765	7.65E-07	7.65E-07
n-Undecane	157	ND	78	156	ND	0	157	ND	0	78	0.08	8	41	4.15E-08	4.15E-08
C11 as Undecane	157	ND	78	156	ND	0	157	ND	0	78	0.08	8	41	4.15E-08	4.15E-08
n-Dodecane	156	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
C12 as Dodecane	156	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
n-Tridecane	156	ND	78	158	ND	0	160	ND	0	78	0.08	8	41	4.13E-08	4.13E-08
C13 as Tridecane	156	ND	78	158	ND	0	160	ND	0	78	0.08	8	41	4.13E-08	4.13E-08
n-Tetradecane	156	ND	78	158	ND	0	159	ND	0	78	0.08	8	41	4.13E-08	4.13E-08
C14 as tetradecane	156	ND	78	158	ND	0	159	ND	0	78	0.08	8	41	4.13E-08	4.13E-08
n-Pentadecane	157	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.15E-08	4.15E-08
C15 as Pentadecane	157	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.15E-08	4.15E-08
n-Hexadecane	156	ND	78	157	ND	0	159	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
C16 as Hexadecane	156	ND	78	157	ND	0	159	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
n-Heptadecane	154	ND	77	157	ND	0	158	ND	0	77	0.08	8	41	4.08E-08	4.08E-08
C17 as Heptadecane	154	ND	77	157	ND	0	158	ND	0	77	0.08	8	41	4.08E-08	4.08E-08
n-Octadecane	156	ND	78	158	ND	0	159	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
C18 as Octodecane	156	ND	78	158	ND	0	159	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
n-Nonadecane	156	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.13E-08	4.13E-08
C19 as Nonadecane	156	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.13E-08	4.13E-08
n-Eicosane	156	ND	78	155	ND	0	157	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
C20 as Eicosane	156	ND	78	155	ND	0	157	ND	0	78	0.08	8	41	4.12E-08	4.12E-08
n-Heneicosane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	42	4.16E-08	4.16E-08
C21 as Heneicosane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	42	4.16E-08	4.16E-08
n-Docosane	155	ND	78	157	ND	0	159	ND	0	78	0.08	8	41	4.11E-08	4.11E-08
C22 as Docosane	155	ND	78	157	ND	0	159	ND	0	78	0.08	8	41	4.11E-08	4.11E-08
n-Tricosane	155	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.11E-08	4.11E-08
C23 as Tricosane	155	ND	78	157	ND	0	158	ND	0	78	0.08	8	41	4.11E-08	4.11E-08
n-Tetracosane	156	ND	78	158	ND	0	160	ND	0	78	0.08	8	41	4.14E-08	4.14E-08
C24 as Tetracosane	156	ND	78	158	ND	0	160	ND	0	78	0.08	8	41	4.14E-08	4.14E-08
Total Hydrocarbon			6,732			0			0		6.73	712	3,562	3.56E-06	3.56E-06

Bagging Data Form — Vacuum Method

Bagging Data Form	**Vacuum Method**		**Sample Id**	**B023**		
Equipment type:	Pump G314 B		**Component ID:**	**B-551**		
Equipment Subtype:	pump running		**Plant ID:**	Refinery B		
Line Size:	6 *inches*		**Date:**	27-Jul-17		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	29.94 *inHg*	760.5 *mmHg*	**Sample Pump A**	BU51790		
			Sample Pump B	BU51292		
Ambient Temp:	69.3 *°F*	20.7 *°C*	**TVA ID**	2149		
Component Temp:	141 *°F*	60.6 *°C*	**Stream Pressure/Temp:**	235 *psig*	*°F*	
Stream Description:	*Lean Sponge Oil*					

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:46	Background	2	*ppmv*	8-sec Dwell	330	*ppmv*	Total Dwell	2:15	*min:sec*	Final M21	755 *ppm*
10:34	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	2.1	*inches H2O*	Bag Temp	120	*°F*	Leak @	top of shaft

Bag Concentrations (ppmv)

Time	10:34	10:37	10:40	10:42	10:46	10:48	10:50	10:52	10:55	11:01	11:05	11:08		
ppmv	231	395	445	460	477	489	515	532	532	547	521	523		

Sorbent Tube Sample Collection Parameters

B023A

Time								
10:57	Volume Start	169.5 *Liters*		Design Sample Flow Rate = 1 liter/min				
11:10	Volume Stop	182.1 *Liters*	Total Vol	12.6 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.958 *L/min*	

B023B

Time								
10:57	Volume Start	143.8 *Liters*		Design Sample Flow Rate = 1 liter/min				
11:10	Volume Stop	156.5 *Liters*	Total Vol	12.7 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent $Flow_{STP}$	0.966 *L/min*	
	Total ST Vol_{STP}	25.02 *Liters*	DGM Vol_{STP}	86.65 *Liters*	Total Run Vol_{STP}	111.67 *Liters*		

Bagging Parameters

Time								
10:59	Vacuum check	0.005 *inches H2O*			DGM_P	2 *inches H2O vacuum*	756.7	*mmHg*
10:59	DGM_{10L} Time	01:28.8 *min:sec.frac*	DGM Time	1.483	DGM Flow	6.74	DGM $Flow_{STP}$ 6.67	*liters/minute*
10:59	Bag Temp.	126 *°F*	52.2	*°C*	$Sample_T$	73.8 *°F*	23.2	*°C*

Post-Sample Data

11:50	Post Test M21	8-sec Dwell	355 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	760 *ppm*
Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*			
Organic condensate collected	N/A *ml*						
Density of organic condensate	N/A *g/ml*						

Average THC emissions =	7.05E-04	kg/hr
Percent difference THC ER =	24%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	6.82E-08
C5 as Pentane	6.82E-08
n-Hexane	7.79E-08
C6 as Hexane	7.21E-08
n-Heptane	1.98E-07
C7 as Heptane	7.55E-08
n-Octane	1.58E-06
C8 as Octane	1.15E-05
n-Nonane	7.72E-06
C9 as Nonane	6.59E-05
n-Decane	1.03E-05
C10 as Decane	1.80E-04
n-Undecane	1.14E-05
C11 as Undecane	2.20E-04
n-Dodecane	7.08E-06
C12 as Dodecane	1.32E-04
n-Tridecane	6.06E-06
C13 as Tridecane	4.03E-05
n-Tetradecane	9.66E-07
C14 as tetradecane	8.42E-06
n-Pentadecane	2.98E-07
C15 as Pentadecane	1.09E-06
n-Hexadecane	7.80E-08
C16 as Hexadecane	1.18E-07
n-Heptadecane	4.76E-08
C17 as Heptadecane	3.05E-08
n-Octadecane	3.06E-08
C18 as Octodecane	3.06E-08
n-Nonadecane	3.05E-08
C19 as Nonadecane	3.05E-08
n-Eicosane	3.02E-08
C20 as Eicosane	3.02E-08
n-Heneicosane	3.05E-08
C21 as Heneicosane	3.05E-08
n-Docosane	3.05E-08
C22 as Docosane	3.05E-08
n-Tricosane	3.04E-08
C23 as Tricosane	3.04E-08
n-Tetracosane	3.07E-08
C24 as Tetracosane	3.07E-08
Total Hydrocarbon	7.05E-04

THC:	**3.73E-02**	**lbs/day**	**6.81E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B023A	B023A		ND Adj	#B024A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	177	ND	89	352	ND	0	355	ND	0	89	0.09	10	46	4.57E-08	0	0	0.00E+00	4.57E-08
C5 as Pentane	177	ND	89	352	ND	0	355	ND	0	89	0.09	10	46	4.57E-08	0	0	0.00E+00	4.57E-08
n-Hexane	116	J	116	372	ND	0	375	ND	0	116	0.12	13	60	5.99E-08	0	0	0.00E+00	5.99E-08
C6 as Hexane	188	ND	94	372	ND	0	375	ND	0	94	0.09	10	48	4.83E-08	0	0	0.00E+00	4.83E-08
n-Heptane	176	J	176	390	ND	0	393	ND	0	176	0.18	20	91	9.06E-08	0	0	0.00E+00	9.06E-08
C7 as Heptane	196	ND	98	390	ND	0	393	ND	0	98	0.10	11	51	5.06E-08	0	0	0.00E+00	5.06E-08
n-Octane	3471		3,471	158	ND	0	160	ND	0	3,471	3.47	388	1789	1.79E-06	0	0	0.00E+00	1.79E-06
C8 as Octane	25051		25,051	158	ND	0	160	ND	0	25,051	25.05	2797	12911	1.29E-05	0	0	0.00E+00	1.29E-05
n-Nonane	16775		16,775	156	ND	0	158	ND	0	16,775	16.77	1873	8646	8.65E-06	0	0	0.00E+00	8.65E-06
C9 as Nonane	142690		142,690	156	ND	0	158	ND	0	142,690	142.69	15934	73542	7.35E-05	0	0	0.00E+00	7.35E-05
n-Decane	22247		22,247	156	ND	0	158	ND	0	22,247	22.25	2484	11466	1.15E-05	0	0	0.00E+00	1.15E-05
C10 as Decane	389210		389,210	156	ND	0	158	ND	0	389,210	389.21	43463	200597	2.01E-04	0	0	0.00E+00	2.01E-04
n-Undecane	24801		24,801	156	ND	0	157	ND	0	24,801	24.80	2769	12782	1.28E-05	0	0	0.00E+00	1.28E-05
C11 as Undecane	476895		476,895	156	ND	0	157	ND	0	476,895	476.90	53255	245790	2.46E-04	0	0	0.00E+00	2.46E-04
n-Dodecane	15547		15,547	157	ND	0	158	ND	0	15,547	15.55	1736	8013	8.01E-06	0	0	0.00E+00	8.01E-06
C12 as Dodecane	287264		287,264	157	ND	0	158	ND	0	287,264	287.26	32079	148055	1.48E-04	0	0	0.00E+00	1.48E-04
n-Tridecane	13637		13,637	158	ND	0	160	ND	0	13,637	13.64	1523	7028	7.03E-06	0	0	0.00E+00	7.03E-06
C13 as Tridecane	90267		90,267	158	ND	0	160	ND	0	90,267	90.27	10080	46523	4.65E-05	0	0	0.00E+00	4.65E-05
n-Tetradecane	2270		2,270	158	ND	0	159	ND	0	2,270	2.27	254	1170	1.17E-06	0	0	0.00E+00	1.17E-06
C14 as tetradecane	19963		19,963	158	ND	0	159	ND	0	19,963	19.96	2229	10289	1.03E-05	0	0	0.00E+00	1.03E-05
n-Pentadecane	697	J	697	157	ND	0	158	ND	0	697	0.70	78	359	3.59E-07	0	0	0.00E+00	3.59E-07
C15 as Pentadecane	3039		3,039	157	ND	0	158	ND	0	3,039	3.04	339	1566	1.57E-06	0	0	0.00E+00	1.57E-06
n-Hexadecane	224	J	224	157	ND	0	159	ND	0	224	0.22	25	116	1.16E-07	0	0	0.00E+00	1.16E-07
C16 as Hexadecane	379	J	379	157	ND	0	159	ND	0	379	0.38	42	195	1.95E-07	0	0	0.00E+00	1.95E-07
n-Heptadecane	106	J	106	157	ND	0	158	ND	0	106	0.11	12	55	5.48E-08	0	0	0.00E+00	5.48E-08
C17 as Heptadecane	79	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Octadecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C18 as Octodecane	80	ND	40	158	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Nonadecane	79	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C19 as Nonadecane	79	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Eicosane	79	ND	40	155	ND	0	157	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C20 as Eicosane	79	ND	40	155	ND	0	157	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heneicosane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C21 as Heneicosane	80	ND	40	157	ND	0	158	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Docosane	79	ND	40	157	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C22 as Docosane	79	ND	40	157	ND	0	159	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tricosane	79	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C23 as Tricosane	79	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tetracosane	80	ND	40	158	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C24 as Tetracosane	80	ND	40	158	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
Total Hydrocarbon			1,535,790			0			0		1535.79	171500	791,541	7.92E-04	0	0	0.00E+00	7.92E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B023B	B023B		ND Adj	#B024A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	352	ND	176	352	ND	0	355	ND	0	176	0.18	20	91	9.07E-08	9.07E-08
C5 as Pentane	352	ND	176	352	ND	0	355	ND	0	176	0.18	20	91	9.07E-08	9.07E-08
n-Hexane	372	ND	186	372	ND	0	375	ND	0	186	0.19	21	96	9.59E-08	9.59E-08
C6 as Hexane	372	ND	186	372	ND	0	375	ND	0	186	0.19	21	96	9.59E-08	9.59E-08
n-Heptane	593	J	593	390	ND	0	393	ND	0	593	0.59	66	306	3.06E-07	3.06E-07
C7 as Heptane	390	ND	195	390	ND	0	393	ND	0	195	0.19	22	100	1.00E-07	1.00E-07
n-Octane	2654		2,654	158	ND	0	160	ND	0	2,654	2.65	296	1368	1.37E-06	1.37E-06
C8 as Octane	19607		19,607	158	ND	0	160	ND	0	19,607	19.61	2190	10105	1.01E-05	1.01E-05
n-Nonane	13197		13,197	156	ND	0	158	ND	0	13,197	13.20	1474	6802	6.80E-06	6.80E-06
C9 as Nonane	112869		112,869	156	ND	0	158	ND	0	112,869	112.87	12604	58172	5.82E-05	5.82E-05
n-Decane	17582		17,582	156	ND	0	158	ND	0	17,582	17.58	1963	9062	9.06E-06	9.06E-06
C10 as Decane	307612		307,612	156	ND	0	158	ND	0	307,612	307.61	34351	158542	1.59E-04	1.59E-04
n-Undecane	19601		19,601	156	ND	0	157	ND	0	19,601	19.60	2189	10102	1.01E-05	1.01E-05
C11 as Undecane	378159		378,159	156	ND	0	157	ND	0	378,159	378.16	42229	194902	1.95E-04	1.95E-04
n-Dodecane	11921		11,921	157	ND	0	158	ND	0	11,921	11.92	1331	6144	6.14E-06	6.14E-06
C12 as Dodecane	223253		223,253	157	ND	0	158	ND	0	223,253	223.25	24931	115064	1.15E-04	1.15E-04
n-Tridecane	9880		9,880	158	ND	0	160	ND	0	9,880	9.88	1103	5092	5.09E-06	5.09E-06
C13 as Tridecane	66288		66,288	158	ND	0	160	ND	0	66,288	66.29	7402	34164	3.42E-05	3.42E-05
n-Tetradecane	1478	J	1,478	158	ND	0	159	ND	0	1,478	1.48	165	762	7.62E-07	7.62E-07
C14 as tetradecane	12730		12,730	158	ND	0	159	ND	0	12,730	12.73	1422	6561	6.56E-06	6.56E-06
n-Pentadecane	458	J	458	157	ND	0	158	ND	0	458	0.46	51	236	2.36E-07	2.36E-07
C15 as Pentadecane	1177	J	1,177	157	ND	0	158	ND	0	1,177	1.18	131	606	6.06E-07	6.06E-07
n-Hexadecane	157	ND	79	157	ND	0	159	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
C16 as Hexadecane	157	ND	79	157	ND	0	159	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
n-Heptadecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
C17 as Heptadecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
n-Octadecane	158	ND	79	158	ND	0	159	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
C18 as Octodecane	158	ND	79	158	ND	0	159	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
n-Nonadecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	9	40	4.05E-08	4.05E-08
C19 as Nonadecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	9	40	4.05E-08	4.05E-08
n-Eicosane	155	ND	78	155	ND	0	157	ND	0	78	0.08	9	40	4.00E-08	4.00E-08
C20 as Eicosane	155	ND	78	155	ND	0	157	ND	0	78	0.08	9	40	4.00E-08	4.00E-08
n-Heneicosane	157	ND	79	157	ND	0	158	ND	0	79	0.08	9	40	4.05E-08	4.05E-08
C21 as Heneicosane	157	ND	79	157	ND	0	158	ND	0	79	0.08	9	40	4.05E-08	4.05E-08
n-Docosane	157	ND	79	157	ND	0	159	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
C22 as Docosane	157	ND	79	157	ND	0	159	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
n-Tricosane	157	ND	78	157	ND	0	158	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
C23 as Tricosane	157	ND	78	157	ND	0	158	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
n-Tetracosane	158	ND	79	158	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
C24 as Tetracosane	158	ND	79	158	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
Total Hydrocarbon			1,201,393			0			0		1201.39	134159	619,194	6.19E-04	6.19E-04

Bagging Data Form — Vacuum Method

Sample Id: B026

Equipment type:	Connector			**Component ID:**	B-270	
Equipment Subtype:	Plug			**Plant ID:**	Refinery B	
Line Size:	1	*inches*		**Date:**	27-Jul-17	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.87 *inHg*	758.7	*mmHg*	**Sample Pump A**	BU51790	
				Sample Pump B	BU51292	
Ambient Temp:	84.2 *°F*	29.0	*°C*	**TVA ID**	2149	
Component Temp:	151 *°F*	66.1	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*HUK Pump Down*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:55	Background		*ppmv*	8-sec Dwell	68	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	80 *ppm*
14:03	Initial Bag Vacuum	0.145	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	84	*°F*	Leak @	at threads

Bag Concentrations (ppmv)

Time	13:59	14:01		14:07	14:11	14:17	14:21							
ppmv	53.9	55.2	56.1	50.5	50.6	50.1	50							

Sorbent Tube Sample Collection Parameters

B026A

Time										
14:07	Volume Start	194.9	*Liters*		Design Sample Flow Rate = 1 liter/min					
14:20	Volume Stop	207.0	*Liters*	Total Vol	12.1	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.931	*L/min*	$Sorbent Flow_{STP}$	0.886	*L/min*

B026B

14:08	Volume Start	156.5	*Liters*		Design Sample Flow Rate = 1 liter/min					
14:20	Volume Stop	168.7	*Liters*	Total Vol	12.2	*Liters*				
	Sample Run Time	12	*Minutes*		Sorbent Flow	1.017	*L/min*	$Sorbent Flow_{STP}$	0.968	*L/min*
	$Total ST Vol_{STP}$	23.13	*Liters*	$DGM Vol_{STP}$	79.85	*Liters*	$Total Run Vol_{STP}$	102.98	*Liters*	

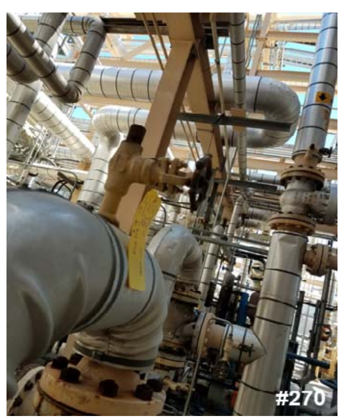
Bagging Parameters

Time										
14:09	Vacuum check	0.145	*inches H2O*			DGM_P	1.9	*inches H2O vacuum*	755.1	*mmHg*
14:10	DGM_{10L} Time	01:33.1	*min:sec.frac*	DGM Time	1.550	DGM Flow	6.45	$DGM Flow_{STP}$	6.14	*liters/minute*
14:10	Bag Temp.	86	*°F*	30.0	*°C*	$Sample_T$	93.2	*°F*	34.0	*°C*

Post-Sample Data

14:28	Post Test M21	8-sec Dwell	65	*ppmv*	Total Dwell	2:30	*min:sec*	Final M21	70	*ppm*
Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*			
Organic condensate collected	N/A	*ml*								
Density of organic condensate	N/A	*g/ml*								

Average THC emissions =	2.54E-05	kg/hr
Percent difference THC ER =	2%	
Acceptable?	Yes	



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	4.55E-08
C5 as Pentane	6.91E-08
n-Hexane	7.31E-08
C6 as Hexane	7.31E-08
n-Heptane	7.65E-08
C7 as Heptane	7.65E-08
n-Octane	3.11E-08
C8 as Octane	3.11E-08
n-Nonane	4.16E-08
C9 as Nonane	5.72E-08
n-Decane	4.53E-08
C10 as Decane	7.25E-07
n-Undecane	8.92E-08
C11 as Undecane	1.13E-06
n-Dodecane	1.58E-07
C12 as Dodecane	1.37E-06
n-Tridecane	3.58E-07
C13 as Tridecane	1.62E-06
n-Tetradecane	1.42E-06
C14 as tetradecane	5.14E-06
n-Pentadecane	1.73E-06
C15 as Pentadecane	7.08E-06
n-Hexadecane	6.34E-07
C16 as Hexadecane	2.68E-06
n-Heptadecane	4.77E-08
C17 as Heptadecane	1.56E-07
n-Octadecane	3.10E-08
C18 as Octodecane	3.10E-08
n-Nonadecane	3.09E-08
C19 as Nonadecane	3.09E-08
n-Eicosane	3.06E-08
C20 as Eicosane	3.06E-08
n-Heneicosane	3.09E-08
C21 as Heneicosane	3.09E-08
n-Docosane	3.09E-08
C22 as Docosane	3.09E-08
n-Tricosane	3.08E-08
C23 as Tricosane	3.08E-08
n-Tetracosane	3.11E-08
C24 as Tetracosane	3.11E-08
Total Hydrocarbon	2.54E-05

THC:	1.34E-03	lbs/day	2.45E-04	tons/yr

B026A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B026A	B026A		ND Adj	#B027A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	185	ND	92	360	ND	0	355	ND	0	92	0.09	10	44	4.39E-08	0	0	0.00E+00	4.39E-08
C5 as Pentane	185	ND	92	360	ND	0	355	ND	0	92	0.09	10	44	4.39E-08	0	0	0.00E+00	4.39E-08
n-Hexane	195	ND	98	381	ND	0	375	ND	0	98	0.10	10	46	4.64E-08	0	0	0.00E+00	4.64E-08
C6 as Hexane	195	ND	98	381	ND	0	375	ND	0	98	0.10	10	46	4.64E-08	0	0	0.00E+00	4.64E-08
n-Heptane	204	ND	102	399	ND	0	393	ND	0	102	0.10	11	49	4.86E-08	0	0	0.00E+00	4.86E-08
C7 as Heptane	204	ND	102	399	ND	0	393	ND	0	102	0.10	11	49	4.86E-08	0	0	0.00E+00	4.86E-08
n-Octane	83	ND	42	162	ND	0	160	ND	0	42	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C8 as Octane	83	ND	42	162	ND	0	160	ND	0	42	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Nonane	87	J	87	160	ND	0	158	ND	0	87	0.09	9	41	4.13E-08	0	0	0.00E+00	4.13E-08
C9 as Nonane	152	J	152	160	ND	0	158	ND	0	152	0.15	16	72	7.24E-08	0	0	0.00E+00	7.24E-08
n-Decane	102	J	102	160	ND	0	158	ND	0	102	0.10	11	49	4.87E-08	0	0	0.00E+00	4.87E-08
C10 as Decane	1701		1,701	160	ND	0	158	ND	0	1,701	1.70	175	809	8.09E-07	0	0	0.00E+00	8.09E-07
n-Undecane	190	J	190	160	ND	0	157	ND	0	190	0.19	20	90	9.02E-08	0	0	0.00E+00	9.02E-08
C11 as Undecane	2265		2,265	160	ND	0	157	ND	0	2,265	2.27	233	1077	1.08E-06	0	0	0.00E+00	1.08E-06
n-Dodecane	320	J	320	161	ND	0	158	ND	0	320	0.32	33	152	1.52E-07	0	0	0.00E+00	1.52E-07
C12 as Dodecane	2712		2,712	161	ND	0	158	ND	0	2,712	2.71	279	1289	1.29E-06	0	0	0.00E+00	1.29E-06
n-Tridecane	763	J	763	162	ND	0	160	ND	0	763	0.76	79	362	3.62E-07	0	0	0.00E+00	3.62E-07
C13 as Tridecane	3136		3,136	162	ND	0	160	ND	0	3,136	3.14	323	1491	1.49E-06	0	0	0.00E+00	1.49E-06
n-Tetradecane	3026		3,026	162	ND	0	159	ND	0	3,026	3.03	312	1438	1.44E-06	0	0	0.00E+00	1.44E-06
C14 as tetradecane	11360		11,360	162	ND	0	159	ND	0	11,360	11.36	1170	5399	5.40E-06	0	0	0.00E+00	5.40E-06
n-Pentadecane	3615		3,615	161	ND	0	158	ND	0	3,615	3.62	372	1718	1.72E-06	0	0	0.00E+00	1.72E-06
C15 as Pentadecane	15053		15,053	161	ND	0	158	ND	0	15,053	15.05	1550	7155	7.15E-06	0	0	0.00E+00	7.15E-06
n-Hexadecane	1250		1,250	161	ND	0	159	ND	0	1,250	1.25	129	594	5.94E-07	0	0	0.00E+00	5.94E-07
C16 as Hexadecane	5466		5,466	161	ND	0	159	ND	0	5,466	5.47	563	2598	2.60E-06	0	0	0.00E+00	2.60E-06
n-Heptadecane	112	J	112	161	ND	0	158	ND	0	112	0.11	12	53	5.33E-08	0	0	0.00E+00	5.33E-08
C17 as Heptadecane	316	J	316	161	ND	0	158	ND	0	316	0.32	33	150	1.50E-07	0	0	0.00E+00	1.50E-07
n-Octadecane	83	ND	41	162	ND	0	159	ND	0	41	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C18 as Octodecane	83	ND	41	162	ND	0	159	ND	0	41	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonadecane	83	ND	41	161	ND	0	158	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C19 as Nonadecane	83	ND	41	161	ND	0	158	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Eicosane	82	ND	41	159	ND	0	157	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C20 as Eicosane	82	ND	41	159	ND	0	157	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heneicosane	83	ND	42	161	ND	0	158	ND	0	42	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C21 as Heneicosane	83	ND	42	161	ND	0	158	ND	0	42	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Docosane	83	ND	41	161	ND	0	159	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	83	ND	41	161	ND	0	159	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	82	ND	41	161	ND	0	158	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C23 as Tricosane	82	ND	41	161	ND	0	158	ND	0	41	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetracosane	83	ND	42	162	ND	0	160	ND	0	42	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C24 as Tetracosane	83	ND	42	162	ND	0	160	ND	0	42	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
Total Hydrocarbon			52,873			0			0		52.87	5445	25,130	2.51E-05	0	0	0.00E+00	2.51E-05

B026B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B026B	B026B		ND Adj	#B027A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	183	ND	92	360	ND	0	355	ND	0	92	0.09	9	47	4.71E-08	4.71E-08
C5 as Pentane	366	ND	183	360	ND	0	355	ND	0	183	0.18	19	94	9.43E-08	9.43E-08
n-Hexane	387	ND	194	381	ND	0	375	ND	0	194	0.19	20	100	9.97E-08	9.97E-08
C6 as Hexane	387	ND	194	381	ND	0	375	ND	0	194	0.19	20	100	9.97E-08	9.97E-08
n-Heptane	406	ND	203	399	ND	0	393	ND	0	203	0.20	21	104	1.04E-07	1.04E-07
C7 as Heptane	406	ND	203	399	ND	0	393	ND	0	203	0.20	21	104	1.04E-07	1.04E-07
n-Octane	165	ND	82	162	ND	0	160	ND	0	82	0.08	8	42	4.25E-08	4.25E-08
C8 as Octane	165	ND	82	162	ND	0	160	ND	0	82	0.08	8	42	4.25E-08	4.25E-08
n-Nonane	163	ND	81	160	ND	0	158	ND	0	81	0.08	8	42	4.19E-08	4.19E-08
C9 as Nonane	163	ND	81	160	ND	0	158	ND	0	81	0.08	8	42	4.19E-08	4.19E-08
n-Decane	163	ND	81	160	ND	0	158	ND	0	81	0.08	8	42	4.19E-08	4.19E-08
C10 as Decane	1246	J	1,246	160	ND	0	158	ND	0	1,246	1.25	128	641	6.41E-07	6.41E-07
n-Undecane	171	J	171	160	ND	0	157	ND	0	171	0.17	18	88	8.82E-08	8.82E-08
C11 as Undecane	2289	J	2,289	160	ND	0	157	ND	0	2,289	2.29	236	1179	1.18E-06	1.18E-06
n-Dodecane	317	J	317	161	ND	0	158	ND	0	317	0.32	33	163	1.63E-07	1.63E-07
C12 as Dodecane	2800		2,800	161	ND	0	158	ND	0	2,800	2.80	288	1442	1.44E-06	1.44E-06
n-Tridecane	687	J	687	162	ND	0	160	ND	0	687	0.69	71	354	3.54E-07	3.54E-07
C13 as Tridecane	3398		3,398	162	ND	0	160	ND	0	3,398	3.40	350	1750	1.75E-06	1.75E-06
n-Tetradecane	2725		2,725	162	ND	0	159	ND	0	2,725	2.73	281	1403	1.40E-06	1.40E-06
C14 as tetradecane	9483		9,483	162	ND	0	159	ND	0	9,483	9.48	977	4883	4.88E-06	4.88E-06
n-Pentadecane	3370		3,370	161	ND	0	158	ND	0	3,370	3.37	347	1735	1.74E-06	1.74E-06
C15 as Pentadecane	13619		13,619	161	ND	0	158	ND	0	13,619	13.62	1403	7013	7.01E-06	7.01E-06
n-Hexadecane	1310	J	1,310	161	ND	0	159	ND	0	1,310	1.31	135	675	6.75E-07	6.75E-07
C16 as Hexadecane	5370		5,370	161	ND	0	159	ND	0	5,370	5.37	553	2765	2.76E-06	2.76E-06
n-Heptadecane	164	ND	82	161	ND	0	158	ND	0	82	0.08	8	42	4.21E-08	4.21E-08
C17 as Heptadecane	316	J	316	161	ND	0	158	ND	0	316	0.32	33	163	1.63E-07	1.63E-07
n-Octadecane	164	ND	82	162	ND	0	159	ND	0	82	0.08	8	42	4.23E-08	4.23E-08
C18 as Octodecane	164	ND	82	162	ND	0	159	ND	0	82	0.08	8	42	4.23E-08	4.23E-08
n-Nonadecane	164	ND	82	161	ND	0	158	ND	0	82	0.08	8	42	4.21E-08	4.21E-08
C19 as Nonadecane	164	ND	82	161	ND	0	158	ND	0	82	0.08	8	42	4.21E-08	4.21E-08
n-Eicosane	162	ND	81	159	ND	0	157	ND	0	81	0.08	8	42	4.16E-08	4.16E-08
C20 as Eicosane	162	ND	81	159	ND	0	157	ND	0	81	0.08	8	42	4.16E-08	4.16E-08
n-Heneicosane	163	ND	82	161	ND	0	158	ND	0	82	0.08	8	42	4.21E-08	4.21E-08
C21 as Heneicosane	163	ND	82	161	ND	0	158	ND	0	82	0.08	8	42	4.21E-08	4.21E-08
n-Docosane	164	ND	82	161	ND	0	159	ND	0	82	0.08	8	42	4.22E-08	4.22E-08
C22 as Docosane	164	ND	82	161	ND	0	159	ND	0	82	0.08	8	42	4.22E-08	4.22E-08
n-Tricosane	163	ND	82	161	ND	0	158	ND	0	82	0.08	8	42	4.21E-08	4.21E-08
C23 as Tricosane	163	ND	82	161	ND	0	158	ND	0	82	0.08	8	42	4.21E-08	4.21E-08
n-Tetracosane	165	ND	82	162	ND	0	160	ND	0	82	0.08	8	42	4.25E-08	4.25E-08
C24 as Tetracosane	165	ND	82	162	ND	0	160	ND	0	82	0.08	8	42	4.25E-08	4.25E-08
Total Hydrocarbon			49,805			0			0		49.80	5129	25,645	2.56E-05	2.56E-05

Bagging Data Form	**Vacuum Method**		**Sample Id**	**B029**
Equipment type:	Valve		**Component ID:**	**B-1326**
Equipment Subtype:	Globe		**Plant ID:**	Refinery B
Line Size:	6 *inches*		**Date:**	18-Apr-18
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR
Barometric pressure	29.97 *inHg*	761.2 *mmHg*	**Sample Pump A**	LP52979
			Sample Pump B	LP52975
Ambient Temp:	70.9 *°F*	21.6 *°C*	**TVA ID**	37887
Component Temp:	111 *°F*	43.9 *°C*	**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*Diesel Prod./Feed Thru E-701*			

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
12:55	Background	0	*ppmv*	8-sec Dwell	6	*ppmv*	Total Dwell	4:00	*min:sec*	Final M21	16 *ppm*
13:48	Initial Bag Vacuum	0.05	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	104.2	*°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:52	13:55	13:56	13:58	14:00	14:04	14:08	14:16						
ppmv	11.1	12	12.1	12.2	12.5	12.5	12.7	12.9						

Sorbent Tube Sample Collection Parameters

B029A

Time									
14:00	Volume Start	515.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:14	Volume Stop	529.3	*Liters*	Total Vol	13.7	*Liters*			
	Sample Run Time	14	*Minutes*		Sorbent Flow	0.979	*L/min*	Sorbent Flow$_{STP}$	0.983 *L/min*

B029B

14:00	Volume Start	450.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:14	Volume Stop	464.3	*Liters*	Total Vol	13.7	*Liters*			
	Sample Run Time	14	*Minutes*		Sorbent Flow	0.979	*L/min*	Sorbent Flow$_{STP}$	0.983 *L/min*
	Total ST Vol$_{STP}$	27.54	*Liters*	DGM Vol$_{STP}$	87.02	*Liters*	Total Run Vol$_{STP}$	114.56	*Liters*

Bagging Parameters

Time									
14:03	Vacuum check	0.06	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	757.9 *mmHg*
14:03	DGM$_{10L}$ Time	01:36.7	*min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM Flow$_{STP}$	6.22 *liters/minute*
14:04	Bag Temp.	112.1	*°F*	44.5	*°C*	Sample$_T$	66	*°F*	18.9 *°C*

Post-Sample Data

Post Test M21	Background	-2	*ppmv*	8-sec Dwell	12	*ppmv*	Total Dwell	1:30 *min:sec*	Final M21 39 *ppm* @ Stem
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	3.54E-06	kg/hr
Percent difference THC ER =	36%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.58E-08
C5 as Pentane	2.58E-08
n-Hexane	3.70E-08
C6 as Hexane	3.70E-08
n-Heptane	3.07E-08
C7 as Heptane	3.07E-08
n-Octane	2.66E-08
C8 as Octane	2.36E-07
n-Nonane	7.63E-08
C9 as Nonane	5.14E-07
n-Decane	1.73E-07
C10 as Decane	4.93E-07
n-Undecane	1.59E-07
C11 as Undecane	4.53E-07
n-Dodecane	1.45E-07
C12 as Dodecane	3.21E-07
n-Tridecane	8.57E-08
C13 as Tridecane	7.56E-08
n-Tetradecane	2.68E-08
C14 as tetradecane	2.68E-08
n-Pentadecane	2.70E-08
C15 as Pentadecane	2.70E-08
n-Hexadecane	2.68E-08
C16 as Hexadecane	2.68E-08
n-Heptadecane	2.65E-08
C17 as Heptadecane	2.65E-08
n-Octadecane	2.68E-08
C18 as Octodecane	2.68E-08
n-Nonadecane	2.69E-08
C19 as Nonadecane	2.69E-08
n-Eicosane	2.68E-08
C20 as Eicosane	2.68E-08
n-Heneicosane	2.70E-08
C21 as Heneicosane	2.70E-08
n-Docosane	2.67E-08
C22 as Docosane	2.67E-08
n-Tricosane	2.69E-08
C23 as Tricosane	2.69E-08
n-Tetracosane	2.69E-08
C24 as Tetracosane	2.69E-08
Total Hydrocarbon	3.54E-06

THC:	**1.87E-04**	**lbs/day**	**3.41E-05**	**tons/yr**

ANALYTICAL RESULTS				**BACKGROUND**			**TRIP BLANK**			**ADJUSTED G/V**		**TOTAL**	**G/V**		**LIQUID RESULTS**			**COMBINED**
B029A	**B029A**		**ND Adj**	**B030A**		**ND Adj**	**#B028**		**ND Adj**	**CONCENTRATION**		**G/V MASS**	**EMISSION RATE**		**Capture**	**#P0XX**		**EMISSION RATE**
Component	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**µg/L**	**µg**	**µg/hr**	**kg/hr**	**µg**	**µg/min**	**kg/hr**	**kg/hr**
n-Pentane	70.11971	ND	35	138.22	ND	0	355	ND	0	35	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
C5 as Pentane	70.11971	ND	35	138.22	ND	0	355	ND	0	35	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
n-Hexane	100.4788	ND	50	198.07	ND	0	375	ND	0	50	0.05	6	25	2.47E-08	0	0	0.00E+00	2.47E-08
C6 as Hexane	100.4788	ND	50	198.07	ND	0	375	ND	0	50	0.05	6	25	2.47E-08	0	0	0.00E+00	2.47E-08
n-Heptane	83.47445	ND	42	164.55	ND	0	393	ND	0	42	0.04	5	20	2.05E-08	0	0	0.00E+00	2.05E-08
C7 as Heptane	83.47445	ND	42	164.55	ND	0	393	ND	0	42	0.04	5	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Octane	72.23358	ND	36	142.39	ND	0	160	ND	0	36	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C8 as Octane	700.4604	J	700	142.39	ND	0	160	ND	0	700	0.70	80	344	3.44E-07	0	0	0.00E+00	3.44E-07
n-Nonane	238.1091	J	238	143.45	ND	0	158	ND	0	238	0.24	27	117	1.17E-07	0	0	0.00E+00	1.17E-07
C9 as Nonane	1301.808		1,302	143.45	ND	0	158	ND	0	1,302	1.30	149	639	6.39E-07	0	0	0.00E+00	6.39E-07
n-Decane	425.0443	J	425	144.75	ND	0	158	ND	0	425	0.43	49	209	2.09E-07	0	0	0.00E+00	2.09E-07
C10 as Decane	1424.304		1,424	144.75	ND	0	158	ND	0	1,424	1.42	163	699	6.99E-07	0	0	0.00E+00	6.99E-07
n-Undecane	378.3225	J	378	144.37	ND	0	157	ND	0	378	0.38	43	186	1.86E-07	0	0	0.00E+00	1.86E-07
C11 as Undecane	1248.175		1,248	144.37	ND	0	157	ND	0	1,248	1.25	143	613	6.13E-07	0	0	0.00E+00	6.13E-07
n-Dodecane	285.5474	J	286	143.4	ND	0	158	ND	0	286	0.29	33	140	1.40E-07	0	0	0.00E+00	1.40E-07
C12 as Dodecane	985.4015		985	143.4	ND	0	158	ND	0	985	0.99	113	484	4.84E-07	0	0	0.00E+00	4.84E-07
n-Tridecane	176.6755	J	177	143.74	ND	0	160	ND	0	177	0.18	20	87	8.67E-08	0	0	0.00E+00	8.67E-08
C13 as Tridecane	235.0788	J	235	143.74	ND	0	160	ND	0	235	0.24	27	115	1.15E-07	0	0	0.00E+00	1.15E-07
n-Tetradecane	72.84672	ND	36	143.6	ND	0	159	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C14 as tetradecane	72.84672	ND	36	143.6	ND	0	159	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Pentadecane	73.21168	ND	37	144.32	ND	0	158	ND	0	37	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C15 as Pentadecane	73.21168	ND	37	144.32	ND	0	158	ND	0	37	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Hexadecane	72.81752	ND	36	143.54	ND	0	159	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C16 as Hexadecane	72.81752	ND	36	143.54	ND	0	159	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Heptadecane	71.9708	ND	36	141.87	ND	0	158	ND	0	36	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C17 as Heptadecane	71.9708	ND	36	141.87	ND	0	158	ND	0	36	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Octadecane	72.77372	ND	36	143.45	ND	0	159	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C18 as Octodecane	72.77372	ND	36	143.45	ND	0	159	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Nonadecane	72.91971	ND	36	143.74	ND	0	158	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C19 as Nonadecane	72.91971	ND	36	143.74	ND	0	158	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Eicosane	72.74453	ND	36	143.4	ND	0	157	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C20 as Eicosane	72.74453	ND	36	143.4	ND	0	157	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Heneicosane	73.43066	ND	37	144.75	ND	0	158	ND	0	37	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C21 as Heneicosane	73.43066	ND	37	144.75	ND	0	158	ND	0	37	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Docosane	72.59854	ND	36	143.11	ND	0	159	ND	0	36	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C22 as Docosane	72.59854	ND	36	143.11	ND	0	159	ND	0	36	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Tricosane	72.9927	ND	36	143.88	ND	0	158	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C23 as Tricosane	72.9927	ND	36	143.88	ND	0	158	ND	0	36	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Tetracosane	73.09489	ND	37	144.09	ND	0	160	ND	0	37	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C24 as Tetracosane	73.09489	ND	37	144.09	ND	0	160	ND	0	37	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
Total Hydrocarbon			8,491			0			0		8.49	973	4,169	4.17E-06	0	0	0.00E+00	4.17E-06

ANALYTICAL RESULTS				**BACKGROUND**			**TRIP BLANK**			**ADJUSTED G/V**		**TOTAL**	**G/V**		**COMBINED**
B029B	**B029B**		**ND Adj**	**B030A**		**ND Adj**	**#B028**		**ND Adj**	**CONCENTRATION**		**G/V MASS**	**EMISSION RATE**		**EMISSION RATE**
Component	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**µg/L**	**µg**	**µg/hr**	**kg/hr**	**kg/hr**
n-Pentane	140.2394	ND	70	138	ND	0	355	ND	0	70	0.07	8	34	3.44E-08	3.44E-08
C5 as Pentane	140.2394	ND	70	138	ND	0	355	ND	0	70	0.07	8	34	3.44E-08	3.44E-08
n-Hexane	200.9577	ND	100	198	ND	0	375	ND	0	100	0.10	12	49	4.93E-08	4.93E-08
C6 as Hexane	200.9577	ND	100	198	ND	0	375	ND	0	100	0.10	12	49	4.93E-08	4.93E-08
n-Heptane	166.9489	ND	83	165	ND	0	393	ND	0	83	0.08	10	41	4.10E-08	4.10E-08
C7 as Heptane	166.9489	ND	83	165	ND	0	393	ND	0	83	0.08	10	41	4.10E-08	4.10E-08
n-Octane	144.4672	ND	72	142	ND	0	160	ND	0	72	0.07	8	35	3.55E-08	3.55E-08
C8 as Octane	260.0999	J	260	142	ND	0	160	ND	0	260	0.26	30	128	1.28E-07	1.28E-07
n-Nonane	145.5474	ND	73	143	ND	0	158	ND	0	73	0.07	8	36	3.57E-08	3.57E-08
C9 as Nonane	793.5688	J	794	143	ND	0	158	ND	0	794	0.79	91	390	3.90E-07	3.90E-07
n-Decane	279.57	J	280	145	ND	0	158	ND	0	280	0.28	32	137	1.37E-07	1.37E-07
C10 as Decane	582.6125	J	583	145	ND	0	158	ND	0	583	0.58	67	286	2.86E-07	2.86E-07
n-Undecane	268.1934	J	268	144	ND	0	157	ND	0	268	0.27	31	132	1.32E-07	1.32E-07
C11 as Undecane	597.3269	J	597	144	ND	0	157	ND	0	597	0.60	68	293	2.93E-07	2.93E-07
n-Dodecane	306.6587	J	307	143	ND	0	158	ND	0	307	0.31	35	151	1.51E-07	1.51E-07
C12 as Dodecane	322.243	J	322	143	ND	0	158	ND	0	322	0.32	37	158	1.58E-07	1.58E-07
n-Tridecane	172.5826	J	173	144	ND	0	160	ND	0	173	0.17	20	85	8.47E-08	8.47E-08
C13 as Tridecane	145.8394	ND	73	144	ND	0	160	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
n-Tetradecane	145.6934	ND	73	144	ND	0	159	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
C14 as tetradecane	145.6934	ND	73	144	ND	0	159	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
n-Pentadecane	146.4234	ND	73	144	ND	0	158	ND	0	73	0.07	8	36	3.59E-08	3.59E-08
C15 as Pentadecane	146.4234	ND	73	144	ND	0	158	ND	0	73	0.07	8	36	3.59E-08	3.59E-08
n-Hexadecane	145.635	ND	73	144	ND	0	159	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
C16 as Hexadecane	145.635	ND	73	144	ND	0	159	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
n-Heptadecane	143.9416	ND	72	142	ND	0	158	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C17 as Heptadecane	143.9416	ND	72	142	ND	0	158	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Octadecane	145.5474	ND	73	143	ND	0	159	ND	0	73	0.07	8	36	3.57E-08	3.57E-08
C18 as Octodecane	145.5474	ND	73	143	ND	0	159	ND	0	73	0.07	8	36	3.57E-08	3.57E-08
n-Nonadecane	145.8394	ND	73	144	ND	0	158	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
C19 as Nonadecane	145.8394	ND	73	144	ND	0	158	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
n-Eicosane	145.4891	ND	73	143	ND	0	157	ND	0	73	0.07	8	36	3.57E-08	3.57E-08
C20 as Eicosane	145.4891	ND	73	143	ND	0	157	ND	0	73	0.07	8	36	3.57E-08	3.57E-08
n-Heneicosane	146.8613	ND	73	145	ND	0	158	ND	0	73	0.07	8	36	3.61E-08	3.61E-08
C21 as Heneicosane	146.8613	ND	73	145	ND	0	158	ND	0	73	0.07	8	36	3.61E-08	3.61E-08
n-Docosane	145.1971	ND	73	143	ND	0	159	ND	0	73	0.07	8	36	3.56E-08	3.56E-08
C22 as Docosane	145.1971	ND	73	143	ND	0	159	ND	0	73	0.07	8	36	3.56E-08	3.56E-08
n-Tricosane	145.9854	ND	73	144	ND	0	158	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
C23 as Tricosane	145.9854	ND	73	144	ND	0	158	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
n-Tetracosane	146.1898	ND	73	144	ND	0	160	ND	0	73	0.07	8	36	3.59E-08	3.59E-08
C24 as Tetracosane	146.1898	ND	73	144	ND	0	160	ND	0	73	0.07	8	36	3.59E-08	3.59E-08
Total Hydrocarbon			5,912			0			0		5.91	677	2,902	2.90E-06	2.90E-06

Bagging Data Form	Vacuum Method		Sample Id	B031
Equipment type:	Connector		Component ID:	B-1466
Equipment Subtype:	Plug		Plant ID:	Refinery B
Line Size:	1	inches	Date:	18-Apr-18
Phase (G, LL, HL):	HL		Analysis team:	EG/DR
Barometric pressure	29.93 inHg	760.2 mmHg	Sample Pump A	LP52979
			Sample Pump B	LP52975
Ambient Temp:	68.7 °F	20.4 °C	TVA ID	
Component Temp:	86.2 °F	30.1 °C	Stream Pressure/Temp:	20 psig / 12-Mar-00 °F
Stream Description:	Cetane Improver			

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
14:45	Background	-1	ppmv	8-sec Dwell	12	ppmv	Total Dwell	3:00	min:sec	Final M21	34	ppm
15:20	Initial Bag Vacuum	0.04	inches H2O	DGM Vac.	1.7	inches H2O	Bag Temp	85.5	°F	Leak @	threaded connection	

Bag Concentrations (ppmv)

Time	15:22	15:24	15:26	15:28	15:30	15:37								
ppmv	1.8	5.6	6.2	7	6.7	5.4								

Sorbent Tube Sample Collection Parameters

B031A

Time										
15:30	Volume Start	529.3	Liters		Design Sample Flow Rate = 1 liter/min					
15:43	Volume Stop	542.0	Liters	Total Vol	12.7	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.977	L/min	Sorbent Flow$_{STP}$	0.945	L/min

B031B

15:30	Volume Start	464.3	Liters		Design Sample Flow Rate = 1 liter/min					
15:43	Volume Stop	477.0	Liters	Total Vol	12.7	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.977	L/min	Sorbent Flow$_{STP}$	0.945	L/min
	Total ST Vol$_{STP}$	24.56	Liters	DGM Vol$_{STP}$	74.68	Liters	Total Run Vol$_{STP}$	99.24	Liters	

Bagging Parameters

Time											
15:31	Vacuum check	0.07	inches H2O			DGM$_P$	1.7	inches H2O vacuum	757.0	mmHg
15:35	DGM$_{10L}$ Time	01:40.6	min:sec.frac	DGM Time	1.683	DGM Flow	5.94	DGM Flow$_{STP}$	5.74	liters/minute
15:32	Bag Temp.	82	°F	27.8	°C	Sample$_T$	86	°F	30.0	°C

Post-Sample Data

Post Test M21	Background	-4	ppmv	8-sec Dwell	12	ppmv	Total Dwell	1:30	min:sec	Final M21	29 ppm
										@	Threaded Connection
Condensate accumulation: starting time		N/A	hour:min	Final time	N/A	hour:min		0:00	hours:min		
Organic condensate collected		N/A	ml								
Density of organic condensate		N/A	g/ml								

Average THC emissions =	2.59E-06	kg/hr
Percent difference THC ER =	24%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.60E-08
C5 as Pentane	2.60E-08
n-Hexane	3.72E-08
C6 as Hexane	3.72E-08
n-Heptane	3.09E-08
C7 as Heptane	3.09E-08
n-Octane	2.68E-08
C8 as Octane	2.68E-08
n-Nonane	2.70E-08
C9 as Nonane	2.70E-08
n-Decane	2.72E-08
C10 as Decane	5.49E-08
n-Undecane	2.71E-08
C11 as Undecane	1.48E-06
n-Dodecane	2.70E-08
C12 as Dodecane	2.70E-08
n-Tridecane	2.70E-08
C13 as Tridecane	2.70E-08
n-Tetradecane	2.70E-08
C14 as tetradecane	2.70E-08
n-Pentadecane	2.71E-08
C15 as Pentadecane	2.71E-08
n-Hexadecane	2.70E-08
C16 as Hexadecane	2.70E-08
n-Heptadecane	2.67E-08
C17 as Heptadecane	2.67E-08
n-Octadecane	2.70E-08
C18 as Octodecane	2.70E-08
n-Nonadecane	2.70E-08
C19 as Nonadecane	2.70E-08
n-Eicosane	2.70E-08
C20 as Eicosane	2.70E-08
n-Heneicosane	2.72E-08
C21 as Heneicosane	2.72E-08
n-Docosane	2.69E-08
C22 as Docosane	2.69E-08
n-Tricosane	2.70E-08
C23 as Tricosane	2.70E-08
n-Tetracosane	2.71E-08
C24 as Tetracosane	2.71E-08
Total Hydrocarbon	2.59E-06

THC:	1.37E-04	lbs/day	2.50E-05	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B031A	B031A		ND Adj	B032A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.64095	ND	38	147.79	ND	0	355	ND	0	38	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
C5 as Pentane	75.64095	ND	38	147.79	ND	0	355	ND	0	38	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
n-Hexane	108.3906	ND	54	211.78	ND	0	375	ND	0	54	0.05	5	25	2.48E-08	0	0	0.00E+00	2.48E-08
C6 as Hexane	108.3906	ND	54	211.78	ND	0	375	ND	0	54	0.05	5	25	2.48E-08	0	0	0.00E+00	2.48E-08
n-Heptane	90.04725	ND	45	175.94	ND	0	393	ND	0	45	0.05	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C7 as Heptane	90.04725	ND	45	175.94	ND	0	393	ND	0	45	0.05	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Octane	77.92126	ND	39	152.25	ND	0	160	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C8 as Octane	77.92126	ND	39	152.25	ND	0	160	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Nonane	78.50394	ND	39	153.38	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C9 as Nonane	78.50394	ND	39	153.38	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Decane	79.2126	ND	40	154.77	ND	0	158	ND	0	40	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C10 as Decane	160.2897	J	160	154.77	ND	0	158	ND	0	160	0.16	16	73	7.34E-08	0	0	0.00E+00	7.34E-08
n-Undecane	79.00788	ND	40	154.37	ND	0	157	ND	0	40	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C11 as Undecane	3282.059		3,282	154.37	ND	0	157	ND	0	3,282	3.28	326	1503	1.50E-06	0	0	0.00E+00	1.50E-06
n-Dodecane	78.47244	ND	39	153.32	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C12 as Dodecane	78.47244	ND	39	153.32	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Tridecane	78.66142	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C13 as Tridecane	78.66142	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Tetradecane	78.58268	ND	39	153.54	ND	0	159	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C14 as tetradecane	78.58268	ND	39	153.54	ND	0	159	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Pentadecane	78.97638	ND	39	154.31	ND	0	158	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C15 as Pentadecane	78.97638	ND	39	154.31	ND	0	158	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Hexadecane	78.55118	ND	39	153.48	ND	0	159	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C16 as Hexadecane	78.55118	ND	39	153.48	ND	0	159	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C17 as Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Octadecane	78.50394	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C18 as Octodecane	78.50394	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Nonadecane	78.66142	ND	39	153.69	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C19 as Nonadecane	78.66142	ND	39	153.69	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Eicosane	78.47244	ND	39	153.32	ND	0	157	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C20 as Eicosane	78.47244	ND	39	153.32	ND	0	157	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Heneicosane	79.2126	ND	40	154.77	ND	0	158	ND	0	40	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C21 as Heneicosane	79.2126	ND	40	154.77	ND	0	158	ND	0	40	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Docosane	78.31496	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C22 as Docosane	78.31496	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Tricosane	78.74016	ND	39	153.85	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C23 as Tricosane	78.74016	ND	39	153.85	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Tetracosane	78.85039	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C24 as Tetracosane	78.85039	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
Total Hydrocarbon			4,974			0			0		4.97	494	2,278	2.28E-06	0	0	0.00E+00	2.28E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B031B	B031B		ND Adj	B032A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.2819	ND	76	148	ND	0	355	ND	0	76	0.08	8	35	3.46E-08	3.46E-08
C5 as Pentane	151.2819	ND	76	148	ND	0	355	ND	0	76	0.08	8	35	3.46E-08	3.46E-08
n-Hexane	216.7811	ND	108	212	ND	0	375	ND	0	108	0.11	11	50	4.96E-08	4.96E-08
C6 as Hexane	216.7811	ND	108	212	ND	0	375	ND	0	108	0.11	11	50	4.96E-08	4.96E-08
n-Heptane	180.0945	ND	90	176	ND	0	393	ND	0	90	0.09	9	41	4.12E-08	4.12E-08
C7 as Heptane	180.0945	ND	90	176	ND	0	393	ND	0	90	0.09	9	41	4.12E-08	4.12E-08
n-Octane	155.8425	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.57E-08	3.57E-08
C8 as Octane	155.8425	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.57E-08	3.57E-08
n-Nonane	157.0079	ND	79	153	ND	0	158	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
C9 as Nonane	157.0079	ND	79	153	ND	0	158	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
n-Decane	158.4252	ND	79	155	ND	0	158	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
C10 as Decane	158.4252	ND	79	155	ND	0	158	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
n-Undecane	158.0158	ND	79	154	ND	0	157	ND	0	79	0.08	8	36	3.62E-08	3.62E-08
C11 as Undecane	3201.465		3,201	154	ND	0	157	ND	0	3,201	3.20	318	1466	1.47E-06	1.47E-06
n-Dodecane	156.9449	ND	78	153	ND	0	158	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
C12 as Dodecane	156.9449	ND	78	153	ND	0	158	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
n-Tridecane	157.3228	ND	79	154	ND	0	160	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
C13 as Tridecane	157.3228	ND	79	154	ND	0	160	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
n-Tetradecane	157.1654	ND	79	154	ND	0	159	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
C14 as tetradecane	157.1654	ND	79	154	ND	0	159	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
n-Pentadecane	157.9528	ND	79	154	ND	0	158	ND	0	79	0.08	8	36	3.62E-08	3.62E-08
C15 as Pentadecane	157.9528	ND	79	154	ND	0	158	ND	0	79	0.08	8	36	3.62E-08	3.62E-08
n-Hexadecane	157.1024	ND	79	153	ND	0	159	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
C16 as Hexadecane	157.1024	ND	79	153	ND	0	159	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
n-Heptadecane	155.2756	ND	78	152	ND	0	158	ND	0	78	0.08	8	36	3.56E-08	3.56E-08
C17 as Heptadecane	155.2756	ND	78	152	ND	0	158	ND	0	78	0.08	8	36	3.56E-08	3.56E-08
n-Octadecane	157.0079	ND	79	153	ND	0	159	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
C18 as Octodecane	157.0079	ND	79	153	ND	0	159	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
n-Nonadecane	157.3228	ND	79	154	ND	0	158	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
C19 as Nonadecane	157.3228	ND	79	154	ND	0	158	ND	0	79	0.08	8	36	3.60E-08	3.60E-08
n-Eicosane	156.9449	ND	78	153	ND	0	157	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
C20 as Eicosane	156.9449	ND	78	153	ND	0	157	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
n-Heneicosane	158.4252	ND	79	155	ND	0	158	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
C21 as Heneicosane	158.4252	ND	79	155	ND	0	158	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
n-Docosane	156.6299	ND	78	153	ND	0	159	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
C22 as Docosane	156.6299	ND	78	153	ND	0	159	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
n-Tricosane	157.4803	ND	79	154	ND	0	158	ND	0	79	0.08	8	36	3.61E-08	3.61E-08
C23 as Tricosane	157.4803	ND	79	154	ND	0	158	ND	0	79	0.08	8	36	3.61E-08	3.61E-08
n-Tetracosane	157.7008	ND	79	154	ND	0	160	ND	0	79	0.08	8	36	3.61E-08	3.61E-08
C24 as Tetracosane	157.7008	ND	79	154	ND	0	160	ND	0	79	0.08	8	36	3.61E-08	3.61E-08
Total Hydrocarbon			6,343			0			0		6.34	630	2,905	2.91E-06	2.91E-06

Bagging Data Form — Vacuum Method

Sample Id: B033

WSPA — Western States Petroleum Association

Equipment type:	Tubing (swagelok) Plug		**Component ID:**	B-1396	
Equipment Subtype:	Plug		**Plant ID:**	Refinery B	
Line Size:	1/4 inches		**Date:**	19-Apr-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.98 inHg	761.5 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	84.7 °F	29.3 °C	**TVA ID**	36502	
Component Temp:	85.5 °F	29.7 °C	**Stream Pressure/Temp:**	200 psig	°F
Stream Description:	Non-blended diesel prod. To U76				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
12:59	Background	-3 ppmv	8-sec Dwell	20 ppmv	Total Dwell	2:00 min:sec	Final M21	90 ppm
13:25	Initial Bag Vacuum	0.045 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	83.3 °F	Leak @	Plug

Bag Concentrations (ppmv)

Time	13:28	13:31	13:33	13:35	13:37	13:45	14:03	14:07						
ppmv	14.6	17.9	18.1	18.2	18	16.4	14.5	14.4						

Sorbent Tube Sample Collection Parameters

B033A

Time						
13:37	Volume Start	544.4 Liters		Design Sample Flow Rate = 1 liter/min		
13:50	Volume Stop	556.7 Liters	Total Vol	12.3 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.946 L/min	Sorbent Flow$_{STP}$	0.940 L/min

B033B

13:37	Volume Start	479.4 Liters		Design Sample Flow Rate = 1 liter/min		
13:50	Volume Stop	491.7 Liters	Total Vol	12.3 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.946 L/min	Sorbent Flow$_{STP}$	0.940 L/min

Total ST Vol$_{STP}$ 24.44 Liters — DGM Vol$_{STP}$ 83.32 Liters — Total Run Vol$_{STP}$ 107.76 Liters

Bagging Parameters

Time								
13:43	Vacuum check	0.045 inches H2O			DGM$_P$	2 inches H2O vacuum		757.8 mmHg
13:41	DGM$_{10L}$ Time	01:32.9 min:sec.frac	DGM Time	1.550	DGM Flow	6.45	DGM Flow$_{STP}$	6.41 liters/minute
13:43	Bag Temp.	77.5 °F		25.3 °C	Sample$_T$	72 °F		22.2 °C

Post-Sample Data

14:18 Post Test M21	Background	2 ppmv	8-sec Dwell	12 ppmv	Total Dwell	2:00 min:sec	Final M21 69 ppm @ Plug
Condensate accumulation: starting time		N/A hour:min	Final time	N/A hour:min		0:00 hours:min	
Organic condensate collected		N/A ml					
Density of organic condensate		N/A g/ml					

Average THC emissions =	6.99E-06 kg/hr
Percent difference THC ER =	44%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.91E-08
C5 as Pentane	2.91E-08
n-Hexane	4.17E-08
C6 as Hexane	4.17E-08
n-Heptane	3.47E-08
C7 as Heptane	3.47E-08
n-Octane	3.00E-08
C8 as Octane	1.04E-07
n-Nonane	4.65E-08
C9 as Nonane	2.85E-07
n-Decane	1.56E-07
C10 as Decane	1.02E-06
n-Undecane	3.63E-07
C11 as Undecane	1.56E-06
n-Dodecane	3.78E-07
C12 as Dodecane	1.44E-06
n-Tridecane	2.83E-07
C13 as Tridecane	3.90E-07
n-Tetradecane	7.86E-08
C14 as tetradecane	3.03E-08
n-Pentadecane	3.04E-08
C15 as Pentadecane	3.04E-08
n-Hexadecane	3.03E-08
C16 as Hexadecane	3.03E-08
n-Heptadecane	2.99E-08
C17 as Heptadecane	2.99E-08
n-Octadecane	3.02E-08
C18 as Octodecane	3.02E-08
n-Nonadecane	3.03E-08
C19 as Nonadecane	3.03E-08
n-Eicosane	3.02E-08
C20 as Eicosane	3.02E-08
n-Heneicosane	3.05E-08
C21 as Heneicosane	3.05E-08
n-Docosane	3.02E-08
C22 as Docosane	3.02E-08
n-Tricosane	3.03E-08
C23 as Tricosane	3.03E-08
n-Tetracosane	3.04E-08
C24 as Tetracosane	3.04E-08
Total Hydrocarbon	6.99E-06

THC:	3.70E-04	lbs/day	6.75E-05	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B033A	B033A		ND Adj	B034A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	78.10081	ND	39	153.7	ND	0	355	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C5 as Pentane	78.10081	ND	39	153.7	ND	0	355	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexane	111.9154	ND	56	220.25	ND	0	375	ND	0	56	0.06	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
C6 as Hexane	111.9154	ND	56	220.25	ND	0	375	ND	0	56	0.06	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
n-Heptane	92.97561	ND	46	182.98	ND	0	393	ND	0	46	0.05	5	23	2.31E-08	0	0	0.00E+00	2.31E-08
C7 as Heptane	92.97561	ND	46	182.98	ND	0	393	ND	0	46	0.05	5	23	2.31E-08	0	0	0.00E+00	2.31E-08
n-Octane	80.45528	ND	40	158.34	ND	0	160	ND	0	40	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C8 as Octane	337.3186	J	337	158.34	ND	0	160	ND	0	337	0.34	36	168	1.68E-07	0	0	0.00E+00	1.68E-07
n-Nonane	105.8197	J	106	159.52	ND	0	158	ND	0	106	0.11	11	53	5.26E-08	0	0	0.00E+00	5.26E-08
C9 as Nonane	928.3932		928	159.52	ND	0	158	ND	0	928	0.93	100	462	4.62E-07	0	0	0.00E+00	4.62E-07
n-Decane	390.791	J	391	160.96	ND	0	158	ND	0	391	0.39	42	194	1.94E-07	0	0	0.00E+00	1.94E-07
C10 as Decane	2835.437		2,835	160.96	ND	0	158	ND	0	2,835	2.84	306	1410	1.41E-06	0	0	0.00E+00	1.41E-06
n-Undecane	815.2365	J	815	160.54	ND	0	157	ND	0	815	0.82	88	405	4.05E-07	0	0	0.00E+00	4.05E-07
C11 as Undecane	3974.392		3,974	160.54	ND	0	157	ND	0	3,974	3.97	428	1977	1.98E-06	0	0	0.00E+00	1.98E-06
n-Dodecane	788.1436	J	788	159.46	ND	0	158	ND	0	788	0.79	85	392	3.92E-07	0	0	0.00E+00	3.92E-07
C12 as Dodecane	3810.83		3,811	159.46	ND	0	158	ND	0	3,811	3.81	411	1895	1.90E-06	0	0	0.00E+00	1.90E-06
n-Tridecane	627.7527	J	628	159.84	ND	0	160	ND	0	628	0.63	68	312	3.12E-07	0	0	0.00E+00	3.12E-07
C13 as Tridecane	1240.308		1,240	159.84	ND	0	160	ND	0	1,240	1.24	134	617	6.17E-07	0	0	0.00E+00	6.17E-07
n-Tetradecane	143.2774	J	143	159.68	ND	0	159	ND	0	143	0.14	15	71	7.13E-08	0	0	0.00E+00	7.13E-08
C14 as tetradecane	81.13821	ND	41	159.68	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Pentadecane	81.54471	ND	41	160.48	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C15 as Pentadecane	81.54471	ND	41	160.48	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Hexadecane	81.10569	ND	41	159.62	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C16 as Hexadecane	81.10569	ND	41	159.62	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heptadecane	80.1626	ND	40	157.76	ND	0	158	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C17 as Heptadecane	80.1626	ND	40	157.76	ND	0	158	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Octadecane	81.05691	ND	41	159.52	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C18 as Octodecane	81.05691	ND	41	159.52	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Nonadecane	81.21951	ND	41	159.84	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C19 as Nonadecane	81.21951	ND	41	159.84	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Eicosane	81.02439	ND	41	159.46	ND	0	157	ND	0	41	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C20 as Eicosane	81.02439	ND	41	159.46	ND	0	157	ND	0	41	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Heneicosane	81.78862	ND	41	160.96	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C21 as Heneicosane	81.78862	ND	41	160.96	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Docosane	80.86179	ND	40	159.14	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C22 as Docosane	80.86179	ND	40	159.14	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Tricosane	81.30081	ND	41	160	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C23 as Tricosane	81.30081	ND	41	160	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tetracosane	81.41463	ND	41	160.22	ND	0	160	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C24 as Tetracosane	81.41463	ND	41	160.22	ND	0	160	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
Total Hydrocarbon			17,173			0			0		17.17	1851	8,541	8.54E-06	0	0	0.00E+00	8.54E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B033B	B033B		ND Adj	B034A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	156.2016	ND	78	154	ND	0	355	ND	0	78	0.08	8	39	3.88E-08	3.88E-08
C5 as Pentane	156.2016	ND	78	154	ND	0	355	ND	0	78	0.08	8	39	3.88E-08	3.88E-08
n-Hexane	223.8309	ND	112	220	ND	0	375	ND	0	112	0.11	12	56	5.57E-08	5.57E-08
C6 as Hexane	223.8309	ND	112	220	ND	0	375	ND	0	112	0.11	12	56	5.57E-08	5.57E-08
n-Heptane	185.9512	ND	93	183	ND	0	393	ND	0	93	0.09	10	46	4.62E-08	4.62E-08
C7 as Heptane	185.9512	ND	93	183	ND	0	393	ND	0	93	0.09	10	46	4.62E-08	4.62E-08
n-Octane	160.9106	ND	80	158	ND	0	160	ND	0	80	0.08	9	40	4.00E-08	4.00E-08
C8 as Octane	160.9106	ND	80	158	ND	0	160	ND	0	80	0.08	9	40	4.00E-08	4.00E-08
n-Nonane	162.1138	ND	81	160	ND	0	158	ND	0	81	0.08	9	40	4.03E-08	4.03E-08
C9 as Nonane	219.6883	J	220	160	ND	0	158	ND	0	220	0.22	24	109	1.09E-07	1.09E-07
n-Decane	235.065	J	235	161	ND	0	158	ND	0	235	0.24	25	117	1.17E-07	1.17E-07
C10 as Decane	1270.251	J	1,270	161	ND	0	158	ND	0	1,270	1.27	137	632	6.32E-07	6.32E-07
n-Undecane	646.1508	J	646	161	ND	0	157	ND	0	646	0.65	70	321	3.21E-07	3.21E-07
C11 as Undecane	2313.005		2,313	161	ND	0	157	ND	0	2,313	2.31	249	1150	1.15E-06	1.15E-06
n-Dodecane	733.8581	J	734	159	ND	0	158	ND	0	734	0.73	79	365	3.65E-07	3.65E-07
C12 as Dodecane	1997.213		1,997	159	ND	0	158	ND	0	1,997	2.00	215	993	9.93E-07	9.93E-07
n-Tridecane	508.5001	J	509	160	ND	0	160	ND	0	509	0.51	55	253	2.53E-07	2.53E-07
C13 as Tridecane	329.3213	J	329	160	ND	0	160	ND	0	329	0.33	35	164	1.64E-07	1.64E-07
n-Tetradecane	172.8245	J	173	160	ND	0	159	ND	0	173	0.17	19	86	8.60E-08	8.60E-08
C14 as tetradecane	162.2764	ND	81	160	ND	0	159	ND	0	81	0.08	9	40	4.04E-08	4.04E-08
n-Pentadecane	163.0894	ND	82	160	ND	0	158	ND	0	82	0.08	9	41	4.06E-08	4.06E-08
C15 as Pentadecane	163.0894	ND	82	160	ND	0	158	ND	0	82	0.08	9	41	4.06E-08	4.06E-08
n-Hexadecane	162.2114	ND	81	160	ND	0	159	ND	0	81	0.08	9	40	4.03E-08	4.03E-08
C16 as Hexadecane	162.2114	ND	81	160	ND	0	159	ND	0	81	0.08	9	40	4.03E-08	4.03E-08
n-Heptadecane	160.3252	ND	80	158	ND	0	158	ND	0	80	0.08	9	40	3.99E-08	3.99E-08
C17 as Heptadecane	160.3252	ND	80	158	ND	0	158	ND	0	80	0.08	9	40	3.99E-08	3.99E-08
n-Octadecane	162.1138	ND	81	160	ND	0	159	ND	0	81	0.08	9	40	4.03E-08	4.03E-08
C18 as Octodecane	162.1138	ND	81	160	ND	0	159	ND	0	81	0.08	9	40	4.03E-08	4.03E-08
n-Nonadecane	162.439	ND	81	160	ND	0	158	ND	0	81	0.08	9	40	4.04E-08	4.04E-08
C19 as Nonadecane	162.439	ND	81	160	ND	0	158	ND	0	81	0.08	9	40	4.04E-08	4.04E-08
n-Eicosane	162.0488	ND	81	159	ND	0	157	ND	0	81	0.08	9	40	4.03E-08	4.03E-08
C20 as Eicosane	162.0488	ND	81	159	ND	0	157	ND	0	81	0.08	9	40	4.03E-08	4.03E-08
n-Heneicosane	163.5772	ND	82	161	ND	0	158	ND	0	82	0.08	9	41	4.07E-08	4.07E-08
C21 as Heneicosane	163.5772	ND	82	161	ND	0	158	ND	0	82	0.08	9	41	4.07E-08	4.07E-08
n-Docosane	161.7236	ND	81	159	ND	0	159	ND	0	81	0.08	9	40	4.02E-08	4.02E-08
C22 as Docosane	161.7236	ND	81	159	ND	0	159	ND	0	81	0.08	9	40	4.02E-08	4.02E-08
n-Tricosane	162.6016	ND	81	160	ND	0	158	ND	0	81	0.08	9	40	4.04E-08	4.04E-08
C23 as Tricosane	162.6016	ND	81	160	ND	0	158	ND	0	81	0.08	9	40	4.04E-08	4.04E-08
n-Tetracosane	162.8293	ND	81	160	ND	0	160	ND	0	81	0.08	9	40	4.05E-08	4.05E-08
C24 as Tetracosane	162.8293	ND	81	160	ND	0	160	ND	0	81	0.08	9	40	4.05E-08	4.05E-08
Total Hydrocarbon			10,938			0			0		10.94	1179	5,440	5.44E-06	5.44E-06

Bagging Data Form **Vacuum Method** **Sample Id** B036

WSPA Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	B-1094	(tag reads 1099)	
Equipment Subtype:	Cap		**Plant ID:**	Refinery B		
Line Size:	1	*inches*	**Date:**	20-Apr-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	30.07 *inHg*	763.8 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	70.6 *°F*	21.4 *°C*	**TVA ID**	37887		
Component Temp:	63.3 *°F*	17.4 *°C*	**Stream Pressure/Temp:**	0	*psig*	*°F*
Stream Description:	*Diesel - G721 B Cetane Improver*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
9:16	Background	2 *ppmv*	8-sec Dwell	12 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	29.7 *ppm*
9:42	Initial Bag Vacuum	0.08 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	70.2 *°F*	Leak @	threaded connection

Bag Concentrations (ppmv)

Time	9:45	9:46	9:49	9:51	9:53	9:58	10:02	10:04						
ppmv	1.9	9.4	6.6	7.4	7.5	7.9	8.2	9.1						

Sorbent Tube Sample Collection Parameters

B036A

Time						
9:53	Volume Start	560.5 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:06	Volume Stop	572.6 *Liters*	Total Vol	12.1 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.931 *L/min*	Sorbent $Flow_{STP}$	0.940 *L/min*

B036B

9:54	Volume Start	494.3 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:07	Volume Stop	507.2 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	Sorbent $Flow_{STP}$	1.002 *L/min*
	Total ST Vol_{STP}	25.26 *Liters*	DGM Vol_{STP}	81.23 *Liters*	Total Run Vol_{STP}	106.49 *Liters*

Bagging Parameters

Time								
9:57	Vacuum check	0.125 *inches H2O*			DGM_P	1.8 *inches H2O vacuum*	760.4	*mmHg*
9:57	DGM_{10L} Time	01:37.3 *min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM $Flow_{STP}$ 6.25	*liters/minute*
9:58	Bag Temp.	70.9 *°F*	21.6	*°C*	$Sample_T$	65 *°F*	18.3	*°C*

Post-Sample Data

10:34 Post Test M21	Background	2 *ppmv*	8-sec Dwell	17 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21 55 *ppm* @ threaded connection
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A *ml*					
Density of organic condensate		N/A *g/ml*					

Average THC emissions =	2.50E-06 kg/hr
Percent difference THC ER =	28%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.81E-08
C5 as Pentane	2.81E-08
n-Hexane	4.02E-08
C6 as Hexane	4.02E-08
n-Heptane	3.34E-08
C7 as Heptane	3.34E-08
n-Octane	2.89E-08
C8 as Octane	2.89E-08
n-Nonane	2.91E-08
C9 as Nonane	2.91E-08
n-Decane	2.94E-08
C10 as Decane	2.94E-08
n-Undecane	2.93E-08
C11 as Undecane	1.31E-06
n-Dodecane	2.91E-08
C12 as Dodecane	2.91E-08
n-Tridecane	2.92E-08
C13 as Tridecane	4.41E-08
n-Tetradecane	4.17E-08
C14 as tetradecane	2.91E-08
n-Pentadecane	2.93E-08
C15 as Pentadecane	2.93E-08
n-Hexadecane	2.91E-08
C16 as Hexadecane	2.91E-08
n-Heptadecane	2.88E-08
C17 as Heptadecane	2.88E-08
n-Octadecane	2.91E-08
C18 as Octodecane	2.91E-08
n-Nonadecane	2.92E-08
C19 as Nonadecane	2.92E-08
n-Eicosane	2.91E-08
C20 as Eicosane	2.91E-08
n-Heneicosane	2.94E-08
C21 as Heneicosane	2.94E-08
n-Docosane	2.90E-08
C22 as Docosane	2.90E-08
n-Tricosane	2.92E-08
C23 as Tricosane	2.92E-08
n-Tetracosane	2.92E-08
C24 as Tetracosane	2.92E-08
Total Hydrocarbon	2.50E-06

THC:	**1.32E-04**	**lbs/day**	**2.42E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B036A	B036A		ND Adj	B037A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	79.39173	ND	40	146.66	ND	0	355	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C5 as Pentane	79.39173	ND	40	146.66	ND	0	355	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Hexane	113.7653	ND	57	210.16	ND	0	375	ND	0	57	0.06	6	28	2.80E-08	0	0	0.00E+00	2.80E-08
C6 as Hexane	113.7653	ND	57	210.16	ND	0	375	ND	0	57	0.06	6	28	2.80E-08	0	0	0.00E+00	2.80E-08
n-Heptane	94.51239	ND	47	174.6	ND	0	393	ND	0	47	0.05	5	23	2.32E-08	0	0	0.00E+00	2.32E-08
C7 as Heptane	94.51239	ND	47	174.6	ND	0	393	ND	0	47	0.05	5	23	2.32E-08	0	0	0.00E+00	2.32E-08
n-Octane	81.78512	ND	41	151.08	ND	0	160	ND	0	41	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C8 as Octane	81.78512	ND	41	151.08	ND	0	160	ND	0	41	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Nonane	82.39669	ND	41	152.21	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C9 as Nonane	82.39669	ND	41	152.21	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Decane	83.14049	ND	42	153.59	ND	0	158	ND	0	42	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C10 as Decane	83.14049	ND	42	153.59	ND	0	158	ND	0	42	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Undecane	82.92562	ND	41	153.19	ND	0	157	ND	0	41	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C11 as Undecane	2619.05		2,619	153.19	ND	0	157	ND	0	2,619	2.62	279	1287	1.29E-06	0	0	0.00E+00	1.29E-06
n-Dodecane	82.36363	ND	41	152.15	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C12 as Dodecane	82.36363	ND	41	152.15	ND	0	158	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tridecane	82.56198	ND	41	152.52	ND	0	160	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C13 as Tridecane	102.2157	J	102	152.52	ND	0	160	ND	0	102	0.10	11	50	5.02E-08	0	0	0.00E+00	5.02E-08
n-Tetradecane	92.38199	J	92	152.37	ND	0	159	ND	0	92	0.09	10	45	4.54E-08	0	0	0.00E+00	4.54E-08
C14 as tetradecane	82.47934	ND	41	152.37	ND	0	159	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Pentadecane	82.89256	ND	41	153.13	ND	0	158	ND	0	41	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C15 as Pentadecane	82.89256	ND	41	153.13	ND	0	158	ND	0	41	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Hexadecane	82.44628	ND	41	152.31	ND	0	159	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C16 as Hexadecane	82.44628	ND	41	152.31	ND	0	159	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Heptadecane	81.4876	ND	41	150.53	ND	0	158	ND	0	41	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C17 as Heptadecane	81.4876	ND	41	150.53	ND	0	158	ND	0	41	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Octadecane	82.39669	ND	41	152.21	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C18 as Octodecane	82.39669	ND	41	152.21	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Nonadecane	82.56198	ND	41	152.52	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C19 as Nonadecane	82.56198	ND	41	152.52	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Eicosane	82.36363	ND	41	152.15	ND	0	157	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C20 as Eicosane	82.36363	ND	41	152.15	ND	0	157	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heneicosane	83.14049	ND	42	153.59	ND	0	158	ND	0	42	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C21 as Heneicosane	83.14049	ND	42	153.59	ND	0	158	ND	0	42	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Docosane	82.19834	ND	41	151.85	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C22 as Docosane	82.19834	ND	41	151.85	ND	0	159	ND	0	41	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tricosane	82.64463	ND	41	152.67	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C23 as Tricosane	82.64463	ND	41	152.67	ND	0	158	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Tetracosane	82.76033	ND	41	152.89	ND	0	160	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C24 as Tetracosane	82.76033	ND	41	152.89	ND	0	160	ND	0	41	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
Total Hydrocarbon			4,380			0			0		4.38	466	2,153	2.15E-06	0	0	0.00E+00	2.15E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B036B	B036B		ND Adj	B037A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.9364	ND	74	147	ND	0	355	ND	0	74	0.07	8	37	3.66E-08	3.66E-08
C5 as Pentane	148.9364	ND	74	147	ND	0	355	ND	0	74	0.07	8	37	3.66E-08	3.66E-08
n-Hexane	213.4202	ND	107	210	ND	0	375	ND	0	107	0.11	11	52	5.24E-08	5.24E-08
C6 as Hexane	213.4202	ND	107	210	ND	0	375	ND	0	107	0.11	11	52	5.24E-08	5.24E-08
n-Heptane	177.3023	ND	89	175	ND	0	393	ND	0	89	0.09	9	44	4.36E-08	4.36E-08
C7 as Heptane	177.3023	ND	89	175	ND	0	393	ND	0	89	0.09	9	44	4.36E-08	4.36E-08
n-Octane	153.4264	ND	77	151	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C8 as Octane	153.4264	ND	77	151	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Nonane	154.5736	ND	77	152	ND	0	158	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C9 as Nonane	154.5736	ND	77	152	ND	0	158	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Decane	155.969	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C10 as Decane	155.969	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Undecane	155.5659	ND	78	153	ND	0	157	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C11 as Undecane	2705.553		2,706	153	ND	0	157	ND	0	2,706	2.71	288	1330	1.33E-06	1.33E-06
n-Dodecane	154.5116	ND	77	152	ND	0	158	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C12 as Dodecane	154.5116	ND	77	152	ND	0	158	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Tridecane	154.8837	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C13 as Tridecane	154.8837	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
n-Tetradecane	154.7287	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C14 as tetradecane	154.7287	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Pentadecane	155.5039	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C15 as Pentadecane	155.5039	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Hexadecane	154.6667	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C16 as Hexadecane	154.6667	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Heptadecane	152.8682	ND	76	151	ND	0	158	ND	0	76	0.08	8	38	3.76E-08	3.76E-08
C17 as Heptadecane	152.8682	ND	76	151	ND	0	158	ND	0	76	0.08	8	38	3.76E-08	3.76E-08
n-Octadecane	154.5736	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C18 as Octodecane	154.5736	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Nonadecane	154.8837	ND	77	153	ND	0	158	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C19 as Nonadecane	154.8837	ND	77	153	ND	0	158	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
n-Eicosane	154.5116	ND	77	152	ND	0	157	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C20 as Eicosane	154.5116	ND	77	152	ND	0	157	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Heneicosane	155.969	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C21 as Heneicosane	155.969	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Docosane	154.2016	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C22 as Docosane	154.2016	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Tricosane	155.0388	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C23 as Tricosane	155.0388	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Tetracosane	155.2558	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C24 as Tetracosane	155.2558	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
Total Hydrocarbon			5,799			0			0		5.80	617	2,850	2.85E-06	2.85E-06

Bagging Data Form — Vacuum Method

Sample Id B039

WSPA — Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	**B-1306**	(assumed; no tag/ID)
Equipment Subtype:	Globe		**Plant ID:**	Refinery B	
Line Size:	8	*inches*	**Date:**	20-Apr-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.08 *inHg*	764.0 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	85.6 *°F*	29.8 *°C*	**TVA ID**	37887	
Component Temp:	150 *°F*	65.6 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Diesel to production thru preheat E-701*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
10:48	Background	2 *ppmv*	8-sec Dwell	3 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	10 *ppm*
11:31	Initial Bag Vacuum	0.065 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	117.9 *°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	11:34	11:36	11:38	11:40	11:42	11:48	11:58							
ppmv	3.5	4.5	4.7	4.7	4.7	5.6	7							

Sorbent Tube Sample Collection Parameters

B039A

Time						
11:43	Volume Start	572.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:56	Volume Stop	585.4 *Liters*	Total Vol	12.8 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.985 *L/min*	$Sorbent\ Flow_{STP}$	0.967 *L/min*

B039B

11:43	Volume Start	507.2 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:56	Volume Stop	520.1 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	$Sorbent\ Flow_{STP}$	0.975 *L/min*
	$Total\ ST\ Vol_{STP}$	25.25 *Liters*	$DGM\ Vol_{STP}$	79.82 *Liters*	$Total\ Run\ Vol_{STP}$	105.07 *Liters*

Bagging Parameters

Time							
11:47	Vacuum check	0.1 *inches H2O*			DGM_P	1.8 *inches H2O vacuum*	760.7 *mmHg*
11:46	DGM_{10L} Time	01:36.4 *min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	$DGM\ Flow_{STP}$ 6.14 *liters/minute*
11:48	Bag Temp.	122.4 *°F*	50.2 *°C*		$Sample_T$	80 *°F*	26.7 *°C*

Post-Sample Data

12:05	Post Test M21	Background	-4 *ppmv*	8-sec Dwell	12 *ppmv*	Total Dwell 1:20 *min:sec*	Final M21	34 *ppm* @ Stem
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*		
Organic condensate collected			N/A *ml*					
Density of organic condensate			N/A *g/ml*					

Average THC emissions =	1.56E-06	kg/hr
Percent difference THC ER =	37%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.72E-08
C5 as Pentane	2.72E-08
n-Hexane	3.89E-08
C6 as Hexane	3.89E-08
n-Heptane	3.23E-08
C7 as Heptane	3.23E-08
n-Octane	2.80E-08
C8 as Octane	5.52E-08
n-Nonane	2.82E-08
C9 as Nonane	5.56E-08
n-Decane	7.21E-08
C10 as Decane	1.23E-07
n-Undecane	3.81E-08
C11 as Undecane	1.73E-07
n-Dodecane	4.04E-08
C12 as Dodecane	2.82E-08
n-Tridecane	2.82E-08
C13 as Tridecane	7.15E-08
n-Tetradecane	2.82E-08
C14 as tetradecane	2.82E-08
n-Pentadecane	2.84E-08
C15 as Pentadecane	2.84E-08
n-Hexadecane	2.82E-08
C16 as Hexadecane	2.82E-08
n-Heptadecane	2.79E-08
C17 as Heptadecane	2.79E-08
n-Octadecane	2.82E-08
C18 as Octodecane	2.82E-08
n-Nonadecane	2.82E-08
C19 as Nonadecane	2.82E-08
n-Eicosane	2.82E-08
C20 as Eicosane	2.82E-08
n-Heneicosane	2.84E-08
C21 as Heneicosane	2.84E-08
n-Docosane	2.81E-08
C22 as Docosane	2.81E-08
n-Tricosane	2.83E-08
C23 as Tricosane	2.83E-08
n-Tetracosane	2.83E-08
C24 as Tetracosane	2.83E-08
Total Hydrocarbon	1.56E-06

THC: 8.25E-05 lbs/day 1.51E-05 tons/yr

B039A

ANALYTICAL RESULTS B039A			BACKGROUND B040A			TRIP BLANK #B028			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#P0XX		COMBINED EMISSION RATE
Component µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane 75.05	ND	38	147.79	ND	0	355	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane 75.05	ND	38	147.79	ND	0	355	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane 107.5437	ND	54	211.78	ND	0	375	ND	0	54	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
C6 as Hexane 107.5437	ND	54	211.78	ND	0	375	ND	0	54	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
n-Heptane 89.34375	ND	45	175.94	ND	0	393	ND	0	45	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
C7 as Heptane 89.34375	ND	45	175.94	ND	0	393	ND	0	45	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
n-Octane 77.3125	ND	39	152.25	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C8 as Octane 77.3125	ND	39	152.25	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Nonane 77.89062	ND	39	153.38	ND	0	158	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C9 as Nonane 77.89062	ND	39	153.38	ND	0	158	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Decane 137.4631	J	137	154.77	ND	0	158	ND	0	137	0.14	14	67	6.67E-08	0	0	0.00E+00	6.67E-08
C10 as Decane 315.619	J	316	154.77	ND	0	158	ND	0	316	0.32	33	153	1.53E-07	0	0	0.00E+00	1.53E-07
n-Undecane 79.33238	J	79	154.37	ND	0	157	ND	0	79	0.08	8	38	3.85E-08	0	0	0.00E+00	3.85E-08
C11 as Undecane 529.073	J	529	154.37	ND	0	157	ND	0	529	0.53	56	257	2.57E-07	0	0	0.00E+00	2.57E-07
n-Dodecane 89.54008	J	90	153.32	ND	0	158	ND	0	90	0.09	9	43	4.34E-08	0	0	0.00E+00	4.34E-08
C12 as Dodecane 77.85937	ND	39	153.32	ND	0	158	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tridecane 78.04687	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C13 as Tridecane 112.754	J	113	153.69	ND	0	160	ND	0	113	0.11	12	55	5.47E-08	0	0	0.00E+00	5.47E-08
n-Tetradecane 77.96875	ND	39	153.54	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C14 as tetradecane 77.96875	ND	39	153.54	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Pentadecane 78.35937	ND	39	154.31	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C15 as Pentadecane 78.35937	ND	39	154.31	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexadecane 77.9375	ND	39	153.48	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C16 as Hexadecane 77.9375	ND	39	153.48	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptadecane 77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C17 as Heptadecane 77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Octadecane 77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C18 as Octodecane 77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Nonadecane 78.04687	ND	39	153.69	ND	0	158	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C19 as Nonadecane 78.04687	ND	39	153.69	ND	0	158	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Eicosane 77.85937	ND	39	153.32	ND	0	157	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C20 as Eicosane 77.85937	ND	39	153.32	ND	0	157	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heneicosane 78.59375	ND	39	154.77	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane 78.59375	ND	39	154.77	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane 77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C22 as Docosane 77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Tricosane 78.125	ND	39	153.85	ND	0	158	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C23 as Tricosane 78.125	ND	39	153.85	ND	0	158	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tetracosane 78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C24 as Tetracosane 78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
Total Hydrocarbon		2,627			0			0		2.63	276	1,274	1.27E-06	0	0	0.00E+00	1.27E-06

B039B

ANALYTICAL RESULTS B039B			BACKGROUND B040A			TRIP BLANK #B028			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane 148.9364	ND	74	148	ND	0	355	ND	0	74	0.07	8	36	3.61E-08	3.61E-08
C5 as Pentane 148.9364	ND	74	148	ND	0	355	ND	0	74	0.07	8	36	3.61E-08	3.61E-08
n-Hexane 213.4202	ND	107	212	ND	0	375	ND	0	107	0.11	11	52	5.17E-08	5.17E-08
C6 as Hexane 213.4202	ND	107	212	ND	0	375	ND	0	107	0.11	11	52	5.17E-08	5.17E-08
n-Heptane 177.3023	ND	89	176	ND	0	393	ND	0	89	0.09	9	43	4.30E-08	4.30E-08
C7 as Heptane 177.3023	ND	89	176	ND	0	393	ND	0	89	0.09	9	43	4.30E-08	4.30E-08
n-Octane 153.4264	ND	77	152	ND	0	160	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C8 as Octane 189.0366	J	189	152	ND	0	160	ND	0	189	0.19	20	92	9.17E-08	9.17E-08
n-Nonane 154.5736	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C9 as Nonane 190.3376	J	190	153	ND	0	158	ND	0	190	0.19	20	92	9.23E-08	9.23E-08
n-Decane 159.7798	J	160	155	ND	0	158	ND	0	160	0.16	17	77	7.75E-08	7.75E-08
C10 as Decane 192.0193	J	192	155	ND	0	158	ND	0	192	0.19	20	93	9.31E-08	9.31E-08
n-Undecane 155.5659	ND	78	154	ND	0	157	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C11 as Undecane 182.4534	J	182	154	ND	0	157	ND	0	182	0.18	19	88	8.85E-08	8.85E-08
n-Dodecane 154.5116	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C12 as Dodecane 154.5116	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
n-Tridecane 154.8837	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C13 as Tridecane 182.1386	J	182	154	ND	0	160	ND	0	182	0.18	19	88	8.83E-08	8.83E-08
n-Tetradecane 154.7287	ND	77	154	ND	0	159	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
C14 as tetradecane 154.7287	ND	77	154	ND	0	159	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
n-Pentadecane 155.5039	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C15 as Pentadecane 155.5039	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Hexadecane 154.6667	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
C16 as Hexadecane 154.6667	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
n-Heptadecane 152.8682	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.71E-08	3.71E-08
C17 as Heptadecane 152.8682	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.71E-08	3.71E-08
n-Octadecane 154.5736	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C18 as Octodecane 154.5736	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
n-Nonadecane 154.8837	ND	77	154	ND	0	158	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C19 as Nonadecane 154.8837	ND	77	154	ND	0	158	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Eicosane 154.5116	ND	77	153	ND	0	157	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C20 as Eicosane 154.5116	ND	77	153	ND	0	157	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
n-Heneicosane 155.969	ND	78	155	ND	0	158	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C21 as Heneicosane 155.969	ND	78	155	ND	0	158	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Docosane 154.2016	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
C22 as Docosane 154.2016	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
n-Tricosane 155.0388	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C23 as Tricosane 155.0388	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Tetracosane 155.2558	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C24 as Tetracosane 155.2558	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
Total Hydrocarbon		3,801			0			0		3.80	399	1,843	1.84E-06	1.84E-06

Bagging Data Form	Vacuum Method		Sample Id	B041
Equipment type:	Valve		Component ID:	B-1137
Equipment Subtype:	Gate - Bleeder		Plant ID:	Refinery B
Line Size:	2 *inches*		Date:	30-Apr-18
Phase (G, LL, HL):	HL		Analysis team:	EG/DR
Barometric pressure	29.92 *inHg*	760.0 *mmHg*	Sample Pump A	LP52979
			Sample Pump B	LP52975
Ambient Temp:	57.6 *°F*	14.2 *°C*	TVA ID	37887
Component Temp:	265 *°F*	129.4 *°C*	Stream Pressure/Temp:	*psig* *°F*
Stream Description:	*Reboil Oil @ B103*			

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:15	Background	-2	*ppmv*	8-sec Dwell	7	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	54 *ppm*
11:01	Initial Bag Vacuum	0.09	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	158	*°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	11:05	11:07	11:08	11:10	11:12	11:14	11:16	11:18	11:20	11:22	11:24	11:26	11:32	11:35
ppmv	16.1	17.1	18	18.8	19.6	20.7	21.2	21.7	22.4	22.9	23.7	23.8	24.9	25.7

Sorbent Tube Sample Collection Parameters

B041A

Time									
11:26	Volume Start	588.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:39	Volume Stop	601.3	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent $Flow_{STP}$	0.978	*L/min*

B041B

11:26	Volume Start	522.4	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:39	Volume Stop	534.9	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent $Flow_{STP}$	0.978	*L/min*
	Total ST Vol_{STP}	25.42	*Liters*	DGM Vol_{STP}	77.00	*Liters*	Total Run Vol_{STP}	102.42	*Liters*

Bagging Parameters

Time									
11:30	Vacuum check	0.1	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	756.6 *mmHg*
11:30	DGM_{10L} Time	01:42.5	*min:sec.frac*	DGM Time	1.717	DGM Flow	5.83	DGM $Flow_{STP}$	5.92 *liters/minute*
11:30	Bag Temp.	59	*°F*	15.0	*°C*	$Sample_T$	59	*°F*	15.0 *°C*

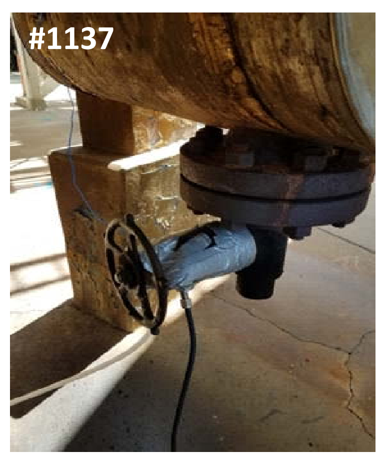
TC came out, DGM temperature used

Post-Sample Data

11:52	Post Test M21	Background	14	*ppmv*	8-sec Dwell	18	*ppmv*	Total Dwell	4:00 *min:sec*	Final M21	35 *ppm*
										@	Stem

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	9.30E-05 kg/hr
Percent difference THC ER =	24%
Acceptable?	No



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.66E-08
C5 as Pentane	2.66E-08
n-Hexane	2.76E-08
C6 as Hexane	3.83E-08
n-Heptane	2.88E-08
C7 as Heptane	2.88E-08
n-Octane	2.81E-08
C8 as Octane	6.66E-08
n-Nonane	2.83E-08
C9 as Nonane	2.10E-07
n-Decane	7.53E-08
C10 as Decane	8.42E-07
n-Undecane	5.79E-08
C11 as Undecane	3.41E-06
n-Dodecane	2.86E-07
C12 as Dodecane	8.59E-06
n-Tridecane	1.50E-06
C13 as Tridecane	1.13E-05
n-Tetradecane	2.00E-06
C14 as tetradecane	1.13E-05
n-Pentadecane	2.59E-06
C15 as Pentadecane	9.65E-06
n-Hexadecane	2.98E-06
C16 as Hexadecane	8.74E-06
n-Heptadecane	2.95E-06
C17 as Heptadecane	7.06E-06
n-Octadecane	2.33E-06
C18 as Octodecane	4.95E-06
n-Nonadecane	1.82E-06
C19 as Nonadecane	3.08E-06
n-Eicosane	1.21E-06
C20 as Eicosane	1.82E-06
n-Heneicosane	7.14E-07
C21 as Heneicosane	1.26E-06
n-Docosane	4.50E-07
C22 as Docosane	6.63E-07
n-Tricosane	2.48E-07
C23 as Tricosane	3.10E-07
n-Tetracosane	1.54E-07
C24 as Tetracosane	1.79E-07
Total Hydrocarbon	9.30E-05

THC:	4.92E-03	lbs/day	8.98E-04	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B041A	B041A		ND Adj	B042A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.896	ND	37	146.28	ND	0	355	ND	0	37	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C5 as Pentane	74.896	ND	37	146.28	ND	0	355	ND	0	37	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Hexane	77.808	ND	39	151.97	ND	0	375	ND	0	39	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C6 as Hexane	84.12692	J	84	151.97	ND	0	375	ND	0	84	0.08	9	40	3.98E-08	0	0	0.00E+00	3.98E-08
n-Heptane	81.312	ND	41	158.81	ND	0	393	ND	0	41	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C7 as Heptane	81.312	ND	41	158.81	ND	0	393	ND	0	41	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Octane	79.168	ND	40	154.62	ND	0	160	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C8 as Octane	374.5956	J	375	210.57	J	211	160	ND	0	164	0.16	17	78	7.75E-08	0	0	0.00E+00	7.75E-08
n-Nonane	79.76	ND	40	155.78	ND	0	158	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C9 as Nonane	507.702	J	508	155.78	ND	0	158	ND	0	508	0.51	52	240	2.40E-07	0	0	0.00E+00	2.40E-07
n-Decane	141.7644	J	142	157.19	ND	0	158	ND	0	142	0.14	15	67	6.70E-08	0	0	0.00E+00	6.70E-08
C10 as Decane	2137.688		2,138	159.06	J	159	158	ND	0	1,979	1.98	203	935	9.35E-07	0	0	0.00E+00	9.35E-07
n-Undecane	164.5531	J	165	156.78	ND	0	157	ND	0	165	0.16	17	78	7.78E-08	0	0	0.00E+00	7.78E-08
C11 as Undecane	7617.018		7,617	168.8	J	169	157	ND	0	7,448	7.45	763	3521	3.52E-06	0	0	0.00E+00	3.52E-06
n-Dodecane	566.3469	J	566	155.72	ND	0	158	ND	0	566	0.57	58	268	2.68E-07	0	0	0.00E+00	2.68E-07
C12 as Dodecane	17243.16		17,243	155.72	ND	0	158	ND	0	17,243	17.24	1766	8151	8.15E-06	0	0	0.00E+00	8.15E-06
n-Tridecane	2930.556		2,931	156.09	ND	0	160	ND	0	2,931	2.93	300	1385	1.39E-06	0	0	0.00E+00	1.39E-06
C13 as Tridecane	22926.05		22,926	320.99	J	321	160	ND	0	22,605	22.61	2315	10686	1.07E-05	0	0	0.00E+00	1.07E-05
n-Tetradecane	4651.442		4,651	155.94	ND	0	159	ND	0	4,651	4.65	476	2199	2.20E-06	0	0	0.00E+00	2.20E-06
C14 as tetradecane	25151.09		25,151	155.94	ND	0	159	ND	0	25,151	25.15	2576	11889	1.19E-05	0	0	0.00E+00	1.19E-05
n-Pentadecane	5770.343		5,770	156.72	ND	0	158	ND	0	5,770	5.77	591	2728	2.73E-06	0	0	0.00E+00	2.73E-06
C15 as Pentadecane	22802.54		22,803	160.51	J	161	158	ND	0	22,642	22.64	2319	10703	1.07E-05	0	0	0.00E+00	1.07E-05
n-Hexadecane	6675.475		6,675	155.87	ND	0	159	ND	0	6,675	6.68	684	3156	3.16E-06	0	0	0.00E+00	3.16E-06
C16 as Hexadecane	21332.7		21,333	155.87	ND	0	159	ND	0	21,333	21.33	2185	10084	1.01E-05	0	0	0.00E+00	1.01E-05
n-Heptadecane	6646.265		6,646	154.06	ND	0	158	ND	0	6,646	6.65	681	3142	3.14E-06	0	0	0.00E+00	3.14E-06
C17 as Heptadecane	18417.49		18,417	154.06	ND	0	158	ND	0	18,417	18.42	1886	8706	8.71E-06	0	0	0.00E+00	8.71E-06
n-Octadecane	5277.243		5,277	155.78	ND	0	159	ND	0	5,277	5.28	540	2495	2.49E-06	0	0	0.00E+00	2.49E-06
C18 as Octodecane	13582.13		13,582	155.78	ND	0	159	ND	0	13,582	13.58	1391	6420	6.42E-06	0	0	0.00E+00	6.42E-06
n-Nonadecane	4237.623		4,238	156.09	ND	0	158	ND	0	4,238	4.24	434	2003	2.00E-06	0	0	0.00E+00	2.00E-06
C19 as Nonadecane	9385.755		9,386	156.09	ND	0	158	ND	0	9,386	9.39	961	4437	4.44E-06	0	0	0.00E+00	4.44E-06
n-Eicosane	3014.959		3,015	155.72	ND	0	157	ND	0	3,015	3.01	309	1425	1.43E-06	0	0	0.00E+00	1.43E-06
C20 as Eicosane	6230.982		6,231	155.72	ND	0	157	ND	0	6,231	6.23	638	2945	2.95E-06	0	0	0.00E+00	2.95E-06
n-Heneicosane	1791.173		1,791	157.19	ND	0	158	ND	0	1,791	1.79	183	847	8.47E-07	0	0	0.00E+00	8.47E-07
C21 as Heneicosane	4438.286		4,438	157.19	ND	0	158	ND	0	4,438	4.44	455	2098	2.10E-06	0	0	0.00E+00	2.10E-06
n-Docosane	1158.039		1,158	155.41	ND	0	159	ND	0	1,158	1.16	119	547	5.47E-07	0	0	0.00E+00	5.47E-07
C22 as Docosane	2522.569		2,523	155.41	ND	0	159	ND	0	2,523	2.52	258	1192	1.19E-06	0	0	0.00E+00	1.19E-06
n-Tricosane	618.0334	J	618	156.25	ND	0	158	ND	0	618	0.62	63	292	2.92E-07	0	0	0.00E+00	2.92E-07
C23 as Tricosane	1140.286		1,140	156.25	ND	0	158	ND	0	1,140	1.14	117	539	5.39E-07	0	0	0.00E+00	5.39E-07
n-Tetracosane	376.7271	J	377	156.47	ND	0	160	ND	0	377	0.38	39	178	1.78E-07	0	0	0.00E+00	1.78E-07
C24 as Tetracosane	676.0295	J	676	156.47	ND	0	160	ND	0	676	0.68	69	320	3.20E-07	0	0	0.00E+00	3.20E-07
Total Hydrocarbon			220,865			1,020			0		219.85	22516	103,922	1.04E-04	0	0	0.00E+00	1.04E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B041B	B041B		ND Adj	B042A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	149.792	ND	75	146	ND	0	355	ND	0	75	0.07	8	35	3.54E-08	3.54E-08
C5 as Pentane	149.792	ND	75	146	ND	0	355	ND	0	75	0.07	8	35	3.54E-08	3.54E-08
n-Hexane	155.616	ND	78	152	ND	0	375	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C6 as Hexane	155.616	ND	78	152	ND	0	375	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Heptane	162.624	ND	81	159	ND	0	393	ND	0	81	0.08	8	38	3.84E-08	3.84E-08
C7 as Heptane	162.624	ND	81	159	ND	0	393	ND	0	81	0.08	8	38	3.84E-08	3.84E-08
n-Octane	158.336	ND	79	155	ND	0	160	ND	0	79	0.08	8	37	3.74E-08	3.74E-08
C8 as Octane	328.1113	J	328	211	J	211	160	ND	0	118	0.12	12	56	5.56E-08	5.56E-08
n-Nonane	159.52	ND	80	156	ND	0	158	ND	0	80	0.08	8	38	3.77E-08	3.77E-08
C9 as Nonane	380.7476	J	381	156	ND	0	158	ND	0	381	0.38	39	180	1.80E-07	1.80E-07
n-Decane	177.0204	J	177	157	ND	0	158	ND	0	177	0.18	18	84	8.37E-08	8.37E-08
C10 as Decane	1743.772		1,744	159	J	159	158	ND	0	1,585	1.58	162	749	7.49E-07	7.49E-07
n-Undecane	160.544	ND	80	157	ND	0	157	ND	0	80	0.08	8	38	3.79E-08	3.79E-08
C11 as Undecane	7127.111		7,127	169	J	169	157	ND	0	6,958	6.96	713	3289	3.29E-06	3.29E-06
n-Dodecane	645.4851	J	645	156	ND	0	158	ND	0	645	0.65	66	305	3.05E-07	3.05E-07
C12 as Dodecane	19080.9		19,081	156	ND	0	158	ND	0	19,081	19.08	1954	9020	9.02E-06	9.02E-06
n-Tridecane	3404.738		3,405	156	ND	0	160	ND	0	3,405	3.40	349	1609	1.61E-06	1.61E-06
C13 as Tridecane	25325.64		25,326	321	J	321	160	ND	0	25,005	25.00	2561	11820	1.18E-05	1.18E-05
n-Tetradecane	3790.044		3,790	156	ND	0	159	ND	0	3,790	3.79	388	1792	1.79E-06	1.79E-06
C14 as tetradecane	22657.3		22,657	156	ND	0	159	ND	0	22,657	22.66	2321	10710	1.07E-05	1.07E-05
n-Pentadecane	5180.733		5,181	157	ND	0	158	ND	0	5,181	5.18	531	2449	2.45E-06	2.45E-06
C15 as Pentadecane	18333.9		18,334	161	J	161	158	ND	0	18,173	18.17	1861	8591	8.59E-06	8.59E-06
n-Hexadecane	5951.548		5,952	156	ND	0	159	ND	0	5,952	5.95	610	2813	2.81E-06	2.81E-06
C16 as Hexadecane	15647.22		15,647	156	ND	0	159	ND	0	15,647	15.65	1603	7397	7.40E-06	7.40E-06
n-Heptadecane	5823.571		5,824	154	ND	0	158	ND	0	5,824	5.82	596	2753	2.75E-06	2.75E-06
C17 as Heptadecane	11463.52		11,464	154	ND	0	158	ND	0	11,464	11.46	1174	5419	5.42E-06	5.42E-06
n-Octadecane	4579.019		4,579	156	ND	0	159	ND	0	4,579	4.58	469	2165	2.16E-06	2.16E-06
C18 as Octodecane	7349.03		7,349	156	ND	0	159	ND	0	7,349	7.35	753	3474	3.47E-06	3.47E-06
n-Nonadecane	3473.174		3,473	156	ND	0	158	ND	0	3,473	3.47	356	1642	1.64E-06	1.64E-06
C19 as Nonadecane	3651.493		3,651	156	ND	0	158	ND	0	3,651	3.65	374	1726	1.73E-06	1.73E-06
n-Eicosane	2118.788		2,119	156	ND	0	157	ND	0	2,119	2.12	217	1002	1.00E-06	1.00E-06
C20 as Eicosane	1462.284	J	1,462	156	ND	0	157	ND	0	1,462	1.46	150	691	6.91E-07	6.91E-07
n-Heneicosane	1228.625	J	1,229	157	ND	0	158	ND	0	1,229	1.23	126	581	5.81E-07	5.81E-07
C21 as Heneicosane	900.511	J	901	157	ND	0	158	ND	0	901	0.90	92	426	4.26E-07	4.26E-07
n-Docosane	744.8725	J	745	155	ND	0	159	ND	0	745	0.74	76	352	3.52E-07	3.52E-07
C22 as Docosane	280.4927	J	280	155	ND	0	159	ND	0	280	0.28	29	133	1.33E-07	1.33E-07
n-Tricosane	432.8799	J	433	156	ND	0	158	ND	0	433	0.43	44	205	2.05E-07	2.05E-07
C23 as Tricosane	169.5992	J	170	156	ND	0	158	ND	0	170	0.17	17	80	8.02E-08	8.02E-08
n-Tetracosane	273.0361	J	273	156	ND	0	160	ND	0	273	0.27	28	129	1.29E-07	1.29E-07
C24 as Tetracosane	160.224	ND	80	156	ND	0	160	ND	0	80	0.08	8	38	3.79E-08	3.79E-08
Total Hydrocarbon			174,513			1,020			0		173.49	17769	82,011	8.20E-05	8.20E-05

Bagging Data Form	**Vacuum Method**	**Sample Id**	**B043**
Equipment type:	Connector	**Component ID:**	B-1329
Equipment Subtype:	Plug	**Plant ID:**	Refinery B
Line Size:	1 *inches*	**Date:**	30-Apr-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.86 *inHg* / 758.4 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	65.9 *°F* / 18.8 *°C*	**TVA ID**	36502
Component Temp:	271 *°F* / 132.8 *°C*	**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*Reboil Oil*		

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
13:56	Background	-3	*ppmv*	8-sec Dwell	2	*ppmv*	Total Dwell	3:30 *min:sec*	Final M21	12 *ppm*
14:24	Initial Bag Vacuum	0.09	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	87.6 *°F*	Leak @	Plug

Bag Concentrations (ppmv)

Time	14:26	14:28	14:30	14:32	14:34	14:44								
ppmv	8.7	10.9	11.2	11.4	11.6	11.9								

Sorbent Tube Sample Collection Parameters

B043A

Time								
14:34	Volume Start	601.3 *Liters*		Design Sample Flow Rate = 1 liter/min				
14:47	Volume Stop	613.9 *Liters*	Total Vol	12.6 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.925	*L/min*

B043B

14:34	Volume Start	534.9 *Liters*		Design Sample Flow Rate = 1 liter/min				
14:47	Volume Stop	547.7 *Liters*	Total Vol	12.8 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.939	*L/min*
	Total ST Vol$_{STP}$	24.23 *Liters*	DGM Vol$_{STP}$	75.93 *Liters*		Total Run Vol$_{STP}$	100.16	*Liters*

Bagging Parameters

Time									
14:39	Vacuum check	0.165	*inches H2O*		DGM$_P$	1.8	*inches H2O vacuum*	755.1	*mmHg*
14:39	DGM$_{10L}$ Time	01:38.0	*min:sec.frac*	DGM Time 1.633	DGM Flow	6.12	DGM Flow$_{STP}$	5.84	*liters/minute*
14:40	Bag Temp.	84.6	*°F*	29.2 *°C*	Sample$_T$	92	*°F*	33.3	*°C*

Post-Sample Data

14:57	Post Test M21	Background 7 *ppmv*	8-sec Dwell 9 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	11 *ppm*	@ Plug

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	4.32E-06 kg/hr
Percent difference THC ER =	98%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.55E-08
C5 as Pentane	2.55E-08
n-Hexane	2.65E-08
C6 as Hexane	2.65E-08
n-Heptane	2.77E-08
C7 as Heptane	2.77E-08
n-Octane	2.69E-08
C8 as Octane	4.05E-08
n-Nonane	2.71E-08
C9 as Nonane	2.71E-08
n-Decane	2.74E-08
C10 as Decane	7.12E-08
n-Undecane	2.73E-08
C11 as Undecane	1.58E-07
n-Dodecane	2.90E-07
C12 as Dodecane	1.26E-07
n-Tridecane	1.05E-07
C13 as Tridecane	9.33E-07
n-Tetradecane	2.55E-07
C14 as tetradecane	9.78E-07
n-Pentadecane	2.03E-07
C15 as Pentadecane	3.42E-07
n-Hexadecane	6.09E-08
C16 as Hexadecane	2.72E-08
n-Heptadecane	2.68E-08
C17 as Heptadecane	2.68E-08
n-Octadecane	2.71E-08
C18 as Octodecane	2.71E-08
n-Nonadecane	2.72E-08
C19 as Nonadecane	2.72E-08
n-Eicosane	2.71E-08
C20 as Eicosane	2.71E-08
n-Heneicosane	2.74E-08
C21 as Heneicosane	2.74E-08
n-Docosane	2.71E-08
C22 as Docosane	2.71E-08
n-Tricosane	2.72E-08
C23 as Tricosane	2.72E-08
n-Tetracosane	2.73E-08
C24 as Tetracosane	2.73E-08
Total Hydrocarbon	4.32E-06

THC:	**2.29E-04**	**lbs/day**	**4.17E-05 tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B043A	B043A		ND Adj	B044A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	146.28	ND	0	355	ND	0	37	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
C5 as Pentane	74.30159	ND	37	146.28	ND	0	355	ND	0	37	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
n-Hexane	77.19047	ND	39	151.97	ND	0	375	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C6 as Hexane	77.19047	ND	39	151.97	ND	0	375	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Heptane	80.66666	ND	40	158.81	ND	0	393	ND	0	40	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C7 as Heptane	80.66666	ND	40	158.81	ND	0	393	ND	0	40	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Octane	78.53968	ND	39	154.62	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C8 as Octane	325.7236	J	326	204.25	J	204	160	ND	0	121	0.12	12	56	5.62E-08	0	0	0.00E+00	5.62E-08
n-Nonane	79.12698	ND	40	155.78	ND	0	158	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C9 as Nonane	79.12698	ND	40	155.78	ND	0	158	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Decane	79.84127	ND	40	157.19	ND	0	158	ND	0	40	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C10 as Decane	357.5406	J	358	157.33	J	157	158	ND	0	200	0.20	20	93	9.26E-08	0	0	0.00E+00	9.26E-08
n-Undecane	79.63492	ND	40	156.78	ND	0	157	ND	0	40	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C11 as Undecane	580.6627	J	581	162.11	J	162	157	ND	0	419	0.42	42	193	1.93E-07	0	0	0.00E+00	1.93E-07
n-Dodecane	695.1531	J	695	155.72	ND	0	158	ND	0	695	0.70	70	321	3.21E-07	0	0	0.00E+00	3.21E-07
C12 as Dodecane	468.4696	J	468	155.72	ND	0	158	ND	0	468	0.47	47	217	2.17E-07	0	0	0.00E+00	2.17E-07
n-Tridecane	377.2669	J	377	156.09	ND	0	160	ND	0	377	0.38	38	174	1.74E-07	0	0	0.00E+00	1.74E-07
C13 as Tridecane	4197.247		4,197	309.67	J	310	160	ND	0	3,888	3.89	389	1797	1.80E-06	0	0	0.00E+00	1.80E-06
n-Tetradecane	856.7226		857	155.94	ND	0	159	ND	0	857	0.86	86	396	3.96E-07	0	0	0.00E+00	3.96E-07
C14 as tetradecane	3837.06		3,837	155.94	ND	0	159	ND	0	3,837	3.84	384	1774	1.77E-06	0	0	0.00E+00	1.77E-06
n-Pentadecane	556.3624	J	556	156.72	ND	0	158	ND	0	556	0.56	56	257	2.57E-07	0	0	0.00E+00	2.57E-07
C15 as Pentadecane	1231.855		1,232	156.72	ND	0	158	ND	0	1,232	1.23	123	569	5.69E-07	0	0	0.00E+00	5.69E-07
n-Hexadecane	185.3235	J	185	155.87	ND	0	159	ND	0	185	0.19	19	86	8.57E-08	0	0	0.00E+00	8.57E-08
C16 as Hexadecane	79.1746	ND	40	155.87	ND	0	159	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Heptadecane	78.25397	ND	39	154.06	ND	0	158	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C17 as Heptadecane	78.25397	ND	39	154.06	ND	0	158	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Octadecane	79.12698	ND	40	155.78	ND	0	159	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C18 as Octodecane	79.12698	ND	40	155.78	ND	0	159	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Nonadecane	79.28571	ND	40	156.09	ND	0	158	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C19 as Nonadecane	79.28571	ND	40	156.09	ND	0	158	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Eicosane	79.09524	ND	40	155.72	ND	0	157	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C20 as Eicosane	79.09524	ND	40	155.72	ND	0	157	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Heneicosane	79.84127	ND	40	157.19	ND	0	158	ND	0	40	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C21 as Heneicosane	79.84127	ND	40	157.19	ND	0	158	ND	0	40	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Docosane	78.93651	ND	39	155.41	ND	0	159	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C22 as Docosane	78.93651	ND	39	155.41	ND	0	159	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Tricosane	79.36508	ND	40	156.25	ND	0	158	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C23 as Tricosane	79.36508	ND	40	156.25	ND	0	158	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Tetracosane	79.47619	ND	40	156.47	ND	0	160	ND	0	40	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C24 as Tetracosane	79.47619	ND	40	156.47	ND	0	160	ND	0	40	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
Total Hydrocarbon			14,773			833			0		13.94	1396	6,444	6.44E-06	0	0	0.00E+00	6.44E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B043B	B043B		ND Adj	B044A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146.2812	ND	73	146	ND	0	355	ND	0	73	0.07	7	34	3.38E-08	3.38E-08
C5 as Pentane	146.2812	ND	73	146	ND	0	355	ND	0	73	0.07	7	34	3.38E-08	3.38E-08
n-Hexane	151.9687	ND	76	152	ND	0	375	ND	0	76	0.08	8	35	3.51E-08	3.51E-08
C6 as Hexane	151.9687	ND	76	152	ND	0	375	ND	0	76	0.08	8	35	3.51E-08	3.51E-08
n-Heptane	158.8125	ND	79	159	ND	0	393	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
C7 as Heptane	158.8125	ND	79	159	ND	0	393	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
n-Octane	154.625	ND	77	155	ND	0	160	ND	0	77	0.08	8	36	3.57E-08	3.57E-08
C8 as Octane	258.1498	J	258	204	J	204	160	ND	0	54	0.05	5	25	2.49E-08	2.49E-08
n-Nonane	155.7812	ND	78	156	ND	0	158	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C9 as Nonane	155.7812	ND	78	156	ND	0	158	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Decane	157.1875	ND	79	157	ND	0	158	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
C10 as Decane	265.1336	J	265	157	J	157	158	ND	0	108	0.11	11	50	4.98E-08	4.98E-08
n-Undecane	156.7812	ND	78	157	ND	0	157	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
C11 as Undecane	424.9983	J	425	162	J	162	157	ND	0	263	0.26	26	122	1.22E-07	1.22E-07
n-Dodecane	557.6324	J	558	156	ND	0	158	ND	0	558	0.56	56	258	2.58E-07	2.58E-07
C12 as Dodecane	155.7187	ND	78	156	ND	0	158	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Tridecane	156.0937	ND	78	156	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C13 as Tridecane	459.686	J	460	310	J	310	160	ND	0	150	0.15	15	69	6.93E-08	6.93E-08
n-Tetradecane	247.2321	J	247	156	ND	0	159	ND	0	247	0.25	25	114	1.14E-07	1.14E-07
C14 as tetradecane	395.7872	J	396	156	ND	0	159	ND	0	396	0.40	40	183	1.83E-07	1.83E-07
n-Pentadecane	322.4365	J	322	157	ND	0	158	ND	0	322	0.32	32	149	1.49E-07	1.49E-07
C15 as Pentadecane	249.8013	J	250	157	ND	0	158	ND	0	250	0.25	25	115	1.15E-07	1.15E-07
n-Hexadecane	155.875	ND	78	156	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C16 as Hexadecane	155.875	ND	78	156	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Heptadecane	154.0625	ND	77	154	ND	0	158	ND	0	77	0.08	8	36	3.56E-08	3.56E-08
C17 as Heptadecane	154.0625	ND	77	154	ND	0	158	ND	0	77	0.08	8	36	3.56E-08	3.56E-08
n-Octadecane	155.7812	ND	78	156	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C18 as Octodecane	155.7812	ND	78	156	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Nonadecane	156.0937	ND	78	156	ND	0	158	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C19 as Nonadecane	156.0937	ND	78	156	ND	0	158	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
n-Eicosane	155.7187	ND	78	156	ND	0	157	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C20 as Eicosane	155.7187	ND	78	156	ND	0	157	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Heneicosane	157.1875	ND	79	157	ND	0	158	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
C21 as Heneicosane	157.1875	ND	79	157	ND	0	158	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
n-Docosane	155.4062	ND	78	155	ND	0	159	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
C22 as Docosane	155.4062	ND	78	155	ND	0	159	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
n-Tricosane	156.25	ND	78	156	ND	0	158	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C23 as Tricosane	156.25	ND	78	156	ND	0	158	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
n-Tetracosane	156.4687	ND	78	156	ND	0	160	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
C24 as Tetracosane	156.4687	ND	78	156	ND	0	160	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
Total Hydrocarbon			5,587			833			0		4.75	476	2,197	2.20E-06	2.20E-06

Bagging Data Form — Vacuum Method

Sample Id B045

Equipment type:	Valve			**Component ID:**	B-278	
Equipment Subtype:	Bonnet			**Plant ID:**	Refinery B	
Line Size:	6	*inches*		**Date:**	1-May-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.86 *inHg*	758.4	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	65.6 *°F*	18.7	*°C*	**TVA ID**	37887	
Component Temp:	217 *°F*	102.8	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*HUK Heavy Unicrackate*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
9:35	Background	-3	*ppmv*	8-sec Dwell	2	*ppmv*	Total Dwell	4:00 *min:sec*	Final M21 27 *ppm*
10:32	Initial Bag Vacuum	0.03	*inches H2O*	DGM Vac.	2.1	*inches H2O*	Bag Temp	185.7 *°F*	Leak @ north side of bonnet

Bag Concentrations (ppmv)

Time	10:36	10:39	10:42	10:44	10:48	10:55
ppmv	12.8	14.4	14.7	14.7	14.3	13.7

Sorbent Tube Sample Collection Parameters

B045A

Time							
10:44	Volume Start	616.3 *Liters*		Design Sample Flow Rate = 1 liter/min			
10:57	Volume Stop	629.1 *Liters*	Total Vol	12.8 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.985 *L/min*	$Sorbent Flow_{STP}$	0.987 *L/min*

B045B

10:44	Volume Start	550.2 *Liters*		Design Sample Flow Rate = 1 liter/min			
10:57	Volume Stop	563.1 *Liters*	Total Vol	12.9 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.992 *L/min*	$Sorbent Flow_{STP}$	0.995 *L/min*
	$Total\ ST\ Vol_{STP}$	25.76 *Liters*	$DGM\ Vol_{STP}$	87.85 *Liters*	$Total\ Run\ Vol_{STP}$	113.61 *Liters*	

Bagging Parameters

Time							
10:47	Vacuum check	0.015 *inches H2O*			DGM_P	2.1 *inches H2O vacuum*	754.5 *mmHg*
10:47	DGM_{10L} Time	01:29.1 *min:sec.frac*	DGM Time	1.483	DGM Flow 6.74	$DGM\ Flow_{STP}$	6.76 *liters/minute*
10:48	Bag Temp.	202.5 *°F*	94.7 *°C*		$Sample_T$	65 *°F*	18.3 *°C*

Post-Sample Data

11:08	Post Test M21	Background 2 *ppmv*	8-sec Dwell	10 *ppmv*	Total Dwell	2:30 *min:sec*	Final M21 26 *ppm* @ north side of bonnet
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A *ml*					
Density of organic condensate		N/A *g/ml*					

Average THC emissions =	5.66E-06	kg/hr
Percent difference THC ER =	32%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.86E-08
C5 as Pentane	2.86E-08
n-Hexane	2.97E-08
C6 as Hexane	2.97E-08
n-Heptane	3.11E-08
C7 as Heptane	3.11E-08
n-Octane	3.02E-08
C8 as Octane	2.56E-07
n-Nonane	3.05E-08
C9 as Nonane	4.15E-07
n-Decane	1.61E-07
C10 as Decane	6.00E-07
n-Undecane	3.07E-08
C11 as Undecane	8.37E-07
n-Dodecane	5.23E-07
C12 as Dodecane	2.00E-07
n-Tridecane	4.33E-08
C13 as Tridecane	1.02E-06
n-Tetradecane	1.23E-07
C14 as tetradecane	3.55E-07
n-Pentadecane	9.87E-08
C15 as Pentadecane	2.10E-07
n-Hexadecane	3.05E-08
C16 as Hexadecane	3.05E-08
n-Heptadecane	3.01E-08
C17 as Heptadecane	3.01E-08
n-Octadecane	3.05E-08
C18 as Octodecane	3.05E-08
n-Nonadecane	3.05E-08
C19 as Nonadecane	3.05E-08
n-Eicosane	3.05E-08
C20 as Eicosane	3.05E-08
n-Heneicosane	3.07E-08
C21 as Heneicosane	3.07E-08
n-Docosane	3.04E-08
C22 as Docosane	3.04E-08
n-Tricosane	3.06E-08
C23 as Tricosane	3.06E-08
n-Tetracosane	3.06E-08
C24 as Tetracosane	3.06E-08
Total Hydrocarbon	5.66E-06

THC: 3.00E-04 lbs/day 5.47E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B045A	B045A		ND Adj	B046A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.14062	ND	37	142.93	ND	0	355	ND	0	37	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C5 as Pentane	73.14062	ND	37	142.93	ND	0	355	ND	0	37	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Hexane	75.98437	ND	38	148.49	ND	0	375	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C6 as Hexane	75.98437	ND	38	148.49	ND	0	375	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Heptane	79.40625	ND	40	155.18	ND	0	393	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C7 as Heptane	79.40625	ND	40	155.18	ND	0	393	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Octane	77.3125	ND	39	151.08	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C8 as Octane	772.7093	J	773	187.07	J	187	160	ND	0	586	0.59	67	307	3.07E-07	0	0	0.00E+00	3.07E-07
n-Nonane	77.89062	ND	39	152.21	ND	0	158	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C9 as Nonane	987.9277		988	152.21	ND	0	158	ND	0	988	0.99	112	518	5.18E-07	0	0	0.00E+00	5.18E-07
n-Decane	341.628	J	342	153.59	ND	0	158	ND	0	342	0.34	39	179	1.79E-07	0	0	0.00E+00	1.79E-07
C10 as Decane	1313.574		1,314	153.59	ND	0	158	ND	0	1,314	1.31	149	689	6.89E-07	0	0	0.00E+00	6.89E-07
n-Undecane	78.39062	ND	39	153.19	ND	0	157	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C11 as Undecane	1818.91		1,819	153.19	ND	0	157	ND	0	1,819	1.82	207	954	9.54E-07	0	0	0.00E+00	9.54E-07
n-Dodecane	1113.82		1,114	152.15	ND	0	158	ND	0	1,114	1.11	127	584	5.84E-07	0	0	0.00E+00	5.84E-07
C12 as Dodecane	461.355	J	461	152.15	ND	0	158	ND	0	461	0.46	52	242	2.42E-07	0	0	0.00E+00	2.42E-07
n-Tridecane	87.8247	J	88	152.52	ND	0	160	ND	0	88	0.09	10	46	4.61E-08	0	0	0.00E+00	4.61E-08
C13 as Tridecane	2753.975		2,754	282.33	J	282	160	ND	0	2,472	2.47	281	1296	1.30E-06	0	0	0.00E+00	1.30E-06
n-Tetradecane	314.9945	J	315	152.37	ND	0	159	ND	0	315	0.31	36	165	1.65E-07	0	0	0.00E+00	1.65E-07
C14 as tetradecane	1278.227		1,278	152.37	ND	0	159	ND	0	1,278	1.28	145	670	6.70E-07	0	0	0.00E+00	6.70E-07
n-Pentadecane	206.783	J	207	153.13	ND	0	158	ND	0	207	0.21	23	108	1.08E-07	0	0	0.00E+00	1.08E-07
C15 as Pentadecane	503.7108	J	504	153.13	ND	0	158	ND	0	504	0.50	57	264	2.64E-07	0	0	0.00E+00	2.64E-07
n-Hexadecane	77.9375	ND	39	152.31	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C16 as Hexadecane	77.9375	ND	39	152.31	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heptadecane	77.03125	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C17 as Heptadecane	77.03125	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Octadecane	77.89062	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C18 as Octodecane	77.89062	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Nonadecane	78.04687	ND	39	152.52	ND	0	158	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C19 as Nonadecane	78.04687	ND	39	152.52	ND	0	158	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Eicosane	77.85937	ND	39	152.15	ND	0	157	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C20 as Eicosane	77.85937	ND	39	152.15	ND	0	157	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heneicosane	78.59375	ND	39	153.59	ND	0	158	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C21 as Heneicosane	78.59375	ND	39	153.59	ND	0	158	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Docosane	77.70312	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C22 as Docosane	77.70312	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tricosane	78.125	ND	39	152.67	ND	0	158	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C23 as Tricosane	78.125	ND	39	152.67	ND	0	158	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Tetracosane	78.23437	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C24 as Tetracosane	78.23437	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
Total Hydrocarbon			13,002			469			0		12.53	1424	6,572	6.57E-06	0	0	0.00E+00	6.57E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B045B	B045B		ND Adj	B046A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	145.1473	ND	73	143	ND	0	355	ND	0	73	0.07	8	38	3.81E-08	3.81E-08
C5 as Pentane	145.1473	ND	73	143	ND	0	355	ND	0	73	0.07	8	38	3.81E-08	3.81E-08
n-Hexane	150.7907	ND	75	148	ND	0	375	ND	0	75	0.08	9	40	3.95E-08	3.95E-08
C6 as Hexane	150.7907	ND	75	148	ND	0	375	ND	0	75	0.08	9	40	3.95E-08	3.95E-08
n-Heptane	157.5814	ND	79	155	ND	0	393	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C7 as Heptane	157.5814	ND	79	155	ND	0	393	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Octane	153.4264	ND	77	151	ND	0	160	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
C8 as Octane	577.6748	J	578	187	J	187	160	ND	0	391	0.39	44	205	2.05E-07	2.05E-07
n-Nonane	154.5736	ND	77	152	ND	0	158	ND	0	77	0.08	9	41	4.05E-08	4.05E-08
C9 as Nonane	596.6717	J	597	152	ND	0	158	ND	0	597	0.60	68	313	3.13E-07	3.13E-07
n-Decane	273.8389	J	274	154	ND	0	158	ND	0	274	0.27	31	144	1.44E-07	1.44E-07
C10 as Decane	976.2819	J	976	154	ND	0	158	ND	0	976	0.98	111	512	5.12E-07	5.12E-07
n-Undecane	155.5659	ND	78	153	ND	0	157	ND	0	78	0.08	9	41	4.08E-08	4.08E-08
C11 as Undecane	1371.825	J	1,372	153	ND	0	157	ND	0	1,372	1.37	156	719	7.19E-07	7.19E-07
n-Dodecane	882.6495	J	883	152	ND	0	158	ND	0	883	0.88	100	463	4.63E-07	4.63E-07
C12 as Dodecane	300.2112	J	300	152	ND	0	158	ND	0	300	0.30	34	157	1.57E-07	1.57E-07
n-Tridecane	154.8837	ND	77	153	ND	0	160	ND	0	77	0.08	9	41	4.06E-08	4.06E-08
C13 as Tridecane	1700.661		1,701	282	J	282	160	ND	0	1,418	1.42	161	744	7.44E-07	7.44E-07
n-Tetradecane	155.7478	J	156	152	ND	0	159	ND	0	156	0.16	18	82	8.17E-08	8.17E-08
C14 as tetradecane	154.7287	ND	77	152	ND	0	159	ND	0	77	0.08	9	41	4.06E-08	4.06E-08
n-Pentadecane	169.4932	J	169	153	ND	0	158	ND	0	169	0.17	19	89	8.89E-08	8.89E-08
C15 as Pentadecane	298.7861	J	299	153	ND	0	158	ND	0	299	0.30	34	157	1.57E-07	1.57E-07
n-Hexadecane	154.6667	ND	77	152	ND	0	159	ND	0	77	0.08	9	41	4.06E-08	4.06E-08
C16 as Hexadecane	154.6667	ND	77	152	ND	0	159	ND	0	77	0.08	9	41	4.06E-08	4.06E-08
n-Heptadecane	152.8682	ND	76	151	ND	0	158	ND	0	76	0.08	9	40	4.01E-08	4.01E-08
C17 as Heptadecane	152.8682	ND	76	151	ND	0	158	ND	0	76	0.08	9	40	4.01E-08	4.01E-08
n-Octadecane	154.5736	ND	77	152	ND	0	159	ND	0	77	0.08	9	41	4.05E-08	4.05E-08
C18 as Octodecane	154.5736	ND	77	152	ND	0	159	ND	0	77	0.08	9	41	4.05E-08	4.05E-08
n-Nonadecane	154.8837	ND	77	153	ND	0	158	ND	0	77	0.08	9	41	4.06E-08	4.06E-08
C19 as Nonadecane	154.8837	ND	77	153	ND	0	158	ND	0	77	0.08	9	41	4.06E-08	4.06E-08
n-Eicosane	154.5116	ND	77	152	ND	0	157	ND	0	77	0.08	9	41	4.05E-08	4.05E-08
C20 as Eicosane	154.5116	ND	77	152	ND	0	157	ND	0	77	0.08	9	41	4.05E-08	4.05E-08
n-Heneicosane	155.969	ND	78	154	ND	0	158	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
C21 as Heneicosane	155.969	ND	78	154	ND	0	158	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
n-Docosane	154.2016	ND	77	152	ND	0	159	ND	0	77	0.08	9	40	4.04E-08	4.04E-08
C22 as Docosane	154.2016	ND	77	152	ND	0	159	ND	0	77	0.08	9	40	4.04E-08	4.04E-08
n-Tricosane	155.0388	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.06E-08	4.06E-08
C23 as Tricosane	155.0388	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.06E-08	4.06E-08
n-Tetracosane	155.2558	ND	78	153	ND	0	160	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C24 as Tetracosane	155.2558	ND	78	153	ND	0	160	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
Total Hydrocarbon			9,536			469			0		9.07	1030	4,754	4.75E-06	4.75E-06

Bagging Data Form **Vacuum Method** **Sample Id** B047

WSPA Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	B-818	
Equipment Subtype:	Plug			**Plant ID:**	Refinery B	
Line Size:	1 *inches*			**Date:**	1-May-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.73 *inHg*	755.1 *mmHg*		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	75.4 °F	24.1 °C		**TVA ID**	36502	
Component Temp:	84 °F	28.9 °C		**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*LCGO*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
14:07	Background	-2 *ppmv*	8-sec Dwell	5 *ppmv*	Total Dwell	4:00 *min:sec*	Final M21	61 *ppm*
14:34	Initial Bag Vacuum	0.05 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	84.4 °F	Leak @	bottom of plug

Bag Concentrations (ppmv)

Time	14:38	14:40	14:42	14:44	14:46	14:48	14:50	14:57	14:59	15:00				
ppmv	7.5	8.7	9.3	9.6	9.5	10	10.2	9.9	9.9	10				

Sorbent Tube Sample Collection Parameters

B047A

Time							
14:50	Volume Start	629.1 *Liters*		Design Sample Flow Rate = 1 liter/min			
15:03	Volume Stop	641.7 *Liters*	Total Vol	12.6 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.938 *L/min*

B047B

14:50	Volume Start	563.1 *Liters*		Design Sample Flow Rate = 1 liter/min			
15:03	Volume Stop	575.8 *Liters*	Total Vol	12.7 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.945 *L/min*
	Total ST Vol$_{STP}$	24.47 *Liters*	DGM Vol$_{STP}$	79.43 *Liters*	Total Run Vol$_{STP}$	103.90 *Liters*	

Bagging Parameters

Time							
15:54	Vacuum check	0.07 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	751.8 *mmHg*
14:53	DGM$_{10L}$ Time	01:35.1 *min:sec.frac*	DGM Time	1.583	DGM Flow	6.32	DGM Flow$_{STP}$ 6.11 *liters/minute*
14:55	Bag Temp.	83.8 °F		28.8 °C	Sample$_T$	82 °F	27.8 °C

Post-Sample Data

15:12	Post Test M21	Background 2 *ppmv*	8-sec Dwell	9 *ppmv*	Total Dwell 2:00 *min:sec*	Final M21	34 *ppm*
						@	bottom of plug
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*		
Organic condensate collected		N/A *ml*					
Density of organic condensate		N/A *g/ml*					

Average THC emissions =	3.17E-06 kg/hr
Percent difference THC ER =	74%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.70E-08
C5 as Pentane	2.70E-08
n-Hexane	3.53E-08
C6 as Hexane	3.53E-08
n-Heptane	3.13E-08
C7 as Heptane	3.13E-08
n-Octane	2.81E-08
C8 as Octane	1.52E-07
n-Nonane	2.83E-08
C9 as Nonane	4.23E-08
n-Decane	3.97E-08
C10 as Decane	1.06E-07
n-Undecane	2.85E-08
C11 as Undecane	1.29E-07
n-Dodecane	7.64E-08
C12 as Dodecane	6.61E-08
n-Tridecane	2.83E-08
C13 as Tridecane	3.77E-07
n-Tetradecane	1.00E-07
C14 as tetradecane	5.01E-07
n-Pentadecane	2.20E-07
C15 as Pentadecane	4.99E-07
n-Hexadecane	7.78E-08
C16 as Hexadecane	2.83E-08
n-Heptadecane	2.80E-08
C17 as Heptadecane	2.80E-08
n-Octadecane	2.83E-08
C18 as Octodecane	2.83E-08
n-Nonadecane	2.83E-08
C19 as Nonadecane	2.83E-08
n-Eicosane	2.83E-08
C20 as Eicosane	2.83E-08
n-Heneicosane	2.85E-08
C21 as Heneicosane	2.85E-08
n-Docosane	2.83E-08
C22 as Docosane	2.83E-08
n-Tricosane	2.83E-08
C23 as Tricosane	2.83E-08
n-Tetracosane	2.85E-08
C24 as Tetracosane	2.85E-08
Total Hydrocarbon	3.17E-06

THC:	**1.68E-04**	**lbs/day**	**3.06E-05 tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B047A	B047A		ND Adj	B048A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.3	ND	37	151	ND	0	355	ND	0	37	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C5 as Pentane	74.3	ND	37	151	ND	0	355	ND	0	37	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Hexane	77.2	ND	39	217	ND	0	375	ND	0	39	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
C6 as Hexane	77.2	ND	39	217	ND	0	375	ND	0	39	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
n-Heptane	80.7	ND	40	180	ND	0	393	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C7 as Heptane	80.7	ND	40	180	ND	0	393	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Octane	78.5	ND	39	156	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C8 as Octane	420	J	420	156	ND	0	160	ND	0	420	0.42	44	201	2.01E-07	0	0	0.00E+00	2.01E-07
n-Nonane	79.1	ND	40	157	ND	0	158	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C9 as Nonane	98.1	J	98	157	ND	0	158	ND	0	98	0.10	10	47	4.70E-08	0	0	0.00E+00	4.70E-08
n-Decane	86.7	J	87	158	ND	0	158	ND	0	87	0.09	9	42	4.16E-08	0	0	0.00E+00	4.16E-08
C10 as Decane	365	J	365	158	ND	0	158	ND	0	365	0.37	38	175	1.75E-07	0	0	0.00E+00	1.75E-07
n-Undecane	79.6	ND	40	158	ND	0	157	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C11 as Undecane	461	J	461	158	ND	0	157	ND	0	461	0.46	48	221	2.21E-07	0	0	0.00E+00	2.21E-07
n-Dodecane	240	J	240	157	ND	0	158	ND	0	240	0.24	25	115	1.15E-07	0	0	0.00E+00	1.15E-07
C12 as Dodecane	197	J	197	157	ND	0	158	ND	0	197	0.20	20	94	9.45E-08	0	0	0.00E+00	9.45E-08
n-Tridecane	79.3	ND	40	157	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C13 as Tridecane	1315		1,315	157	ND	0	160	ND	0	1,315	1.32	137	631	6.31E-07	0	0	0.00E+00	6.31E-07
n-Tetradecane	339	J	339	157	ND	0	159	ND	0	339	0.34	35	163	1.63E-07	0	0	0.00E+00	1.63E-07
C14 as tetradecane	1922		1,922	157	ND	0	159	ND	0	1,922	1.92	200	922	9.22E-07	0	0	0.00E+00	9.22E-07
n-Pentadecane	672	J	672	158	ND	0	158	ND	0	672	0.67	70	322	3.22E-07	0	0	0.00E+00	3.22E-07
C15 as Pentadecane	1619		1,619	158	ND	0	158	ND	0	1,619	1.62	168	776	7.76E-07	0	0	0.00E+00	7.76E-07
n-Hexadecane	246	J	246	157	ND	0	159	ND	0	246	0.25	26	118	1.18E-07	0	0	0.00E+00	1.18E-07
C16 as Hexadecane	79.2	ND	40	157	ND	0	159	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptadecane	78.3	ND	39	155	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C17 as Heptadecane	78.3	ND	39	155	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Octadecane	79.1	ND	40	157	ND	0	159	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C18 as Octodecane	79.1	ND	40	157	ND	0	159	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Nonadecane	79.3	ND	40	157	ND	0	158	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C19 as Nonadecane	79.3	ND	40	157	ND	0	158	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Eicosane	79.1	ND	40	157	ND	0	157	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C20 as Eicosane	79.1	ND	40	157	ND	0	157	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heneicosane	79.8	ND	40	158	ND	0	158	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane	79.8	ND	40	158	ND	0	158	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane	78.9	ND	39	157	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	78.9	ND	39	157	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	79.4	ND	40	157	ND	0	158	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	79.4	ND	40	157	ND	0	158	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Tetracosane	79.5	ND	40	158	ND	0	160	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C24 as Tetracosane	79.5	ND	40	158	ND	0	160	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
Total Hydrocarbon			9,044			0			0		9.04	940	4,337	4.34E-06	0	0	0.00E+00	4.34E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B047B	B047B		ND Adj	B048A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151	ND	76	151	ND	0	355	ND	0	76	0.08	8	36	3.62E-08	3.62E-08
C5 as Pentane	151	ND	76	151	ND	0	355	ND	0	76	0.08	8	36	3.62E-08	3.62E-08
n-Hexane	217	ND	109	217	ND	0	375	ND	0	109	0.11	11	52	5.20E-08	5.20E-08
C6 as Hexane	217	ND	109	217	ND	0	375	ND	0	109	0.11	11	52	5.20E-08	5.20E-08
n-Heptane	180	ND	90	180	ND	0	393	ND	0	90	0.09	9	43	4.32E-08	4.32E-08
C7 as Heptane	180	ND	90	180	ND	0	393	ND	0	90	0.09	9	43	4.32E-08	4.32E-08
n-Octane	156	ND	78	156	ND	0	160	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
C8 as Octane	212	J	212	156	ND	0	160	ND	0	212	0.21	22	102	1.02E-07	1.02E-07
n-Nonane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C9 as Nonane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Decane	158	ND	79	158	ND	0	158	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C10 as Decane	158	ND	79	158	ND	0	158	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Undecane	158	ND	79	158	ND	0	157	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C11 as Undecane	158	ND	79	158	ND	0	157	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Dodecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C12 as Dodecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Tridecane	157	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C13 as Tridecane	259	J	259	157	ND	0	160	ND	0	259	0.26	27	124	1.24E-07	1.24E-07
n-Tetradecane	157	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C14 as tetradecane	169	J	169	157	ND	0	159	ND	0	169	0.17	18	81	8.10E-08	8.10E-08
n-Pentadecane	244	J	244	158	ND	0	158	ND	0	244	0.24	25	117	1.17E-07	1.17E-07
C15 as Pentadecane	462	J	462	158	ND	0	158	ND	0	462	0.46	48	222	2.22E-07	2.22E-07
n-Hexadecane	157	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C16 as Hexadecane	157	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Heptadecane	155	ND	78	155	ND	0	158	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
C17 as Heptadecane	155	ND	78	155	ND	0	158	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
n-Octadecane	157	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C18 as Octodecane	157	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Nonadecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C19 as Nonadecane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Eicosane	157	ND	79	157	ND	0	157	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C20 as Eicosane	157	ND	79	157	ND	0	157	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Heneicosane	158	ND	79	158	ND	0	158	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C21 as Heneicosane	158	ND	79	158	ND	0	158	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Docosane	157	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C22 as Docosane	157	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Tricosane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C23 as Tricosane	157	ND	79	157	ND	0	158	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Tetracosane	158	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C24 as Tetracosane	158	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
Total Hydrocarbon			4,172			0			0		4.17	433	2,001	2.00E-06	2.00E-06

Bagging Data Form — Vacuum Method

Sample Id: B049

WSPA — Western States Petroleum Association

Equipment type:	Pump	**Component ID:**	B-670
Equipment Subtype:	Seal	**Plant ID:**	Refinery B
Line Size:	6 *inches*	**Date:**	2-May-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.89 *inHg* / 759.2 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	66.4 *°F* / 19.1 *°C*	**TVA ID**	37887
Component Temp:	105 *°F* / 40.6 *°C*	**Stream Pressure/Temp:**	80 *psig* / *°F*
Stream Description:	*Tank 201 Resid Pump (Pump off)*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
9:12	Background	1 *ppmv*	8-sec Dwell	6 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	16 *ppm*
10:05	Initial Bag Vacuum	0.002 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	79.7 *°F*	Leak @	NW lower side of seal

Bag Concentrations (ppmv)

Time	10:08	10:10	10:12	10:14	10:16	10:18	10:20	10:22	10:27	10:30	10:34			
ppmv	2.1	3.1	3.9	4.4	4.7	4.6	4	4	3.5	3.2	2.6			

Sorbent Tube Sample Collection Parameters

B049A

Time						
10:22	Volume Start	644.4 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:35	Volume Stop	657.0 *Liters*	Total Vol	12.6 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.969 *L/min*	$\text{Sorbent Flow}_{STP}$	0.979 *L/min*

B049B

10:22	Volume Start	577.9 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:35	Volume Stop	590.7 *Liters*	Total Vol	12.8 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.985 *L/min*	$\text{Sorbent Flow}_{STP}$	0.994 *L/min*
	$\text{Total ST Vol}_{STP}$	25.65 *Liters*	DGM Vol_{STP}	87.51 *Liters*	$\text{Total Run Vol}_{STP}$	113.15 *Liters*

Bagging Parameters

Time								
10:23	Vacuum check	0.001 *inches H2O*			DGM_P	1.9 *inches H2O vacuum*	755.7	*mmHg*
10:26	DGM_{10L} Time	01:30.0 *min:sec.frac*	DGM Time	1.500	DGM Flow	6.67	DGM Flow_{STP} 6.73	*liters/minute*
10:24	Bag Temp.	83.3 *°F*	28.5	*°C*	Sample_T	62 *°F*	16.7	*°C*

Post-Sample Data

11:01	Post Test M21	Background	-2 *ppmv*	8-sec Dwell	9 *ppmv*	Total Dwell 2:00 *min:sec*	Final M21	23 *ppm* @ NW lower side of seal

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	1.91E-06 kg/hr
Percent difference THC ER =	13%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.93E-08
C5 as Pentane	2.93E-08
n-Hexane	3.81E-08
C6 as Hexane	3.81E-08
n-Heptane	3.39E-08
C7 as Heptane	3.39E-08
n-Octane	3.05E-08
C8 as Octane	2.14E-07
n-Nonane	3.07E-08
C9 as Nonane	7.70E-08
n-Decane	4.62E-08
C10 as Decane	1.02E-07
n-Undecane	3.09E-08
C11 as Undecane	9.41E-08
n-Dodecane	6.95E-08
C12 as Dodecane	3.07E-08
n-Tridecane	3.07E-08
C13 as Tridecane	1.51E-07
n-Tetradecane	4.67E-08
C14 as tetradecane	3.07E-08
n-Pentadecane	4.90E-08
C15 as Pentadecane	1.19E-07
n-Hexadecane	3.07E-08
C16 as Hexadecane	3.07E-08
n-Heptadecane	3.03E-08
C17 as Heptadecane	3.03E-08
n-Octadecane	3.07E-08
C18 as Octodecane	3.07E-08
n-Nonadecane	3.07E-08
C19 as Nonadecane	3.07E-08
n-Eicosane	3.07E-08
C20 as Eicosane	3.07E-08
n-Heneicosane	3.09E-08
C21 as Heneicosane	3.09E-08
n-Docosane	3.05E-08
C22 as Docosane	3.05E-08
n-Tricosane	3.07E-08
C23 as Tricosane	3.07E-08
n-Tetracosane	3.07E-08
C24 as Tetracosane	3.07E-08
Total Hydrocarbon	1.91E-06

THC:	1.01E-04	lbs/day	1.84E-05	tons/yr

B049A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS			COMBINED EMISSION RATE
B049A	B049A		ND Adj	B050A		ND Adj	#B028		ND Adj						Capture	#P0XX		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.3	ND	37	148	ND	0	355	ND	0	37	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C5 as Pentane	74.3	ND	37	148	ND	0	355	ND	0	37	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexane	77.2	ND	39	212	ND	0	375	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C6 as Hexane	77.2	ND	39	212	ND	0	375	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heptane	80.7	ND	40	176	ND	0	393	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C7 as Heptane	80.7	ND	40	176	ND	0	393	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Octane	78.5	ND	39	152	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C8 as Octane	521	J	521	152	ND	0	160	ND	0	521	0.52	59	272	2.72E-07	0	0	0.00E+00	2.72E-07
n-Nonane	79.1	ND	40	153	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C9 as Nonane	217	J	217	153	ND	0	158	ND	0	217	0.22	25	113	1.13E-07	0	0	0.00E+00	1.13E-07
n-Decane	98.3	J	98	155	ND	0	158	ND	0	98	0.10	11	51	5.13E-08	0	0	0.00E+00	5.13E-08
C10 as Decane	313	J	313	155	ND	0	158	ND	0	313	0.31	35	163	1.63E-07	0	0	0.00E+00	1.63E-07
n-Undecane	79.6	ND	40	154	ND	0	157	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C11 as Undecane	282	J	282	154	ND	0	157	ND	0	282	0.28	32	147	1.47E-07	0	0	0.00E+00	1.47E-07
n-Dodecane	188	J	188	153	ND	0	158	ND	0	188	0.19	21	98	9.82E-08	0	0	0.00E+00	9.82E-08
C12 as Dodecane	79.1	ND	40	153	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Tridecane	79.3	ND	40	154	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C13 as Tridecane	501	J	501	154	ND	0	160	ND	0	501	0.50	57	262	2.62E-07	0	0	0.00E+00	2.62E-07
n-Tetradecane	101	J	101	154	ND	0	159	ND	0	101	0.10	11	53	5.27E-08	0	0	0.00E+00	5.27E-08
C14 as tetradecane	79.2	ND	40	154	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Pentadecane	109	J	109	154	ND	0	158	ND	0	109	0.11	12	57	5.69E-08	0	0	0.00E+00	5.69E-08
C15 as Pentadecane	378	J	378	154	ND	0	158	ND	0	378	0.38	43	197	1.97E-07	0	0	0.00E+00	1.97E-07
n-Hexadecane	79.2	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C16 as Hexadecane	79.2	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Heptadecane	78.3	ND	39	152	ND	0	158	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C17 as Heptadecane	78.3	ND	39	152	ND	0	158	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Octadecane	79.1	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C18 as Octodecane	79.1	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Nonadecane	79.3	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C19 as Nonadecane	79.3	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Eicosane	79.1	ND	40	153	ND	0	157	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C20 as Eicosane	79.1	ND	40	153	ND	0	157	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Heneicosane	79.8	ND	40	155	ND	0	158	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C21 as Heneicosane	79.8	ND	40	155	ND	0	158	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Docosane	78.9	ND	39	153	ND	0	159	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C22 as Docosane	78.9	ND	39	153	ND	0	159	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Tricosane	79.4	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C23 as Tricosane	79.4	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Tetracosane	79.5	ND	40	154	ND	0	160	ND	0	40	0.04	4	21	2.08E-08	0	0	0.00E+00	2.08E-08
C24 as Tetracosane	79.5	ND	40	154	ND	0	160	ND	0	40	0.04	4	21	2.08E-08	0	0	0.00E+00	2.08E-08
Total Hydrocarbon			3,891			0			0		3.89	440	2,032	2.03E-06	0	0	0.00E+00	2.03E-06

B049B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
B049B	B049B		ND Adj	B050A		ND Adj	#B028		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150	ND	75	148	ND	0	355	ND	0	75	0.08	8	39	3.92E-08	3.92E-08
C5 as Pentane	150	ND	75	148	ND	0	355	ND	0	75	0.08	8	39	3.92E-08	3.92E-08
n-Hexane	215	ND	108	212	ND	0	375	ND	0	108	0.11	12	56	5.61E-08	5.61E-08
C6 as Hexane	215	ND	108	212	ND	0	375	ND	0	108	0.11	12	56	5.61E-08	5.61E-08
n-Heptane	179	ND	90	176	ND	0	393	ND	0	90	0.09	10	47	4.67E-08	4.67E-08
C7 as Heptane	179	ND	90	176	ND	0	393	ND	0	90	0.09	10	47	4.67E-08	4.67E-08
n-Octane	155	ND	78	152	ND	0	160	ND	0	78	0.08	9	40	4.05E-08	4.05E-08
C8 as Octane	300	J	300	152	ND	0	160	ND	0	300	0.30	34	157	1.57E-07	1.57E-07
n-Nonane	156	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C9 as Nonane	156	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Decane	157	ND	79	155	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C10 as Decane	157	ND	79	155	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Undecane	157	ND	79	154	ND	0	157	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C11 as Undecane	157	ND	79	154	ND	0	157	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Dodecane	156	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C12 as Dodecane	156	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Tridecane	156	ND	78	154	ND	0	160	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C13 as Tridecane	156	ND	78	154	ND	0	160	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Tetradecane	156	ND	78	154	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C14 as tetradecane	156	ND	78	154	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Pentadecane	157	ND	79	154	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C15 as Pentadecane	157	ND	79	154	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Hexadecane	156	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C16 as Hexadecane	156	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Heptadecane	154	ND	77	152	ND	0	158	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
C17 as Heptadecane	154	ND	77	152	ND	0	158	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
n-Octadecane	156	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C18 as Octodecane	156	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Nonadecane	156	ND	78	154	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C19 as Nonadecane	156	ND	78	154	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Eicosane	156	ND	78	153	ND	0	157	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C20 as Eicosane	156	ND	78	153	ND	0	157	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Heneicosane	157	ND	79	155	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C21 as Heneicosane	157	ND	79	155	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Docosane	155	ND	78	153	ND	0	159	ND	0	78	0.08	9	40	4.05E-08	4.05E-08
C22 as Docosane	155	ND	78	153	ND	0	159	ND	0	78	0.08	9	40	4.05E-08	4.05E-08
n-Tricosane	156	ND	78	154	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C23 as Tricosane	156	ND	78	154	ND	0	158	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Tetracosane	156	ND	78	154	ND	0	160	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C24 as Tetracosane	156	ND	78	154	ND	0	160	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
Total Hydrocarbon			3,419			0			0		3.42	387	1,785	1.79E-06	1.79E-06

Bagging Data Form — Vacuum Method

Sample Id: B052

Equipment type:	Pump		**Component ID:**	B-539	
Equipment Subtype:	Seal		**Plant ID:**	Refinery B	
Line Size:	6 inches		**Date:**	2-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.95 inHg	760.7 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	73.2 °F	22.9 °C	**TVA ID**	34251	
Component Temp:	67 °F	19.4 °C	**Stream Pressure/Temp:**	210 psig	°F
Stream Description:	Turbine Fuel G605-A (Pump Off)				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
13:18	Background	-12 ppmv	8-sec Dwell	3 ppmv	Total Dwell	4:00 min:sec	Final M21	35 ppm	
14:23	Initial Bag Vacuum	0.005 inches H2O	DGM Vac.	1.8 inches H2O	Bag Temp	81.3 °F	Leak @	bottom of seal	

Bag Concentrations (ppmv)

Time	14:27	14:29	14:31	14:33	14:35	14:37	14:39	14:41	14:43	14:48	14:54			
ppmv	0.9	1.9	2.4	3	3.2	3.4	4.1	4.3	4.2	5	6.9			

Sorbent Tube Sample Collection Parameters

B052A

Time							
14:43	Volume Start	657.0 Liters		Design Sample Flow Rate = 1 liter/min			
14:56	Volume Stop	669.6 Liters	Total Vol	12.6 Liters			
	Sample Run Time	13 Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	0.972 L/min

B052B

Time							
14:43	Volume Start	590.9 Liters		Design Sample Flow Rate = 1 liter/min			
14:56	Volume Stop	603.6 Liters	Total Vol	12.7 Liters			
	Sample Run Time	13 Minutes		Sorbent Flow	0.977 L/min	Sorbent Flow$_{STP}$	0.979 L/min
	Total ST Vol$_{STP}$	25.36 Liters	DGM Vol$_{STP}$	81.44 Liters	Total Run Vol$_{STP}$	106.80 Liters	

Bagging Parameters

Time							
14:44	Vacuum check	0.005 inches H2O			DGM$_P$	1.8 inches H2O vacuum	757.4 mmHg
14:48	DGM$_{10L}$ Time	01:36.2 min:sec.frac	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$ 6.26 liters/minute
14:45	Bag Temp.	74.7 °F	23.7 °C		Sample$_T$	67 °F	19.4 °C

Post-Sample Data

15:09	Post Test M21	Background 0 ppmv	8-sec Dwell	20 ppmv	Total Dwell	3:00 min:sec	Final M21 31 ppm @ bottom of seal
Condensate accumulation: starting time		N/A hour:min	Final time	N/A hour:min		0:00 hours:min	
Organic condensate collected		N/A ml					
Density of organic condensate		N/A g/ml					

Average THC emissions =	1.89E-06 kg/hr
Percent difference THC ER =	33%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.78E-08
C5 as Pentane	2.78E-08
n-Hexane	3.63E-08
C6 as Hexane	3.63E-08
n-Heptane	3.21E-08
C7 as Heptane	3.21E-08
n-Octane	2.89E-08
C8 as Octane	1.26E-07
n-Nonane	2.91E-08
C9 as Nonane	1.23E-07
n-Decane	4.81E-08
C10 as Decane	1.97E-07
n-Undecane	2.93E-08
C11 as Undecane	1.23E-07
n-Dodecane	6.94E-08
C12 as Dodecane	2.91E-08
n-Tridecane	2.91E-08
C13 as Tridecane	1.36E-07
n-Tetradecane	2.91E-08
C14 as tetradecane	2.91E-08
n-Pentadecane	4.27E-08
C15 as Pentadecane	1.05E-07
n-Hexadecane	2.91E-08
C16 as Hexadecane	2.91E-08
n-Heptadecane	2.87E-08
C17 as Heptadecane	2.87E-08
n-Octadecane	2.91E-08
C18 as Octodecane	2.91E-08
n-Nonadecane	2.91E-08
C19 as Nonadecane	2.91E-08
n-Eicosane	2.91E-08
C20 as Eicosane	2.91E-08
n-Heneicosane	2.93E-08
C21 as Heneicosane	2.93E-08
n-Docosane	2.91E-08
C22 as Docosane	2.91E-08
n-Tricosane	2.91E-08
C23 as Tricosane	2.91E-08
n-Tetracosane	2.93E-08
C24 as Tetracosane	2.93E-08
Total Hydrocarbon	1.89E-06

THC:	1.00E-04	lbs/day	1.83E-05	tons/yr

B052A

Component	ANALYTICAL RESULTS B052A µg/m³	Flag	ND Adj µg/m³	BACKGROUND B053A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#P0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	74.3	ND	37	150	ND	0	355	ND	0	37	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C5 as Pentane	74.3	ND	37	150	ND	0	355	ND	0	37	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Hexane	77.2	ND	39	215	ND	0	375	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C6 as Hexane	77.2	ND	39	215	ND	0	375	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptane	80.7	ND	40	179	ND	0	393	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C7 as Heptane	80.7	ND	40	179	ND	0	393	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Octane	78.5	ND	39	155	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C8 as Octane	637	J	637	195	J	195	160	ND	0	442	0.44	47	218	2.18E-07	0	0	0.00E+00	2.18E-07
n-Nonane	79.1	ND	40	156	ND	0	158	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C9 as Nonane	419	J	419	156	ND	0	158	ND	0	419	0.42	45	207	2.07E-07	0	0	0.00E+00	2.07E-07
n-Decane	116	J	116	157	ND	0	158	ND	0	116	0.12	12	57	5.72E-08	0	0	0.00E+00	5.72E-08
C10 as Decane	721	J	721	157	ND	0	158	ND	0	721	0.72	77	355	3.55E-07	0	0	0.00E+00	3.55E-07
n-Undecane	79.6	ND	40	157	ND	0	157	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C11 as Undecane	422	J	422	157	ND	0	157	ND	0	422	0.42	45	208	2.08E-07	0	0	0.00E+00	2.08E-07
n-Dodecane	203	J	203	156	ND	0	158	ND	0	203	0.20	22	100	1.00E-07	0	0	0.00E+00	1.00E-07
C12 as Dodecane	79.1	ND	40	156	ND	0	158	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tridecane	79.3	ND	40	156	ND	0	160	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C13 as Tridecane	474	J	474	156	ND	0	160	ND	0	474	0.47	51	234	2.34E-07	0	0	0.00E+00	2.34E-07
n-Tetradecane	79.2	ND	40	156	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C14 as tetradecane	79.2	ND	40	156	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Pentadecane	94.4	J	94	157	ND	0	158	ND	0	94	0.09	10	47	4.65E-08	0	0	0.00E+00	4.65E-08
C15 as Pentadecane	346	J	346	157	ND	0	158	ND	0	346	0.35	37	171	1.71E-07	0	0	0.00E+00	1.71E-07
n-Hexadecane	79.2	ND	40	156	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C16 as Hexadecane	79.2	ND	40	156	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Heptadecane	78.3	ND	39	154	ND	0	158	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C17 as Heptadecane	78.3	ND	39	154	ND	0	158	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Octadecane	79.1	ND	40	156	ND	0	159	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C18 as Octodecane	79.1	ND	40	156	ND	0	159	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Nonadecane	79.3	ND	40	156	ND	0	158	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C19 as Nonadecane	79.3	ND	40	156	ND	0	158	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Eicosane	79.1	ND	40	156	ND	0	157	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C20 as Eicosane	79.1	ND	40	156	ND	0	157	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Heneicosane	79.8	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C21 as Heneicosane	79.8	ND	40	157	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Docosane	78.9	ND	39	155	ND	0	159	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C22 as Docosane	78.9	ND	39	155	ND	0	159	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tricosane	79.4	ND	40	156	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C23 as Tricosane	79.4	ND	40	156	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetracosane	79.5	ND	40	156	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C24 as Tetracosane	79.5	ND	40	156	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
Total Hydrocarbon			4,654			195			0		4.46	476	2,198	2.20E-06	0	0	0.00E+00	2.20E-06

B052B

Component	ANALYTICAL RESULTS B052B µg/m³	Flag	ND Adj µg/m³	BACKGROUND B053A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	151	ND	76	150	ND	0	355	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
C5 as Pentane	151	ND	76	150	ND	0	355	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
n-Hexane	217	ND	109	215	ND	0	375	ND	0	109	0.11	12	53	5.35E-08	5.35E-08
C6 as Hexane	217	ND	109	215	ND	0	375	ND	0	109	0.11	12	53	5.35E-08	5.35E-08
n-Heptane	180	ND	90	179	ND	0	393	ND	0	90	0.09	10	44	4.44E-08	4.44E-08
C7 as Heptane	180	ND	90	179	ND	0	393	ND	0	90	0.09	10	44	4.44E-08	4.44E-08
n-Octane	156	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C8 as Octane	264	J	264	195	J	195	160	ND	0	69	0.07	7	34	3.40E-08	3.40E-08
n-Nonane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C9 as Nonane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Decane	158	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C10 as Decane	158	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Undecane	158	ND	79	157	ND	0	157	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C11 as Undecane	158	ND	79	157	ND	0	157	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Dodecane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C12 as Dodecane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Tridecane	157	ND	79	156	ND	0	160	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C13 as Tridecane	157	ND	79	156	ND	0	160	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Tetradecane	157	ND	79	156	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C14 as tetradecane	157	ND	79	156	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Pentadecane	158	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C15 as Pentadecane	158	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Hexadecane	157	ND	79	156	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C16 as Hexadecane	157	ND	79	156	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Heptadecane	155	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C17 as Heptadecane	155	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Octadecane	157	ND	79	156	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C18 as Octodecane	157	ND	79	156	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Nonadecane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C19 as Nonadecane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Eicosane	157	ND	79	156	ND	0	157	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C20 as Eicosane	157	ND	79	156	ND	0	157	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Heneicosane	158	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C21 as Heneicosane	158	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Docosane	157	ND	79	155	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C22 as Docosane	157	ND	79	155	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Tricosane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C23 as Tricosane	157	ND	79	156	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Tetracosane	158	ND	79	156	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C24 as Tetracosane	158	ND	79	156	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
Total Hydrocarbon			3,405			195			0		3.21	343	1,582	1.58E-06	1.58E-06

Bagging Data Form	Vacuum Method		Sample Id	B054
Equipment type:	Pump - G809		Component ID:	B-285
Equipment Subtype:	Seal		Plant ID:	Refinery B
Line Size:	8	inches	Date:	3-May-18
Phase (G, LL, HL):	HL		Analysis team:	EG/DR
Barometric pressure	30.18 inHg	766.6 mmHg	Sample Pump A	LP52979
			Sample Pump B	LP52975
Ambient Temp:	77.7 °F	25.4 °C	TVA ID	36502
Component Temp:	229 °F	109.4 °C	Stream Pressure/Temp:	60 psig °F
Stream Description:	TPA/HUK			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:30	Background	3	ppmv	8-sec Dwell	3	ppmv	Total Dwell	3:00	min:sec	Final M21	12 ppm
13:33	Initial Bag Vacuum	0.006	inches H2O	DGM Vac.	2	inches H2O	Bag Temp	143	°F	Leak @	bottom of seal

Bag Concentrations (ppmv) (Changed TVA filter)

Time	13:35	13:39	13:41	13:43	13:45	13:47	13:49	13:51	13:53	14:03				
ppmv	11.2	13.3	13.9	14.5	14.9	15	15.5	16	15.9	22.8				

Sorbent Tube Sample Collection Parameters

B054A

Time									
13:53	Volume Start	671.8	Liters		Design Sample Flow Rate = 1 liter/min				
14:06	Volume Stop	684.7	Liters	Total Vol	12.9	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow 0.992	L/min	Sorbent Flow$_{STP}$	0.940	L/min

B054B

Time									
13:54	Volume Start	605.4	Liters		Design Sample Flow Rate = 1 liter/min				
14:07	Volume Stop	618.4	Liters	Total Vol	13.0	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow 1.000	L/min	Sorbent Flow$_{STP}$	0.947	L/min
	Total ST Vol$_{STP}$	24.53	Liters	DGM Vol$_{STP}$	79.43	Liters	Total Run Vol$_{STP}$	103.96	Liters

Bagging Parameters

Time										
14:00	Vacuum check	0.01	inches H2O			DGM$_P$	1.8	inches H2O vacuum	763.2	mmHg
13:58	DGM$_{10L}$ Time	01:33.0	min:sec.frac	DGM Time	1.550	DGM Flow	6.45	DGM Flow$_{STP}$	6.11	liters/minute
13:59	Bag Temp.	157.1	°F	69.5	°C	Sample$_T$	102	°F	38.9	°C

Post-Sample Data

14:16	Post Test M21	Background	4	ppmv	8-sec Dwell	7	ppmv	Total Dwell	2:00 min:sec	Final M21 15 ppm @ bottom of seal
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A	hour:min		0:00 hours:min	
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions =	1.86E-05	kg/hr
Percent difference THC ER =	45%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.65E-08
C5 as Pentane	2.65E-08
n-Hexane	3.45E-08
C6 as Hexane	3.45E-08
n-Heptane	3.06E-08
C7 as Heptane	3.06E-08
n-Octane	2.74E-08
C8 as Octane	2.68E-07
n-Nonane	5.24E-08
C9 as Nonane	4.97E-07
n-Decane	1.49E-07
C10 as Decane	1.21E-06
n-Undecane	2.22E-07
C11 as Undecane	2.79E-06
n-Dodecane	4.73E-07
C12 as Dodecane	2.78E-06
n-Tridecane	3.12E-07
C13 as Tridecane	2.76E-06
n-Tetradecane	3.50E-07
C14 as tetradecane	1.68E-06
n-Pentadecane	2.62E-07
C15 as Pentadecane	1.38E-06
n-Hexadecane	3.77E-07
C16 as Hexadecane	6.88E-07
n-Heptadecane	2.11E-07
C17 as Heptadecane	3.26E-07
n-Octadecane	1.12E-07
C18 as Octodecane	2.43E-07
n-Nonadecane	1.03E-07
C19 as Nonadecane	1.43E-07
n-Eicosane	1.02E-07
C20 as Eicosane	2.28E-07
n-Heneicosane	8.61E-08
C21 as Heneicosane	2.40E-07
n-Docosane	7.82E-08
C22 as Docosane	1.18E-07
n-Tricosane	4.00E-08
C23 as Tricosane	5.83E-08
n-Tetracosane	2.78E-08
C24 as Tetracosane	2.78E-08
Total Hydrocarbon	1.86E-05

THC: 9.84E-04 lbs/day 1.80E-04 tons/yr

ANALYTICAL RESULTS B054A				BACKGROUND B055A			TRIP BLANK #B028			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#P0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	72.6	ND	36	148	ND	0	355	ND	0	36	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
C5 as Pentane	72.6	ND	36	148	ND	0	355	ND	0	36	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
n-Hexane	75.4	ND	38	212	ND	0	375	ND	0	38	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C6 as Hexane	75.4	ND	38	212	ND	0	375	ND	0	38	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Heptane	78.8	ND	39	176	ND	0	393	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C7 as Heptane	78.8	ND	39	176	ND	0	393	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Octane	76.7	ND	38	152	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C8 as Octane	758	J	758	152	ND	0	160	ND	0	758	0.76	79	364	3.64E-07	0	0	0.00E+00	3.64E-07
n-Nonane	142	J	142	153	ND	0	158	ND	0	142	0.14	15	68	6.81E-08	0	0	0.00E+00	6.81E-08
C9 as Nonane	1224		1,224	153	ND	0	158	ND	0	1,224	1.22	127	587	5.87E-07	0	0	0.00E+00	5.87E-07
n-Decane	357	J	357	155	ND	0	158	ND	0	357	0.36	37	171	1.71E-07	0	0	0.00E+00	1.71E-07
C10 as Decane	3107		3,107	155	ND	0	158	ND	0	3,107	3.11	323	1491	1.49E-06	0	0	0.00E+00	1.49E-06
n-Undecane	475	J	475	154	ND	0	157	ND	0	475	0.48	49	228	2.28E-07	0	0	0.00E+00	2.28E-07
C11 as Undecane	7000		7,000	154	ND	0	157	ND	0	7,000	7.00	728	3359	3.36E-06	0	0	0.00E+00	3.36E-06
n-Dodecane	1156		1,156	153	ND	0	158	ND	0	1,156	1.16	120	555	5.55E-07	0	0	0.00E+00	5.55E-07
C12 as Dodecane	7316		7,316	153	ND	0	158	ND	0	7,316	7.32	761	3510	3.51E-06	0	0	0.00E+00	3.51E-06
n-Tridecane	791		791	154	ND	0	160	ND	0	791	0.79	82	380	3.80E-07	0	0	0.00E+00	3.80E-07
C13 as Tridecane	6842		6,842	154	ND	0	160	ND	0	6,842	6.84	711	3283	3.28E-06	0	0	0.00E+00	3.28E-06
n-Tetradecane	919		919	154	ND	0	159	ND	0	919	0.92	96	441	4.41E-07	0	0	0.00E+00	4.41E-07
C14 as tetradecane	4463		4,463	154	ND	0	159	ND	0	4,463	4.46	464	2142	2.14E-06	0	0	0.00E+00	2.14E-06
n-Pentadecane	671	J	671	154	ND	0	158	ND	0	671	0.67	70	322	3.22E-07	0	0	0.00E+00	3.22E-07
C15 as Pentadecane	3753		3,753	154	ND	0	158	ND	0	3,753	3.75	390	1801	1.80E-06	0	0	0.00E+00	1.80E-06
n-Hexadecane	1171		1,171	153	ND	0	159	ND	0	1,171	1.17	122	562	5.62E-07	0	0	0.00E+00	5.62E-07
C16 as Hexadecane	2154		2,154	153	ND	0	159	ND	0	2,154	2.15	224	1034	1.03E-06	0	0	0.00E+00	1.03E-06
n-Heptadecane	498	J	498	152	ND	0	158	ND	0	498	0.50	52	239	2.39E-07	0	0	0.00E+00	2.39E-07
C17 as Heptadecane	675	J	675	152	ND	0	158	ND	0	675	0.68	70	324	3.24E-07	0	0	0.00E+00	3.24E-07
n-Octadecane	219	J	219	153	ND	0	159	ND	0	219	0.22	23	105	1.05E-07	0	0	0.00E+00	1.05E-07
C18 as Octodecane	530	J	530	153	ND	0	159	ND	0	530	0.53	55	254	2.54E-07	0	0	0.00E+00	2.54E-07
n-Nonadecane	209	J	209	154	ND	0	158	ND	0	209	0.21	22	100	1.00E-07	0	0	0.00E+00	1.00E-07
C19 as Nonadecane	377	J	377	154	ND	0	158	ND	0	377	0.38	39	181	1.81E-07	0	0	0.00E+00	1.81E-07
n-Eicosane	227	J	227	153	ND	0	157	ND	0	227	0.23	24	109	1.09E-07	0	0	0.00E+00	1.09E-07
C20 as Eicosane	531	J	531	153	ND	0	157	ND	0	531	0.53	55	255	2.55E-07	0	0	0.00E+00	2.55E-07
n-Heneicosane	178	J	178	155	ND	0	158	ND	0	178	0.18	19	85	8.54E-08	0	0	0.00E+00	8.54E-08
C21 as Heneicosane	712	J	712	155	ND	0	158	ND	0	712	0.71	74	342	3.42E-07	0	0	0.00E+00	3.42E-07
n-Docosane	172	J	172	153	ND	0	159	ND	0	172	0.17	18	83	8.25E-08	0	0	0.00E+00	8.25E-08
C22 as Docosane	339	J	339	153	ND	0	159	ND	0	339	0.34	35	163	1.63E-07	0	0	0.00E+00	1.63E-07
n-Tricosane	89.9	J	90	154	ND	0	158	ND	0	90	0.09	9	43	4.31E-08	0	0	0.00E+00	4.31E-08
C23 as Tricosane	166	J	166	154	ND	0	158	ND	0	166	0.17	17	80	7.97E-08	0	0	0.00E+00	7.97E-08
n-Tetracosane	77.6	ND	39	154	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C24 as Tetracosane	77.6	ND	39	154	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
Total Hydrocarbon			47,565			0			0		47.56	4945	22,823	2.28E-05	0	0	0.00E+00	2.28E-05

ANALYTICAL RESULTS B054B				BACKGROUND B055A			TRIP BLANK #B028			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148	ND	74	148	ND	0	355	ND	0	74	0.07	8	36	3.55E-08	3.55E-08
C5 as Pentane	148	ND	74	148	ND	0	355	ND	0	74	0.07	8	36	3.55E-08	3.55E-08
n-Hexane	212	ND	106	212	ND	0	375	ND	0	106	0.11	11	51	5.09E-08	5.09E-08
C6 as Hexane	212	ND	106	212	ND	0	375	ND	0	106	0.11	11	51	5.09E-08	5.09E-08
n-Heptane	176	ND	88	176	ND	0	393	ND	0	88	0.09	9	42	4.22E-08	4.22E-08
C7 as Heptane	176	ND	88	176	ND	0	393	ND	0	88	0.09	9	42	4.22E-08	4.22E-08
n-Octane	152	ND	76	152	ND	0	160	ND	0	76	0.08	8	36	3.65E-08	3.65E-08
C8 as Octane	360	J	360	152	ND	0	160	ND	0	360	0.36	37	173	1.73E-07	1.73E-07
n-Nonane	153	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.67E-08	3.67E-08
C9 as Nonane	849	J	849	153	ND	0	158	ND	0	849	0.85	88	407	4.07E-07	4.07E-07
n-Decane	264	J	264	155	ND	0	158	ND	0	264	0.26	27	127	1.27E-07	1.27E-07
C10 as Decane	1933		1,933	155	ND	0	158	ND	0	1,933	1.93	201	928	9.28E-07	9.28E-07
n-Undecane	451	J	451	154	ND	0	157	ND	0	451	0.45	47	216	2.16E-07	2.16E-07
C11 as Undecane	4648		4,648	154	ND	0	157	ND	0	4,648	4.65	483	2230	2.23E-06	2.23E-06
n-Dodecane	816	J	816	153	ND	0	158	ND	0	816	0.82	85	392	3.92E-07	3.92E-07
C12 as Dodecane	4259		4,259	153	ND	0	158	ND	0	4,259	4.26	443	2044	2.04E-06	2.04E-06
n-Tridecane	511	J	511	154	ND	0	160	ND	0	511	0.51	53	245	2.45E-07	2.45E-07
C13 as Tridecane	4643		4,643	154	ND	0	160	ND	0	4,643	4.64	483	2228	2.23E-06	2.23E-06
n-Tetradecane	538	J	538	154	ND	0	159	ND	0	538	0.54	56	258	2.58E-07	2.58E-07
C14 as tetradecane	2539		2,539	154	ND	0	159	ND	0	2,539	2.54	264	1218	1.22E-06	1.22E-06
n-Pentadecane	421	J	421	154	ND	0	158	ND	0	421	0.42	44	202	2.02E-07	2.02E-07
C15 as Pentadecane	1981		1,981	154	ND	0	158	ND	0	1,981	1.98	206	951	9.51E-07	9.51E-07
n-Hexadecane	402	J	402	153	ND	0	159	ND	0	402	0.40	42	193	1.93E-07	1.93E-07
C16 as Hexadecane	714	J	714	153	ND	0	159	ND	0	714	0.71	74	343	3.43E-07	3.43E-07
n-Heptadecane	380	J	380	152	ND	0	158	ND	0	380	0.38	40	182	1.82E-07	1.82E-07
C17 as Heptadecane	685	J	685	152	ND	0	158	ND	0	685	0.69	71	329	3.29E-07	3.29E-07
n-Octadecane	249	J	249	153	ND	0	159	ND	0	249	0.25	26	119	1.19E-07	1.19E-07
C18 as Octodecane	483	J	483	153	ND	0	159	ND	0	483	0.48	50	232	2.32E-07	2.32E-07
n-Nonadecane	220	J	220	154	ND	0	158	ND	0	220	0.22	23	106	1.06E-07	1.06E-07
C19 as Nonadecane	217	J	217	154	ND	0	158	ND	0	217	0.22	23	104	1.04E-07	1.04E-07
n-Eicosane	199	J	199	153	ND	0	157	ND	0	199	0.20	21	95	9.55E-08	9.55E-08
C20 as Eicosane	418	J	418	153	ND	0	157	ND	0	418	0.42	43	201	2.01E-07	2.01E-07
n-Heneicosane	181	J	181	155	ND	0	158	ND	0	181	0.18	19	87	8.69E-08	8.69E-08
C21 as Heneicosane	290	J	290	155	ND	0	158	ND	0	290	0.29	30	139	1.39E-07	1.39E-07
n-Docosane	154	J	154	153	ND	0	159	ND	0	154	0.15	16	74	7.39E-08	7.39E-08
C22 as Docosane	154	J	154	153	ND	0	159	ND	0	154	0.15	16	74	7.39E-08	7.39E-08
n-Tricosane	154	ND	77	154	ND	0	158	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C23 as Tricosane	154	ND	77	154	ND	0	158	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
n-Tetracosane	154	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C24 as Tetracosane	154	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
Total Hydrocarbon			29,956			0			0		29.96	3114	14,374	1.44E-05	1.44E-05

Bagging Data Form — Vacuum Method

Sample Id: B056

Equipment type:	Connector	**Component ID:**	B-818
Equipment Subtype:	Plug	**Plant ID:**	Refinery B
Line Size:	1 inches	**Date:**	4-May-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	30.14 inHg / 765.6 mmHg	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	62.2 °F / 16.8 °C	**TVA ID**	37887
Component Temp:	79 °F / 26.1 °C	**Stream Pressure/Temp:**	psig / 230 °F
Stream Description:	LCGO		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
8:55	Background	3 ppmv	8-sec Dwell	2 ppmv	Total Dwell	4:00 min:sec	Final M21	8 ppm
9:25	Initial Bag Vacuum	0.1 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	71.2 °F	Leak @	N side of plug

Bag Concentrations (ppmv)

Time	9:27	9:30	9:32	9:34	9:38	9:43								
ppmv	1.4	1.8	2	2	2.1	1.9								

Sorbent Tube Sample Collection Parameters

B056A

Time						
9:34	Volume Start	687.6 Liters		Design Sample Flow Rate = 1 liter/min		
9:47	Volume Stop	700.0 Liters	Total Vol	12.4 Liters		
	Sample Run Time	13 Minutes	Sorbent Flow	0.954 L/min	$Sorbent Flow_{STP}$	0.971 L/min

B056B

9:34	Volume Start	621.1 Liters		Design Sample Flow Rate = 1 liter/min		
9:47	Volume Stop	633.6 Liters	Total Vol	12.5 Liters		
	Sample Run Time	13 Minutes	Sorbent Flow	0.962 L/min	$Sorbent Flow_{STP}$	0.979 L/min
	$Total ST Vol_{STP}$	25.35 Liters	$DGM Vol_{STP}$	86.30 Liters	$Total Run Vol_{STP}$	111.65 Liters

Bagging Parameters

Time						
9:39	Vacuum check	0.14 inches H2O		DGM_P	2 inches H2O vacuum	761.8 mmHg
9:38	DGM_{10L} Time	01:32.3 min:sec.frac	DGM Time 1.533	DGM Flow	6.52	$DGM Flow_{STP}$ 6.64 liters/minute
9:39	Bag Temp.	74.5 °F	23.6 °C	$Sample_T$	62 °F	16.7 °C

Post-Sample Data

9:57	Post Test M21	Background 0 ppmv	8-sec Dwell	7 ppmv	Total Dwell	2:00 min:sec	Final M21	10.2 ppm @ N side of plug

Condensate accumulation: starting time N/A hour:min — Final time N/A hour:min — 0:00 hours:min
Organic condensate collected N/A ml
Density of organic condensate N/A g/ml

Average THC emissions =	2.29E-06 kg/hr
Percent difference THC ER =	43%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.96E-08
C5 as Pentane	2.96E-08
n-Hexane	3.84E-08
C6 as Hexane	3.84E-08
n-Heptane	3.41E-08
C7 as Heptane	3.41E-08
n-Octane	3.06E-08
C8 as Octane	1.37E-07
n-Nonane	3.10E-08
C9 as Nonane	3.10E-08
n-Decane	3.12E-08
C10 as Decane	9.62E-08
n-Undecane	3.12E-08
C11 as Undecane	9.47E-08
n-Dodecane	7.12E-08
C12 as Dodecane	9.44E-08
n-Tridecane	5.33E-08
C13 as Tridecane	5.00E-07
n-Tetradecane	9.61E-08
C14 as tetradecane	8.01E-08
n-Pentadecane	4.15E-08
C15 as Pentadecane	1.06E-07
n-Hexadecane	3.10E-08
C16 as Hexadecane	3.10E-08
n-Heptadecane	3.06E-08
C17 as Heptadecane	3.06E-08
n-Octadecane	3.10E-08
C18 as Octodecane	3.10E-08
n-Nonadecane	3.10E-08
C19 as Nonadecane	3.10E-08
n-Eicosane	3.08E-08
C20 as Eicosane	3.08E-08
n-Heneicosane	3.12E-08
C21 as Heneicosane	3.12E-08
n-Docosane	3.08E-08
C22 as Docosane	3.08E-08
n-Tricosane	3.10E-08
C23 as Tricosane	3.10E-08
n-Tetracosane	3.10E-08
C24 as Tetracosane	3.10E-08
Total Hydrocarbon	2.29E-06

THC: 1.21E-04 lbs/day 2.21E-05 tons/yr

B056A

ANALYTICAL RESULTS B056A				BACKGROUND B057A			TRIP BLANK #B028			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS #P0XX			COMBINED EMISSION RATE
Component	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	Capture µg	µg/min	kg/hr	kg/hr
n-Pentane	75.5	ND	38	148	ND	0	355	ND	0	38	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C5 as Pentane	75.5	ND	38	148	ND	0	355	ND	0	38	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Hexane	78.4	ND	39	212	ND	0	375	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C6 as Hexane	78.4	ND	39	212	ND	0	375	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heptane	82	ND	41	176	ND	0	393	ND	0	41	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C7 as Heptane	82	ND	41	176	ND	0	393	ND	0	41	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Octane	79.8	ND	40	152	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C8 as Octane	368	J	368	152	ND	0	160	ND	0	368	0.37	41	190	1.90E-07	0	0	0.00E+00	1.90E-07
n-Nonane	80.4	ND	40	153	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C9 as Nonane	80.4	ND	40	153	ND	0	158	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Decane	81.1	ND	41	155	ND	0	158	ND	0	41	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
C10 as Decane	293	J	293	155	ND	0	158	ND	0	293	0.29	33	151	1.51E-07	0	0	0.00E+00	1.51E-07
n-Undecane	80.9	ND	40	154	ND	0	157	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C11 as Undecane	287	J	287	154	ND	0	157	ND	0	287	0.29	32	148	1.48E-07	0	0	0.00E+00	1.48E-07
n-Dodecane	197	J	197	153	ND	0	158	ND	0	197	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C12 as Dodecane	287	J	287	153	ND	0	158	ND	0	287	0.29	32	148	1.48E-07	0	0	0.00E+00	1.48E-07
n-Tridecane	127	J	127	154	ND	0	160	ND	0	127	0.13	14	65	6.54E-08	0	0	0.00E+00	6.54E-08
C13 as Tridecane	1743		1,743	154	ND	0	160	ND	0	1,743	1.74	195	898	8.98E-07	0	0	0.00E+00	8.98E-07
n-Tetradecane	293	J	293	154	ND	0	159	ND	0	293	0.29	33	151	1.51E-07	0	0	0.00E+00	1.51E-07
C14 as tetradecane	231	J	231	154	ND	0	159	ND	0	231	0.23	26	119	1.19E-07	0	0	0.00E+00	1.19E-07
n-Pentadecane	81.1	J	81	154	ND	0	158	ND	0	81	0.08	9	42	4.18E-08	0	0	0.00E+00	4.18E-08
C15 as Pentadecane	333	J	333	154	ND	0	158	ND	0	333	0.33	37	172	1.72E-07	0	0	0.00E+00	1.72E-07
n-Hexadecane	80.5	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C16 as Hexadecane	80.5	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Heptadecane	79.5	ND	40	152	ND	0	158	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C17 as Heptadecane	79.5	ND	40	152	ND	0	158	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Octadecane	80.4	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C18 as Octodecane	80.4	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Nonadecane	80.6	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.08E-08	0	0	0.00E+00	2.08E-08
C19 as Nonadecane	80.6	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Eicosane	80.4	ND	40	153	ND	0	157	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C20 as Eicosane	80.4	ND	40	153	ND	0	157	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Heneicosane	81.1	ND	41	155	ND	0	158	ND	0	41	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
C21 as Heneicosane	81.1	ND	41	155	ND	0	158	ND	0	41	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
n-Docosane	80.2	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C22 as Docosane	80.2	ND	40	153	ND	0	159	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Tricosane	80.6	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.08E-08	0	0	0.00E+00	2.08E-08
C23 as Tricosane	80.6	ND	40	154	ND	0	158	ND	0	40	0.04	4	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Tetracosane	80.8	ND	40	154	ND	0	160	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C24 as Tetracosane	80.8	ND	40	154	ND	0	160	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
Total Hydrocarbon			5,401			0			0		5.40	603	2,783	2.78E-06	0	0	0.00E+00	2.78E-06

B056B

ANALYTICAL RESULTS B056B				BACKGROUND B057A			TRIP BLANK #B028			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	154	ND	77	148	ND	0	355	ND	0	77	0.08	9	40	3.97E-08	3.97E-08
C5 as Pentane	154	ND	77	148	ND	0	355	ND	0	77	0.08	9	40	3.97E-08	3.97E-08
n-Hexane	220	ND	110	212	ND	0	375	ND	0	110	0.11	12	57	5.67E-08	5.67E-08
C6 as Hexane	220	ND	110	212	ND	0	375	ND	0	110	0.11	12	57	5.67E-08	5.67E-08
n-Heptane	183	ND	92	176	ND	0	393	ND	0	92	0.09	10	47	4.71E-08	4.71E-08
C7 as Heptane	183	ND	92	176	ND	0	393	ND	0	92	0.09	10	47	4.71E-08	4.71E-08
n-Octane	158	ND	79	152	ND	0	160	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
C8 as Octane	163	J	163	152	ND	0	160	ND	0	163	0.16	18	84	8.40E-08	8.40E-08
n-Nonane	160	ND	80	153	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C9 as Nonane	160	ND	80	153	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
n-Decane	161	ND	81	155	ND	0	158	ND	0	81	0.08	9	41	4.15E-08	4.15E-08
C10 as Decane	161	ND	81	155	ND	0	158	ND	0	81	0.08	9	41	4.15E-08	4.15E-08
n-Undecane	161	ND	81	154	ND	0	157	ND	0	81	0.08	9	41	4.15E-08	4.15E-08
C11 as Undecane	161	ND	81	154	ND	0	157	ND	0	81	0.08	9	41	4.15E-08	4.15E-08
n-Dodecane	159	ND	80	153	ND	0	158	ND	0	80	0.08	9	41	4.10E-08	4.10E-08
C12 as Dodecane	159	ND	80	153	ND	0	158	ND	0	80	0.08	9	41	4.10E-08	4.10E-08
n-Tridecane	160	ND	80	154	ND	0	160	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C13 as Tridecane	199	J	199	154	ND	0	160	ND	0	199	0.20	22	103	1.03E-07	1.03E-07
n-Tetradecane	160	ND	80	154	ND	0	159	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C14 as tetradecane	160	ND	80	154	ND	0	159	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
n-Pentadecane	160	ND	80	154	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C15 as Pentadecane	160	ND	80	154	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
n-Hexadecane	160	ND	80	153	ND	0	159	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C16 as Hexadecane	160	ND	80	153	ND	0	159	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
n-Heptadecane	158	ND	79	152	ND	0	158	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
C17 as Heptadecane	158	ND	79	152	ND	0	158	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
n-Octadecane	160	ND	80	153	ND	0	159	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C18 as Octodecane	160	ND	80	153	ND	0	159	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
n-Nonadecane	160	ND	80	154	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C19 as Nonadecane	160	ND	80	154	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
n-Eicosane	159	ND	80	153	ND	0	157	ND	0	80	0.08	9	41	4.10E-08	4.10E-08
C20 as Eicosane	159	ND	80	153	ND	0	157	ND	0	80	0.08	9	41	4.10E-08	4.10E-08
n-Heneicosane	161	ND	81	155	ND	0	158	ND	0	81	0.08	9	41	4.15E-08	4.15E-08
C21 as Heneicosane	161	ND	81	155	ND	0	158	ND	0	81	0.08	9	41	4.15E-08	4.15E-08
n-Docosane	159	ND	80	153	ND	0	159	ND	0	80	0.08	9	41	4.10E-08	4.10E-08
C22 as Docosane	159	ND	80	153	ND	0	159	ND	0	80	0.08	9	41	4.10E-08	4.10E-08
n-Tricosane	160	ND	80	154	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C23 as Tricosane	160	ND	80	154	ND	0	158	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
n-Tetracosane	160	ND	80	154	ND	0	160	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
C24 as Tetracosane	160	ND	80	154	ND	0	160	ND	0	80	0.08	9	41	4.12E-08	4.12E-08
Total Hydrocarbon			3,476			0			0		3.48	388	1,791	1.79E-06	1.79E-06

Bagging Data Form **Vacuum Method** **Sample Id** **B058**

WSPA Western States Petroleum Association

Equipment type:	Pump - G-311		**Component ID:**	B-547	
Equipment Subtype:	Seal		**Plant ID:**	Refinery B	
Line Size:	6 *inches*		**Date:**	4-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.14 *inHg*	765.6 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	74.8 *°F*	23.8 *°C*	**TVA ID**	34251	
Component Temp:	263 *°F*	128.3 *°C*	**Stream Pressure/Temp:**	>300psig *psig*	*°F*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Stream Description: *HUK Product (pump On-Water Seal turned off)*

Pre-Sample Data

Time								
12:14	Background	0 *ppmv*	8-sec Dwell	162 *ppmv*	Total Dwell	4:00 *min:sec*	Final M21	531 *ppm*
13:20	Initial Bag Vacuum	0.005 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	242 *°F*	Leak @	Top of Seal

Bag Concentrations (ppmv) (Changed TVA filter)

Time	13:22	13:24	13:26	13:28	13:30	13:32	13:34	13:36	13:38	13:50				
ppmv	506	613	711	802	851	891	927	925	946	1775				

Sorbent Tube Sample Collection Parameters

B058A

Time						
13:38	Volume Start	700.0 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:51	Volume Stop	712.6 *Liters*	Total Vol	12.6 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.969 *L/min*	$Sorbent Flow_{STP}$	0.968 *L/min*

B058B

13:38	Volume Start	633.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:51	Volume Stop	646.3 *Liters*	Total Vol	12.7 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.977 *L/min*	$Sorbent Flow_{STP}$	0.976 *L/min*
	$Total ST Vol_{STP}$	25.28 *Liters*	$DGM Vol_{STP}$	78.73 *Liters*	$Total Run Vol_{STP}$	104.01 *Liters*

Bagging Parameters

Time						
13:43	Vacuum check	0.005 *inches H2O*		DGM_P 1.8 *inches H2O vacuum*		762.2 *mmHg*
13:42	DGM_{10L} Time	01:38.9 *min:sec.frac*	DGM Time 1.650	DGM Flow 6.06	$DGM Flow_{STP}$	6.06 *liters/minute*
13:44	Bag Temp.	254.5 *°F*	123.6 *°C*	$Sample_T$ 72 *°F*		22.2 *°C*

Post-Sample Data

14:01	Post Test M21	Background 37 *ppmv*	8-sec Dwell	170 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	542 *ppm* @ Top of Seal

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	1.62E-03	kg/hr
Percent difference THC ER =	10%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.70E-08
C5 as Pentane	2.70E-08
n-Hexane	3.53E-08
C6 as Hexane	1.55E-07
n-Heptane	3.13E-08
C7 as Heptane	1.24E-07
n-Octane	1.94E-06
C8 as Octane	6.13E-05
n-Nonane	9.25E-06
C9 as Nonane	1.91E-04
n-Decane	1.68E-05
C10 as Decane	4.07E-04
n-Undecane	2.64E-05
C11 as Undecane	3.81E-04
n-Dodecane	2.39E-05
C12 as Dodecane	2.26E-04
n-Tridecane	2.09E-05
C13 as Tridecane	1.12E-04
n-Tetradecane	1.67E-05
C14 as tetradecane	6.06E-05
n-Pentadecane	1.20E-05
C15 as Pentadecane	2.68E-05
n-Hexadecane	5.11E-06
C16 as Hexadecane	1.04E-05
n-Heptadecane	2.15E-06
C17 as Heptadecane	2.87E-06
n-Octadecane	8.28E-07
C18 as Octodecane	5.61E-07
n-Nonadecane	3.28E-07
C19 as Nonadecane	7.32E-08
n-Eicosane	1.19E-07
C20 as Eicosane	2.83E-08
n-Heneicosane	3.93E-08
C21 as Heneicosane	2.85E-08
n-Docosane	2.83E-08
C22 as Docosane	2.83E-08
n-Tricosane	2.84E-08
C23 as Tricosane	2.84E-08
n-Tetracosane	2.85E-08
C24 as Tetracosane	2.85E-08
Total Hydrocarbon	1.62E-03

THC:	**8.55E-02**	**lbs/day**	**1.56E-02**	**tons/yr**

B058A Component	ANALYTICAL RESULTS B058A µg/m³	Flag	ND Adj µg/m³	BACKGROUND B059A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³
n-Pentane	74.3	ND	37	148	ND	0	355	ND	0
C5 as Pentane	74.3	ND	37	148	ND	0	355	ND	0
n-Hexane	77.2	ND	39	212	ND	0	375	ND	0
C6 as Hexane	539	J	539	212	ND	0	375	ND	0
n-Heptane	80.7	ND	40	176	ND	0	393	ND	0
C7 as Heptane	428	J	428	176	ND	0	393	ND	0
n-Octane	4483		4,483	152	ND	0	160	ND	0
C8 as Octane	139161		139,161	152	ND	0	160	ND	0
n-Nonane	28759		28,759	153	ND	0	158	ND	0
C9 as Nonane	435552		435,552	153	ND	0	158	ND	0
n-Decane	37843		37,843	155	ND	0	158	ND	0
C10 as Decane	919528		919,528	155	ND	0	158	ND	0
n-Undecane	55108		55,108	154	ND	0	157	ND	0
C11 as Undecane	832073		832,073	154	ND	0	157	ND	0
n-Dodecane	36705		36,705	153	ND	0	158	ND	0
C12 as Dodecane	466039		466,039	153	ND	0	158	ND	0
n-Tridecane	51834		51,834	154	ND	0	160	ND	0
C13 as Tridecane	225349		225,349	154	ND	0	160	ND	0
n-Tetradecane	35996		35,996	154	ND	0	159	ND	0
C14 as tetradecane	130935		130,935	154	ND	0	159	ND	0
n-Pentadecane	23128		23,128	154	ND	0	158	ND	0
C15 as Pentadecane	58488		58,488	154	ND	0	158	ND	0
n-Hexadecane	11454		11,454	153	ND	0	159	ND	0
C16 as Hexadecane	23502		23,502	153	ND	0	159	ND	0
n-Heptadecane	4736		4,736	152	ND	0	158	ND	0
C17 as Heptadecane	7740		7,740	152	ND	0	158	ND	0
n-Octadecane	1989		1,989	153	ND	0	159	ND	0
C18 as Octodecane	1709		1,709	153	ND	0	159	ND	0
n-Nonadecane	724	J	724	154	ND	0	158	ND	0
C19 as Nonadecane	144	J	144	154	ND	0	158	ND	0
n-Eicosane	220	J	220	153	ND	0	157	ND	0
C20 as Eicosane	79.1	ND	40	153	ND	0	157	ND	0
n-Heneicosane	84.9	J	85	155	ND	0	158	ND	0
C21 as Heneicosane	79.8	ND	40	155	ND	0	158	ND	0
n-Docosane	78.9	ND	39	153	ND	0	159	ND	0
C22 as Docosane	78.9	ND	39	153	ND	0	159	ND	0
n-Tricosane	79.4	ND	40	154	ND	0	158	ND	0
C23 as Tricosane	79.4	ND	40	154	ND	0	158	ND	0
n-Tetracosane	79.5	ND	40	154	ND	0	160	ND	0
C24 as Tetracosane	79.5	ND	40	154	ND	0	160	ND	0
Total Hydrocarbon			3,534,721			0			0

B058A Component	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#P0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	37	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C5 as Pentane	37	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Hexane	39	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
C6 as Hexane	539	0.54	56	259	2.59E-07	0	0	0.00E+00	2.59E-07
n-Heptane	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C7 as Heptane	428	0.43	45	205	2.05E-07	0	0	0.00E+00	2.05E-07
n-Octane	4,483	4.48	466	2152	2.15E-06	0	0	0.00E+00	2.15E-06
C8 as Octane	139,161	139.16	14474	66803	6.68E-05	0	0	0.00E+00	6.68E-05
n-Nonane	28,759	28.76	2991	13806	1.38E-05	0	0	0.00E+00	1.38E-05
C9 as Nonane	435,552	435.55	45301	209083	2.09E-04	0	0	0.00E+00	2.09E-04
n-Decane	37,843	37.84	3936	18166	1.82E-05	0	0	0.00E+00	1.82E-05
C10 as Decane	919,528	919.53	95639	441412	4.41E-04	0	0	0.00E+00	4.41E-04
n-Undecane	55,108	55.11	5732	26454	2.65E-05	0	0	0.00E+00	2.65E-05
C11 as Undecane	832,073	832.07	86543	399430	3.99E-04	0	0	0.00E+00	3.99E-04
n-Dodecane	36,705	36.71	3818	17620	1.76E-05	0	0	0.00E+00	1.76E-05
C12 as Dodecane	466,039	466.04	48472	223718	2.24E-04	0	0	0.00E+00	2.24E-04
n-Tridecane	51,834	51.83	5391	24882	2.49E-05	0	0	0.00E+00	2.49E-05
C13 as Tridecane	225,349	225.35	23438	108177	1.08E-04	0	0	0.00E+00	1.08E-04
n-Tetradecane	35,996	36.00	3744	17280	1.73E-05	0	0	0.00E+00	1.73E-05
C14 as tetradecane	130,935	130.94	13618	62854	6.29E-05	0	0	0.00E+00	6.29E-05
n-Pentadecane	23,128	23.13	2406	11102	1.11E-05	0	0	0.00E+00	1.11E-05
C15 as Pentadecane	58,488	58.49	6083	28077	2.81E-05	0	0	0.00E+00	2.81E-05
n-Hexadecane	11,454	11.45	1191	5498	5.50E-06	0	0	0.00E+00	5.50E-06
C16 as Hexadecane	23,502	23.50	2444	11282	1.13E-05	0	0	0.00E+00	1.13E-05
n-Heptadecane	4,736	4.74	493	2273	2.27E-06	0	0	0.00E+00	2.27E-06
C17 as Heptadecane	7,740	7.74	805	3716	3.72E-06	0	0	0.00E+00	3.72E-06
n-Octadecane	1,989	1.99	207	955	9.55E-07	0	0	0.00E+00	9.55E-07
C18 as Octodecane	1,709	1.71	178	820	8.20E-07	0	0	0.00E+00	8.20E-07
n-Nonadecane	724	0.72	75	348	3.48E-07	0	0	0.00E+00	3.48E-07
C19 as Nonadecane	144	0.14	15	69	6.91E-08	0	0	0.00E+00	6.91E-08
n-Eicosane	220	0.22	23	106	1.06E-07	0	0	0.00E+00	1.06E-07
C20 as Eicosane	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heneicosane	85	0.08	9	41	4.08E-08	0	0	0.00E+00	4.08E-08
C21 as Heneicosane	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Docosane	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C23 as Tricosane	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Tetracosane	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C24 as Tetracosane	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
Total Hydrocarbon		3534.72	367643	#######	1.70E-03	0	0	0.00E+00	1.70E-03

B058B Component	ANALYTICAL RESULTS B058B µg/m³	Flag	ND Adj µg/m³	BACKGROUND B059A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³
n-Pentane	151	ND	76	148	ND	0	355	ND	0
C5 as Pentane	151	ND	76	148	ND	0	355	ND	0
n-Hexane	217	ND	109	212	ND	0	375	ND	0
C6 as Hexane	217	ND	109	212	ND	0	375	ND	0
n-Heptane	180	ND	90	176	ND	0	393	ND	0
C7 as Heptane	180	ND	90	176	ND	0	393	ND	0
n-Octane	3613		3,613	152	ND	0	160	ND	0
C8 as Octane	116043		116,043	152	ND	0	160	ND	0
n-Nonane	9792		9,792	153	ND	0	158	ND	0
C9 as Nonane	361321		361,321	153	ND	0	158	ND	0
n-Decane	32030		32,030	155	ND	0	158	ND	0
C10 as Decane	775965		775,965	155	ND	0	158	ND	0
n-Undecane	54799		54,799	154	ND	0	157	ND	0
C11 as Undecane	753676		753,676	154	ND	0	157	ND	0
n-Dodecane	62801		62,801	153	ND	0	158	ND	0
C12 as Dodecane	474752		474,752	153	ND	0	158	ND	0
n-Tridecane	35215		35,215	154	ND	0	160	ND	0
C13 as Tridecane	241732		241,732	154	ND	0	160	ND	0
n-Tetradecane	33388		33,388	154	ND	0	159	ND	0
C14 as tetradecane	121504		121,504	154	ND	0	159	ND	0
n-Pentadecane	26753		26,753	154	ND	0	158	ND	0
C15 as Pentadecane	53366		53,366	154	ND	0	158	ND	0
n-Hexadecane	9829		9,829	153	ND	0	159	ND	0
C16 as Hexadecane	20000		20,000	153	ND	0	159	ND	0
n-Heptadecane	4222		4,222	152	ND	0	158	ND	0
C17 as Heptadecane	4203		4,203	152	ND	0	158	ND	0
n-Octadecane	1460	J	1,460	153	ND	0	159	ND	0
C18 as Octodecane	628	J	628	153	ND	0	159	ND	0
n-Nonadecane	641	J	641	154	ND	0	158	ND	0
C19 as Nonadecane	161	J	161	154	ND	0	158	ND	0
n-Eicosane	275	J	275	153	ND	0	157	ND	0
C20 as Eicosane	157	ND	79	153	ND	0	157	ND	0
n-Heneicosane	158	ND	79	155	ND	0	158	ND	0
C21 as Heneicosane	158	ND	79	155	ND	0	158	ND	0
n-Docosane	157	ND	79	153	ND	0	159	ND	0
C22 as Docosane	157	ND	79	153	ND	0	159	ND	0
n-Tricosane	157	ND	79	154	ND	0	158	ND	0
C23 as Tricosane	157	ND	79	154	ND	0	158	ND	0
n-Tetracosane	158	ND	79	154	ND	0	160	ND	0
C24 as Tetracosane	158	ND	79	154	ND	0	160	ND	0
Total Hydrocarbon			3,199,426			0			0

B058B Component	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	76	0.08	8	36	3.62E-08	3.62E-08
C5 as Pentane	76	0.08	8	36	3.62E-08	3.62E-08
n-Hexane	109	0.11	11	52	5.21E-08	5.21E-08
C6 as Hexane	109	0.11	11	52	5.21E-08	5.21E-08
n-Heptane	90	0.09	9	43	4.32E-08	4.32E-08
C7 as Heptane	90	0.09	9	43	4.32E-08	4.32E-08
n-Octane	3,613	3.61	376	1734	1.73E-06	1.73E-06
C8 as Octane	116,043	116.04	12070	55706	5.57E-05	5.57E-05
n-Nonane	9,792	9.79	1018	4701	4.70E-06	4.70E-06
C9 as Nonane	361,321	361.32	37581	173449	1.73E-04	1.73E-04
n-Decane	32,030	32.03	3331	15376	1.54E-05	1.54E-05
C10 as Decane	775,965	775.97	80707	372496	3.72E-04	3.72E-04
n-Undecane	54,799	54.80	5700	26306	2.63E-05	2.63E-05
C11 as Undecane	753,676	753.68	78389	361796	3.62E-04	3.62E-04
n-Dodecane	62,801	62.80	6532	30147	3.01E-05	3.01E-05
C12 as Dodecane	474,752	474.75	49379	227901	2.28E-04	2.28E-04
n-Tridecane	35,215	35.22	3663	16905	1.69E-05	1.69E-05
C13 as Tridecane	241,732	241.73	25142	116042	1.16E-04	1.16E-04
n-Tetradecane	33,388	33.39	3473	16028	1.60E-05	1.60E-05
C14 as tetradecane	121,504	121.50	12638	58327	5.83E-05	5.83E-05
n-Pentadecane	26,753	26.75	2783	12843	1.28E-05	1.28E-05
C15 as Pentadecane	53,366	53.37	5551	25618	2.56E-05	2.56E-05
n-Hexadecane	9,829	9.83	1022	4718	4.72E-06	4.72E-06
C16 as Hexadecane	20,000	20.00	2080	9601	9.60E-06	9.60E-06
n-Heptadecane	4,222	4.22	439	2027	2.03E-06	2.03E-06
C17 as Heptadecane	4,203	4.20	437	2018	2.02E-06	2.02E-06
n-Octadecane	1,460	1.46	152	701	7.01E-07	7.01E-07
C18 as Octodecane	628	0.63	65	301	3.01E-07	3.01E-07
n-Nonadecane	641	0.64	67	308	3.08E-07	3.08E-07
C19 as Nonadecane	161	0.16	17	77	7.73E-08	7.73E-08
n-Eicosane	275	0.28	29	132	1.32E-07	1.32E-07
C20 as Eicosane	79	0.08	8	38	3.77E-08	3.77E-08
n-Heneicosane	79	0.08	8	38	3.79E-08	3.79E-08
C21 as Heneicosane	79	0.08	8	38	3.79E-08	3.79E-08
n-Docosane	79	0.08	8	38	3.77E-08	3.77E-08
C22 as Docosane	79	0.08	8	38	3.77E-08	3.77E-08
n-Tricosane	79	0.08	8	38	3.77E-08	3.77E-08
C23 as Tricosane	79	0.08	8	38	3.77E-08	3.77E-08
n-Tetracosane	79	0.08	8	38	3.79E-08	3.79E-08
C24 as Tetracosane	79	0.08	8	38	3.79E-08	3.79E-08
Total Hydrocarbon		3199.43	332769	#######	1.54E-03	1.54E-03

Bagging Data Form — Vacuum Method

Sample Id: B060

Equipment type:	Pump - CP 407			**Component ID:**	B-2040	
Equipment Subtype:	Seal-Inboard			**Plant ID:**	Refinery B	
Line Size:	10 inches			**Date:**	7-May-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.98 inHg	761.5 mmHg		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	69 °F	20.6 °C		**TVA ID**	37887	
Component Temp:	62 °F	16.7 °C		**Stream Pressure/Temp:**	60 psig	°F
Stream Description:	Mid Barrel (Pump off)					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:33	Background	-14	ppmv	8-sec Dwell	31	ppmv	Total Dwell	2:00	min:sec	Final M21	116 ppm
10:36	Initial Bag Vacuum	0.005	inches H2O	DGM Vac.	2	inches H2O	Bag Temp	88.2	°F	Leak @	Inboard Seal NW Side

Bag Concentrations (ppmv)

Time	10:42	10:44	10:46	10:48	10:50	10:52	10:54	10:56	10:58	11:00	11:06	11:10		
ppmv	33.4	38	41.8	42.7	43.6	45.8	47.3	48.7	50.5	51.7	51.7	52.8		

Sorbent Tube Sample Collection Parameters

B060A

Time									
11:00	Volume Start	715.6	Liters		Design Sample Flow Rate = 1 liter/min				
11:13	Volume Stop	728.3	Liters	Total Vol	12.7	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.977 L/min	Sorbent Flow$_{STP}$	0.947	L/min

B060B

11:00	Volume Start	648.6	Liters		Design Sample Flow Rate = 1 liter/min				
11:13	Volume Stop	661.4	Liters	Total Vol	12.8	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.985 L/min	Sorbent Flow$_{STP}$	0.955	L/min
	Total ST Vol$_{STP}$	24.73	Liters	DGM Vol$_{STP}$	84.99	Liters	Total Run Vol$_{STP}$	109.71	Liters

Bagging Parameters

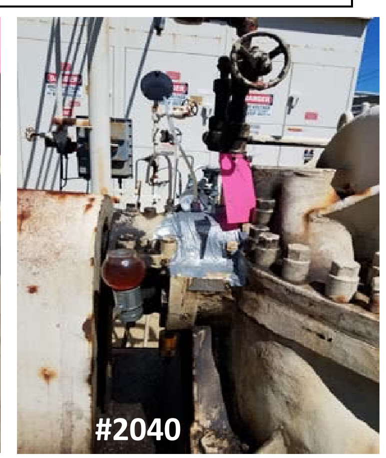
Time										
11:04	Vacuum check	0.005	inches H2O			DGM$_P$	2	inches H2O vacuum	757.8	mmHg
11:03	DGM$_{10L}$ Time	01:29.2	min:sec.frac	DGM Time	1.483	DGM Flow	6.74	DGM Flow$_{STP}$	6.54	liters/minute
11:04	Bag Temp.	83.7	°F	28.7	°C	Sample$_T$	85	°F	29.4	°C

Post-Sample Data

11:25	Post Test M21	Background	-15	ppmv	8-sec Dwell	148	ppmv	Total Dwell	1:30 min:sec	Final M21 255 ppm @ Inboard Seal NW Side

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00 hours:min
Organic condensate collected	N/A	ml				
Density of organic condensate	N/A	g/ml				

Average THC emissions =	5.98E-05 kg/hr
Percent difference THC ER =	9%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.83E-08
C5 as Pentane	2.83E-08
n-Hexane	3.69E-08
C6 as Hexane	6.09E-08
n-Heptane	2.37E-07
C7 as Heptane	5.25E-07
n-Octane	7.41E-07
C8 as Octane	1.06E-05
n-Nonane	1.50E-06
C9 as Nonane	1.25E-05
n-Decane	1.55E-06
C10 as Decane	1.29E-05
n-Undecane	1.41E-06
C11 as Undecane	8.72E-06
n-Dodecane	9.07E-07
C12 as Dodecane	4.54E-06
n-Tridecane	5.11E-07
C13 as Tridecane	1.80E-06
n-Tetradecane	2.47E-07
C14 as tetradecane	3.49E-07
n-Pentadecane	5.61E-08
C15 as Pentadecane	1.14E-07
n-Hexadecane	2.97E-08
C16 as Hexadecane	2.97E-08
n-Heptadecane	2.93E-08
C17 as Heptadecane	2.93E-08
n-Octadecane	2.97E-08
C18 as Octodecane	2.97E-08
n-Nonadecane	2.97E-08
C19 as Nonadecane	2.97E-08
n-Eicosane	2.97E-08
C20 as Eicosane	2.97E-08
n-Heneicosane	2.99E-08
C21 as Heneicosane	2.99E-08
n-Docosane	2.95E-08
C22 as Docosane	2.95E-08
n-Tricosane	2.97E-08
C23 as Tricosane	2.97E-08
n-Tetracosane	2.97E-08
C24 as Tetracosane	2.97E-08
Total Hydrocarbon	5.98E-05

THC:	3.17E-03	lbs/day	5.78E-04	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B060A	B060A		ND Adj	B061A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.7	ND	37	149	ND	0	355	ND	0	37	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C5 as Pentane	73.7	ND	37	149	ND	0	355	ND	0	37	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Hexane	76.6	ND	38	213	ND	0	375	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C6 as Hexane	133	J	133	213	ND	0	375	ND	0	133	0.13	15	67	6.73E-08	0	0	0.00E+00	6.73E-08
n-Heptane	848		848	177	ND	0	393	ND	0	848	0.85	93	429	4.29E-07	0	0	0.00E+00	4.29E-07
C7 as Heptane	1984		1,984	177	ND	0	393	ND	0	1,984	1.98	218	1005	1.00E-06	0	0	0.00E+00	1.00E-06
n-Octane	1949		1,949	153	ND	0	160	ND	0	1,949	1.95	214	987	9.87E-07	0	0	0.00E+00	9.87E-07
C8 as Octane	19106		19,106	153	ND	0	160	ND	0	19,106	19.11	2096	9675	9.67E-06	0	0	0.00E+00	9.67E-06
n-Nonane	3473		3,473	155	ND	0	158	ND	0	3,473	3.47	381	1759	1.76E-06	0	0	0.00E+00	1.76E-06
C9 as Nonane	21630		21,630	155	ND	0	158	ND	0	21,630	21.63	2373	10953	1.10E-05	0	0	0.00E+00	1.10E-05
n-Decane	3242		3,242	156	ND	0	158	ND	0	3,242	3.24	356	1642	1.64E-06	0	0	0.00E+00	1.64E-06
C10 as Decane	23243		23,243	156	ND	0	158	ND	0	23,243	23.24	2550	11769	1.18E-05	0	0	0.00E+00	1.18E-05
n-Undecane	2773		2,773	156	ND	0	157	ND	0	2,773	2.77	304	1404	1.40E-06	0	0	0.00E+00	1.40E-06
C11 as Undecane	16232		16,232	156	ND	0	157	ND	0	16,232	16.23	1781	8219	8.22E-06	0	0	0.00E+00	8.22E-06
n-Dodecane	1463		1,463	155	ND	0	158	ND	0	1,463	1.46	161	741	7.41E-07	0	0	0.00E+00	7.41E-07
C12 as Dodecane	8783		8,783	155	ND	0	158	ND	0	8,783	8.78	964	4447	4.45E-06	0	0	0.00E+00	4.45E-06
n-Tridecane	1070		1,070	155	ND	0	160	ND	0	1,070	1.07	117	542	5.42E-07	0	0	0.00E+00	5.42E-07
C13 as Tridecane	4058		4,058	155	ND	0	160	ND	0	4,058	4.06	445	2055	2.05E-06	0	0	0.00E+00	2.05E-06
n-Tetradecane	537	J	537	155	ND	0	159	ND	0	537	0.54	59	272	2.72E-07	0	0	0.00E+00	2.72E-07
C14 as tetradecane	965		965	155	ND	0	159	ND	0	965	0.97	106	489	4.89E-07	0	0	0.00E+00	4.89E-07
n-Pentadecane	143	J	143	156	ND	0	158	ND	0	143	0.14	16	72	7.24E-08	0	0	0.00E+00	7.24E-08
C15 as Pentadecane	372	J	372	156	ND	0	158	ND	0	372	0.37	41	188	1.88E-07	0	0	0.00E+00	1.88E-07
n-Hexadecane	78.6	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C16 as Hexadecane	78.6	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Heptadecane	77.6	ND	39	153	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C17 as Heptadecane	77.6	ND	39	153	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Octadecane	78.5	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C18 as Octodecane	78.5	ND	39	155	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Nonadecane	78.7	ND	39	155	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C19 as Nonadecane	78.7	ND	39	155	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Eicosane	78.5	ND	39	155	ND	0	157	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C20 as Eicosane	78.5	ND	39	155	ND	0	157	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Heneicosane	79.2	ND	40	156	ND	0	158	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C21 as Heneicosane	79.2	ND	40	156	ND	0	158	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Docosane	78.3	ND	39	154	ND	0	159	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C22 as Docosane	78.3	ND	39	154	ND	0	159	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Tricosane	78.7	ND	39	155	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C23 as Tricosane	78.7	ND	39	155	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Tetracosane	78.9	ND	39	155	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C24 as Tetracosane	78.9	ND	39	155	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
Total Hydrocarbon			112,823			0			0		112.82	12378	57,130	5.71E-05	0	0	0.00E+00	5.71E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
B060B	B060B		ND Adj	B061A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150	ND	75	149	ND	0	355	ND	0	75	0.08	8	38	3.80E-08	3.80E-08
C5 as Pentane	150	ND	75	149	ND	0	355	ND	0	75	0.08	8	38	3.80E-08	3.80E-08
n-Hexane	215	ND	108	213	ND	0	375	ND	0	108	0.11	12	54	5.44E-08	5.44E-08
C6 as Hexane	215	ND	108	213	ND	0	375	ND	0	108	0.11	12	54	5.44E-08	5.44E-08
n-Heptane	179	ND	90	177	ND	0	393	ND	0	90	0.09	10	45	4.53E-08	4.53E-08
C7 as Heptane	179	ND	90	177	ND	0	393	ND	0	90	0.09	10	45	4.53E-08	4.53E-08
n-Octane	976	J	976	153	ND	0	160	ND	0	976	0.98	107	494	4.94E-07	4.94E-07
C8 as Octane	22825		22,825	153	ND	0	160	ND	0	22,825	22.83	2504	11558	1.16E-05	1.16E-05
n-Nonane	2436		2,436	155	ND	0	158	ND	0	2,436	2.44	267	1234	1.23E-06	1.23E-06
C9 as Nonane	27562		27,562	155	ND	0	158	ND	0	27,562	27.56	3024	13956	1.40E-05	1.40E-05
n-Decane	2896		2,896	156	ND	0	158	ND	0	2,896	2.90	318	1466	1.47E-06	1.47E-06
C10 as Decane	27612		27,612	156	ND	0	158	ND	0	27,612	27.61	3029	13982	1.40E-05	1.40E-05
n-Undecane	2814		2,814	156	ND	0	157	ND	0	2,814	2.81	309	1425	1.42E-06	1.42E-06
C11 as Undecane	18190		18,190	156	ND	0	157	ND	0	18,190	18.19	1996	9211	9.21E-06	9.21E-06
n-Dodecane	2121		2,121	155	ND	0	158	ND	0	2,121	2.12	233	1074	1.07E-06	1.07E-06
C12 as Dodecane	9165		9,165	155	ND	0	158	ND	0	9,165	9.17	1006	4641	4.64E-06	4.64E-06
n-Tridecane	950	J	950	155	ND	0	160	ND	0	950	0.95	104	481	4.81E-07	4.81E-07
C13 as Tridecane	3065		3,065	155	ND	0	160	ND	0	3,065	3.07	336	1552	1.55E-06	1.55E-06
n-Tetradecane	439	J	439	155	ND	0	159	ND	0	439	0.44	48	222	2.22E-07	2.22E-07
C14 as tetradecane	413	J	413	155	ND	0	159	ND	0	413	0.41	45	209	2.09E-07	2.09E-07
n-Pentadecane	157	ND	79	156	ND	0	158	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C15 as Pentadecane	157	ND	79	156	ND	0	158	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
n-Hexadecane	156	ND	78	155	ND	0	159	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C16 as Hexadecane	156	ND	78	155	ND	0	159	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
n-Heptadecane	154	ND	77	153	ND	0	158	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C17 as Heptadecane	154	ND	77	153	ND	0	158	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Octadecane	156	ND	78	155	ND	0	159	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C18 as Octodecane	156	ND	78	155	ND	0	159	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
n-Nonadecane	156	ND	78	155	ND	0	158	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C19 as Nonadecane	156	ND	78	155	ND	0	158	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
n-Eicosane	156	ND	78	155	ND	0	157	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C20 as Eicosane	156	ND	78	155	ND	0	157	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
n-Heneicosane	157	ND	79	156	ND	0	158	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C21 as Heneicosane	157	ND	79	156	ND	0	158	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
n-Docosane	155	ND	78	154	ND	0	159	ND	0	78	0.08	9	39	3.92E-08	3.92E-08
C22 as Docosane	155	ND	78	154	ND	0	159	ND	0	78	0.08	9	39	3.92E-08	3.92E-08
n-Tricosane	156	ND	78	155	ND	0	158	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C23 as Tricosane	156	ND	78	155	ND	0	158	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
n-Tetracosane	156	ND	78	155	ND	0	160	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C24 as Tetracosane	156	ND	78	155	ND	0	160	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
Total Hydrocarbon			123,567			0			0		123.57	13557	62,570	6.26E-05	6.26E-05

Bagging Data Form — Vacuum Method

Sample Id: B062

WSPA — Western States Petroleum Association

Equipment type:	Pump - CP 407		**Component ID:**	B-2036	
Equipment Subtype:	Outboard Seal		**Plant ID:**	Refinery B	
Line Size:	10 inches		**Date:**	7-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.93 inHg	760.2 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	86 °F	30.0 °C	**TVA ID**	36502	
Component Temp:	85 °F	29.4 °C	**Stream Pressure/Temp:**	60 psig	°F
Stream Description:	*Mid Barrel (Pump Off)*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:14	Background	-5	ppmv	8-sec Dwell	42	ppmv	Total Dwell	3:00	min:sec	Final M21	110 ppm
14:03	Initial Bag Vacuum	0.005	inches H2O	DGM Vac.	1.9	inches H2O	Bag Temp	98.6	°F	Leak @	Top of Seal

Bag Concentrations (ppmv)

Time	14:05	14:07	14:09	14:12	14:14	14:16	14:18	14:20	14:22	14:24	14:30	14:32	14:35	
ppmv	15.1	18.8	20.8	21.4	22.5	23.6	24.8	26.1	27.4	28.5	29.9	29.7	28.3	

Sorbent Tube Sample Collection Parameters

B062A

Time									
14:24	Volume Start	728.3	Liters		Design Sample Flow Rate = 1 liter/min				
14:37	Volume Stop	740.9	Liters	Total Vol	12.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	0.898	L/min

B062B

14:24	Volume Start	661.4	Liters		Design Sample Flow Rate = 1 liter/min				
14:37	Volume Stop	674.1	Liters	Total Vol	12.7	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.977 L/min	Sorbent Flow$_{STP}$	0.905	L/min
	Total ST Vol$_{STP}$	23.43	Liters	DGM Vol$_{STP}$	84.98	Liters	Total Run Vol$_{STP}$	108.41	Liters

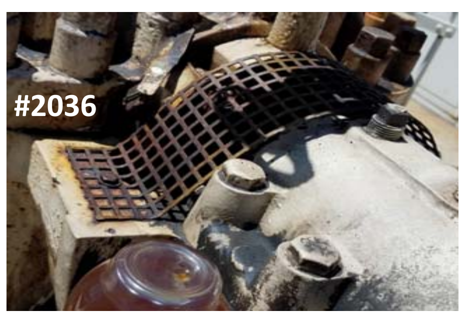
Bagging Parameters

Time									
	Vacuum check	0.005	inches H2O		DGM$_P$	1.8	inches H2O vacuum	756.9	mmHg
14:27	DGM$_{10L}$ Time	01:25.1	min:sec.frac	DGM Time 1.417	DGM Flow	7.06	DGM Flow$_{STP}$	6.54	liters/minute
14:28	Bag Temp.	95.9	°F	35.5 °C	Sample$_T$	110	°F	43.3	°C

Post-Sample Data

14:45	Post Test M21	Background	0	ppmv	8-sec Dwell	60 ppmv	Total Dwell	2:00 min:sec	Final M21 115 ppm @ Top of Seal
	Condensate accumulation: starting time		N/A	hour:min	Final time	N/A hour:min		0:00 hours:min	
	Organic condensate collected		N/A	ml					
	Density of organic condensate		N/A	g/ml					

Average THC emissions = 3.41E-05 kg/hr
Percent difference THC ER = 43%
Acceptable? No



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.82E-08
C5 as Pentane	2.82E-08
n-Hexane	3.68E-08
C6 as Hexane	3.68E-08
n-Heptane	4.53E-08
C7 as Heptane	7.15E-08
n-Octane	1.51E-07
C8 as Octane	1.65E-06
n-Nonane	2.64E-07
C9 as Nonane	2.43E-06
n-Decane	4.85E-07
C10 as Decane	4.95E-06
n-Undecane	9.43E-07
C11 as Undecane	6.79E-06
n-Dodecane	1.08E-06
C12 as Dodecane	6.41E-06
n-Tridecane	9.78E-07
C13 as Tridecane	4.11E-06
n-Tetradecane	6.30E-07
C14 as tetradecane	1.75E-06
n-Pentadecane	2.51E-07
C15 as Pentadecane	4.11E-07
n-Hexadecane	8.07E-08
C16 as Hexadecane	2.95E-08
n-Heptadecane	2.92E-08
C17 as Heptadecane	2.92E-08
n-Octadecane	2.95E-08
C18 as Octodecane	2.95E-08
n-Nonadecane	2.96E-08
C19 as Nonadecane	2.96E-08
n-Eicosane	2.95E-08
C20 as Eicosane	2.95E-08
n-Heneicosane	2.97E-08
C21 as Heneicosane	2.97E-08
n-Docosane	2.95E-08
C22 as Docosane	2.95E-08
n-Tricosane	2.96E-08
C23 as Tricosane	2.96E-08
n-Tetracosane	2.97E-08
C24 as Tetracosane	2.97E-08
Total Hydrocarbon	3.41E-05

THC: 1.80E-03 lbs/day 3.29E-04 tons/yr

B062A

ANALYTICAL RESULTS B062A Component	µg/m³	Flag	ND Adj µg/m³	BACKGROUND B063A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#P0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	74.3	ND	37	147	ND	0	355	ND	0	37	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C5 as Pentane	74.3	ND	37	147	ND	0	355	ND	0	37	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Hexane	77.2	ND	39	210	ND	0	375	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C6 as Hexane	77.2	ND	39	210	ND	0	375	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heptane	90.9	J	91	175	ND	0	393	ND	0	91	0.09	10	45	4.55E-08	0	0	0.00E+00	4.55E-08
C7 as Heptane	196	J	196	175	ND	0	393	ND	0	196	0.20	21	98	9.81E-08	0	0	0.00E+00	9.81E-08
n-Octane	341	J	341	151	ND	0	160	ND	0	341	0.34	37	171	1.71E-07	0	0	0.00E+00	1.71E-07
C8 as Octane	3906		3,906	151	ND	0	160	ND	0	3,906	3.91	423	1954	1.95E-06	0	0	0.00E+00	1.95E-06
n-Nonane	735	J	735	152	ND	0	158	ND	0	735	0.74	80	368	3.68E-07	0	0	0.00E+00	3.68E-07
C9 as Nonane	5536		5,536	152	ND	0	158	ND	0	5,536	5.54	600	2770	2.77E-06	0	0	0.00E+00	2.77E-06
n-Decane	1205		1,205	154	ND	0	158	ND	0	1,205	1.21	131	603	6.03E-07	0	0	0.00E+00	6.03E-07
C10 as Decane	11635		11,635	154	ND	0	158	ND	0	11,635	11.64	1261	5821	5.82E-06	0	0	0.00E+00	5.82E-06
n-Undecane	2288		2,288	153	ND	0	157	ND	0	2,288	2.29	248	1145	1.14E-06	0	0	0.00E+00	1.14E-06
C11 as Undecane	16247		16,247	153	ND	0	157	ND	0	16,247	16.25	1761	8129	8.13E-06	0	0	0.00E+00	8.13E-06
n-Dodecane	2254		2,254	152	ND	0	158	ND	0	2,254	2.25	244	1128	1.13E-06	0	0	0.00E+00	1.13E-06
C12 as Dodecane	15411		15,411	152	ND	0	158	ND	0	15,411	15.41	1671	7711	7.71E-06	0	0	0.00E+00	7.71E-06
n-Tridecane	2435		2,435	153	ND	0	160	ND	0	2,435	2.44	264	1218	1.22E-06	0	0	0.00E+00	1.22E-06
C13 as Tridecane	10258		10,258	153	ND	0	160	ND	0	10,258	10.26	1112	5132	5.13E-06	0	0	0.00E+00	5.13E-06
n-Tetradecane	1606		1,606	152	ND	0	159	ND	0	1,606	1.61	174	804	8.04E-07	0	0	0.00E+00	8.04E-07
C14 as tetradecane	5279		5,279	152	ND	0	159	ND	0	5,279	5.28	572	2641	2.64E-06	0	0	0.00E+00	2.64E-06
n-Pentadecane	700	J	700	153	ND	0	158	ND	0	700	0.70	76	350	3.50E-07	0	0	0.00E+00	3.50E-07
C15 as Pentadecane	1565		1,565	153	ND	0	158	ND	0	1,565	1.57	170	783	7.83E-07	0	0	0.00E+00	7.83E-07
n-Hexadecane	244	J	244	152	ND	0	159	ND	0	244	0.24	26	122	1.22E-07	0	0	0.00E+00	1.22E-07
C16 as Hexadecane	79.2	ND	40	152	ND	0	159	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Heptadecane	78.3	ND	39	151	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C17 as Heptadecane	78.3	ND	39	151	ND	0	158	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Octadecane	79.1	ND	40	152	ND	0	159	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C18 as Octodecane	79.1	ND	40	152	ND	0	159	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Nonadecane	79.3	ND	40	153	ND	0	158	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C19 as Nonadecane	79.3	ND	40	153	ND	0	158	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Eicosane	79.1	ND	40	152	ND	0	157	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C20 as Eicosane	79.1	ND	40	152	ND	0	157	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Heneicosane	79.8	ND	40	154	ND	0	158	ND	0	40	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C21 as Heneicosane	79.8	ND	40	154	ND	0	158	ND	0	40	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Docosane	78.9	ND	39	152	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C22 as Docosane	78.9	ND	39	152	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tricosane	79.4	ND	40	153	ND	0	158	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C23 as Tricosane	79.4	ND	40	153	ND	0	158	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Tetracosane	79.5	ND	40	153	ND	0	160	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C24 as Tetracosane	79.5	ND	40	153	ND	0	160	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
Total Hydrocarbon			82,756			0			0		82.76	8971	41,406	4.14E-05	0	0	0.00E+00	4.14E-05

B062B

ANALYTICAL RESULTS B062B Component	µg/m³	Flag	ND Adj µg/m³	BACKGROUND B063A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	151	ND	76	147	ND	0	355	ND	0	76	0.08	8	38	3.78E-08	3.78E-08
C5 as Pentane	151	ND	76	147	ND	0	355	ND	0	76	0.08	8	38	3.78E-08	3.78E-08
n-Hexane	217	ND	109	210	ND	0	375	ND	0	109	0.11	12	54	5.43E-08	5.43E-08
C6 as Hexane	217	ND	109	210	ND	0	375	ND	0	109	0.11	12	54	5.43E-08	5.43E-08
n-Heptane	180	ND	90	175	ND	0	393	ND	0	90	0.09	10	45	4.50E-08	4.50E-08
C7 as Heptane	180	ND	90	175	ND	0	393	ND	0	90	0.09	10	45	4.50E-08	4.50E-08
n-Octane	264	J	264	151	ND	0	160	ND	0	264	0.26	29	132	1.32E-07	1.32E-07
C8 as Octane	2671		2,671	151	ND	0	160	ND	0	2,671	2.67	290	1336	1.34E-06	1.34E-06
n-Nonane	321	J	321	152	ND	0	158	ND	0	321	0.32	35	161	1.61E-07	1.61E-07
C9 as Nonane	4164		4,164	152	ND	0	158	ND	0	4,164	4.16	451	2083	2.08E-06	2.08E-06
n-Decane	734	J	734	154	ND	0	158	ND	0	734	0.73	80	367	3.67E-07	3.67E-07
C10 as Decane	8163		8,163	154	ND	0	158	ND	0	8,163	8.16	885	4084	4.08E-06	4.08E-06
n-Undecane	1481	J	1,481	153	ND	0	157	ND	0	1,481	1.48	161	741	7.41E-07	7.41E-07
C11 as Undecane	10883		10,883	153	ND	0	157	ND	0	10,883	10.88	1180	5445	5.45E-06	5.45E-06
n-Dodecane	2062		2,062	152	ND	0	158	ND	0	2,062	2.06	224	1032	1.03E-06	1.03E-06
C12 as Dodecane	10198		10,198	152	ND	0	158	ND	0	10,198	10.20	1106	5102	5.10E-06	5.10E-06
n-Tridecane	1473	J	1,473	153	ND	0	160	ND	0	1,473	1.47	160	737	7.37E-07	7.37E-07
C13 as Tridecane	6175		6,175	153	ND	0	160	ND	0	6,175	6.18	669	3090	3.09E-06	3.09E-06
n-Tetradecane	913	J	913	152	ND	0	159	ND	0	913	0.91	99	457	4.57E-07	4.57E-07
C14 as tetradecane	1709		1,709	152	ND	0	159	ND	0	1,709	1.71	185	855	8.55E-07	8.55E-07
n-Pentadecane	305	J	305	153	ND	0	158	ND	0	305	0.31	33	153	1.53E-07	1.53E-07
C15 as Pentadecane	158	ND	79	153	ND	0	158	ND	0	79	0.08	9	40	3.95E-08	3.95E-08
n-Hexadecane	157	ND	79	152	ND	0	159	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
C16 as Hexadecane	157	ND	79	152	ND	0	159	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
n-Heptadecane	155	ND	78	151	ND	0	158	ND	0	78	0.08	8	39	3.88E-08	3.88E-08
C17 as Heptadecane	155	ND	78	151	ND	0	158	ND	0	78	0.08	8	39	3.88E-08	3.88E-08
n-Octadecane	157	ND	79	152	ND	0	159	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
C18 as Octodecane	157	ND	79	152	ND	0	159	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
n-Nonadecane	157	ND	79	153	ND	0	158	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
C19 as Nonadecane	157	ND	79	153	ND	0	158	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
n-Eicosane	157	ND	79	152	ND	0	157	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
C20 as Eicosane	157	ND	79	152	ND	0	157	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
n-Heneicosane	158	ND	79	154	ND	0	158	ND	0	79	0.08	9	40	3.95E-08	3.95E-08
C21 as Heneicosane	158	ND	79	154	ND	0	158	ND	0	79	0.08	9	40	3.95E-08	3.95E-08
n-Docosane	157	ND	79	152	ND	0	159	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
C22 as Docosane	157	ND	79	152	ND	0	159	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
n-Tricosane	157	ND	79	153	ND	0	158	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
C23 as Tricosane	157	ND	79	153	ND	0	158	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
n-Tetracosane	158	ND	79	153	ND	0	160	ND	0	79	0.08	9	40	3.95E-08	3.95E-08
C24 as Tetracosane	158	ND	79	153	ND	0	160	ND	0	79	0.08	9	40	3.95E-08	3.95E-08
Total Hydrocarbon			53,556			0			0		53.56	5806	26,796	2.68E-05	2.68E-05

Bagging Data Form — Vacuum Method

Sample Id B064

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	B-807 (sub for B-821)	
Equipment Subtype:	Gate			**Plant ID:**	Refinery B	
Line Size:	1	inches		**Date:**	8-May-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.99	inHg	761.7 mmHg	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	72.3	°F	22.4 °C	**TVA ID**	37887	
Component Temp:	69	°F	20.6 °C	**Stream Pressure/Temp:**	110 psig	°F
Stream Description:	LCGO @ Pump GM-222					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:05	Background	3	ppmv	8-sec Dwell	11	ppmv	Total Dwell	2:00	min:sec	Final M21	20 ppm
9:40	Initial Bag Vacuum	0.11	inches H2O	DGM Vac.	1.9	inches H2O	Bag Temp	75.4	°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	9:44	9:48	9:50	9:52	9:54	9:56	10:02	10:07						
ppmv	5.7	6.5	6.4	7	7.3	6.7	6.6	6.6						

Sorbent Tube Sample Collection Parameters

B064A

Time									
9:56	Volume Start	743.0	Liters		Design Sample Flow Rate = 1 liter/min				
10:09	Volume Stop	755.5	Liters	Total Vol	12.5	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.962 L/min	Sorbent Flow$_{STP}$	0.967	L/min

B064B

9:56	Volume Start	676.0	Liters		Design Sample Flow Rate = 1 liter/min				
10:09	Volume Stop	688.5	Liters	Total Vol	12.5	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.962 L/min	Sorbent Flow$_{STP}$	0.967	L/min
	Total ST Vol$_{STP}$	25.13	Liters	DGM Vol$_{STP}$	80.84	Liters	Total Run Vol$_{STP}$	105.98	Liters

Bagging Parameters

Time										
10:01	Vacuum check	0.17	inches H2O			DGM$_P$	1.9	inches H2O vacuum	758.2	mmHg
10:00	DGM$_{10L}$ Time	01:37.4	min:sec.frac	DGM Time	1.617	DGM Flow	6.19	DGM Flow$_{STP}$	6.22	liters/minute
10:02	Bag Temp.	80.4	°F	26.9	°C	Sample$_T$	66	°F	18.9	°C

Post-Sample Data

10:17	Post Test M21	Background	0	ppmv	8-sec Dwell	15	ppmv	Total Dwell	2:00	min:sec	Final M21 31 ppm @ Stem
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A	hour:min		0:00	hours:min	
Organic condensate collected			N/A	ml							
Density of organic condensate			N/A	g/ml							

Average THC emissions =	1.17E-06	kg/hr
Percent difference THC ER =	67%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.75E-08
C5 as Pentane	2.75E-08
n-Hexane	2.85E-08
C6 as Hexane	2.85E-08
n-Heptane	2.98E-08
C7 as Heptane	2.98E-08
n-Octane	2.90E-08
C8 as Octane	2.90E-08
n-Nonane	2.93E-08
C9 as Nonane	2.93E-08
n-Decane	2.95E-08
C10 as Decane	2.95E-08
n-Undecane	2.94E-08
C11 as Undecane	2.94E-08
n-Dodecane	2.92E-08
C12 as Dodecane	2.92E-08
n-Tridecane	2.93E-08
C13 as Tridecane	2.93E-08
n-Tetradecane	2.93E-08
C14 as tetradecane	2.93E-08
n-Pentadecane	2.94E-08
C15 as Pentadecane	2.94E-08
n-Hexadecane	2.93E-08
C16 as Hexadecane	2.93E-08
n-Heptadecane	2.89E-08
C17 as Heptadecane	2.89E-08
n-Octadecane	2.93E-08
C18 as Octodecane	2.93E-08
n-Nonadecane	2.93E-08
C19 as Nonadecane	2.93E-08
n-Eicosane	2.92E-08
C20 as Eicosane	2.92E-08
n-Heneicosane	2.95E-08
C21 as Heneicosane	2.95E-08
n-Docosane	2.92E-08
C22 as Docosane	2.92E-08
n-Tricosane	2.93E-08
C23 as Tricosane	2.93E-08
n-Tetracosane	2.94E-08
C24 as Tetracosane	2.94E-08
Total Hydrocarbon	1.17E-06

THC:	6.18E-05	lbs/day	1.13E-05	tons/yr

B064A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
B064A	B064A		ND Adj	B065A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#P0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.896	ND	37	148.6	ND	0	355	ND	0	37	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C5 as Pentane	74.896	ND	37	148.6	ND	0	355	ND	0	37	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Hexane	77.808	ND	39	154.38	ND	0	375	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C6 as Hexane	77.808	ND	39	154.38	ND	0	375	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptane	81.312	ND	41	161.33	ND	0	393	ND	0	41	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C7 as Heptane	81.312	ND	41	161.33	ND	0	393	ND	0	41	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Octane	79.168	ND	40	157.08	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C8 as Octane	79.168	ND	40	157.08	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Nonane	79.76	ND	40	158.25	ND	0	158	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C9 as Nonane	79.76	ND	40	158.25	ND	0	158	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Decane	80.48	ND	40	159.68	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C10 as Decane	80.48	ND	40	159.68	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Undecane	80.272	ND	40	159.27	ND	0	157	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C11 as Undecane	80.272	ND	40	159.27	ND	0	157	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Dodecane	79.728	ND	40	158.19	ND	0	158	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C12 as Dodecane	79.728	ND	40	158.19	ND	0	158	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tridecane	79.92	ND	40	158.57	ND	0	160	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C13 as Tridecane	79.92	ND	40	158.57	ND	0	160	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tetradecane	79.84	ND	40	158.41	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C14 as tetradecane	79.84	ND	40	158.41	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Pentadecane	80.24	ND	40	159.21	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C15 as Pentadecane	80.24	ND	40	159.21	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Hexadecane	79.808	ND	40	158.35	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C16 as Hexadecane	79.808	ND	40	158.35	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Heptadecane	78.88	ND	39	156.51	ND	0	158	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C17 as Heptadecane	78.88	ND	39	156.51	ND	0	158	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Octadecane	79.76	ND	40	158.25	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C18 as Octodecane	79.76	ND	40	158.25	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Nonadecane	79.92	ND	40	158.57	ND	0	158	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C19 as Nonadecane	79.92	ND	40	158.57	ND	0	158	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Eicosane	79.728	ND	40	158.19	ND	0	157	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C20 as Eicosane	79.728	ND	40	158.19	ND	0	157	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Heneicosane	80.48	ND	40	159.68	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C21 as Heneicosane	80.48	ND	40	159.68	ND	0	158	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Docosane	79.568	ND	40	157.87	ND	0	159	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C22 as Docosane	79.568	ND	40	157.87	ND	0	159	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tricosane	80	ND	40	158.73	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C23 as Tricosane	80	ND	40	158.73	ND	0	158	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetracosane	80.112	ND	40	158.95	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C24 as Tetracosane	80.112	ND	40	158.95	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
Total Hydrocarbon			1,592			0			0		1.59	169	779	7.79E-07	0	0	0.00E+00	7.79E-07

B064B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
B064B	B064B		ND Adj	B065A		ND Adj	#B028		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	149.792	ND	75	149	ND	0	355	ND	0	75	0.07	8	37	3.66E-08		3.66E-08
C5 as Pentane	149.792	ND	75	149	ND	0	355	ND	0	75	0.07	8	37	3.66E-08		3.66E-08
n-Hexane	155.616	ND	78	154	ND	0	375	ND	0	78	0.08	8	38	3.81E-08		3.81E-08
C6 as Hexane	155.616	ND	78	154	ND	0	375	ND	0	78	0.08	8	38	3.81E-08		3.81E-08
n-Heptane	162.624	ND	81	161	ND	0	393	ND	0	81	0.08	9	40	3.98E-08		3.98E-08
C7 as Heptane	162.624	ND	81	161	ND	0	393	ND	0	81	0.08	9	40	3.98E-08		3.98E-08
n-Octane	158.336	ND	79	157	ND	0	160	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
C8 as Octane	158.336	ND	79	157	ND	0	160	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
n-Nonane	159.52	ND	80	158	ND	0	158	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
C9 as Nonane	159.52	ND	80	158	ND	0	158	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
n-Decane	160.96	ND	80	160	ND	0	158	ND	0	80	0.08	9	39	3.94E-08		3.94E-08
C10 as Decane	160.96	ND	80	160	ND	0	158	ND	0	80	0.08	9	39	3.94E-08		3.94E-08
n-Undecane	160.544	ND	80	159	ND	0	157	ND	0	80	0.08	9	39	3.93E-08		3.93E-08
C11 as Undecane	160.544	ND	80	159	ND	0	157	ND	0	80	0.08	9	39	3.93E-08		3.93E-08
n-Dodecane	159.456	ND	80	158	ND	0	158	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
C12 as Dodecane	159.456	ND	80	158	ND	0	158	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
n-Tridecane	159.84	ND	80	159	ND	0	160	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
C13 as Tridecane	159.84	ND	80	159	ND	0	160	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
n-Tetradecane	159.68	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
C14 as tetradecane	159.68	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
n-Pentadecane	160.48	ND	80	159	ND	0	158	ND	0	80	0.08	9	39	3.92E-08		3.92E-08
C15 as Pentadecane	160.48	ND	80	159	ND	0	158	ND	0	80	0.08	9	39	3.92E-08		3.92E-08
n-Hexadecane	159.616	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
C16 as Hexadecane	159.616	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
n-Heptadecane	157.76	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
C17 as Heptadecane	157.76	ND	79	157	ND	0	158	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
n-Octadecane	159.52	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
C18 as Octodecane	159.52	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
n-Nonadecane	159.84	ND	80	159	ND	0	158	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
C19 as Nonadecane	159.84	ND	80	159	ND	0	158	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
n-Eicosane	159.456	ND	80	158	ND	0	157	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
C20 as Eicosane	159.456	ND	80	158	ND	0	157	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
n-Heneicosane	160.96	ND	80	160	ND	0	158	ND	0	80	0.08	9	39	3.94E-08		3.94E-08
C21 as Heneicosane	160.96	ND	80	160	ND	0	158	ND	0	80	0.08	9	39	3.94E-08		3.94E-08
n-Docosane	159.136	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.89E-08		3.89E-08
C22 as Docosane	159.136	ND	80	158	ND	0	159	ND	0	80	0.08	8	39	3.89E-08		3.89E-08
n-Tricosane	160	ND	80	159	ND	0	158	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
C23 as Tricosane	160	ND	80	159	ND	0	158	ND	0	80	0.08	8	39	3.91E-08		3.91E-08
n-Tetracosane	160.224	ND	80	159	ND	0	160	ND	0	80	0.08	8	39	3.92E-08		3.92E-08
C24 as Tetracosane	160.224	ND	80	159	ND	0	160	ND	0	80	0.08	8	39	3.92E-08		3.92E-08
Total Hydrocarbon			3,183			0			0		3.18	337	1,557	1.56E-06		1.56E-06

Bagging Data Form — Vacuum Method

Sample Id: B066

WSPA Western States Petroleum Association

Equipment type:	Pump CP 591		**Component ID:**	B-2042	
Equipment Subtype:	Seal		**Plant ID:**	Refinery B	
Line Size:	6 inches		**Date:**	8-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.06 inHg	763.5 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	80.5 °F	26.9 °C	**TVA ID**	34251	
Component Temp:	85 °F	29.4 °C	**Stream Pressure/Temp:**	psig	°F

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Stream Description: *Diesel Blend Pump CP-591 (Pump off)*

Pre-Sample Data

Time								
10:36	Background	0 ppmv	8-sec Dwell	160 ppmv	Total Dwell	12:00 min:sec	Final M21	810 ppm
11:48	Initial Bag Vacuum	0.21 inches H2O	DGM Vac.	1.9 inches H2O	Bag Temp	91 °F	Leak @	South Side of Seal

Bag Concentrations (ppmv)

Time	11:53	11:55	11:58	12:00	12:02	12:06	12:08	12:10	12:12	12:19				
ppmv	190	215	220	236	244	270	277	290	294	327				

Sorbent Tube Sample Collection Parameters

B066A

Time								
12:12	Volume Start	755.5 Liters		Design Sample Flow Rate = 1 liter/min				
12:25	Volume Stop	768.7 Liters	Total Vol	13.2 Liters				
	Sample Run Time	13 Minutes		Sorbent Flow	1.015 L/min	Sorbent Flow$_{STP}$	0.972	L/min

B066B

Time								
12:12	Volume Start	688.5 Liters		Design Sample Flow Rate = 1 liter/min				
12:25	Volume Stop	701.8 Liters	Total Vol	13.3 Liters				
	Sample Run Time	13 Minutes		Sorbent Flow	1.023 L/min	Sorbent Flow$_{STP}$	0.979	L/min
	Total ST Vol$_{STP}$	25.36 Liters	DGM Vol$_{STP}$	72.47 Liters	Total Run Vol$_{STP}$	97.83 Liters		

Bagging Parameters

Time									
12:18	Vacuum check	0.25	inches H2O			DGM$_P$	1.8 inches H2O vacuum	760.2	mmHg
12:16	DGM$_{10L}$ Time	01:42.7	min:sec.frac	DGM Time	1.717	DGM Flow	5.83	DGM Flow$_{STP}$ 5.57	liters/minute
12:18	Bag Temp.	94.8	°F	34.9	°C	Sample$_T$	94 °F	34.4	°C

Post-Sample Data

12:41	Post Test M21	Background	10 ppmv	8-sec Dwell	412 ppmv	Total Dwell	1:30 min:sec	Final M21 991 ppm @ South Side of Seal
Condensate accumulation: starting time			N/A hour:min	Final time	N/A hour:min		0:00 hours:min	
Organic condensate collected			N/A ml					
Density of organic condensate			N/A g/ml					

Average THC emissions =	3.07E-04	kg/hr
Percent difference THC ER =	21%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	6.31E-08
C5 as Pentane	4.60E-08
n-Hexane	7.88E-07
C6 as Hexane	2.65E-06
n-Heptane	8.39E-06
C7 as Heptane	2.21E-05
n-Octane	1.31E-05
C8 as Octane	7.59E-05
n-Nonane	1.47E-05
C9 as Nonane	5.86E-05
n-Decane	8.83E-06
C10 as Decane	3.71E-05
n-Undecane	5.15E-06
C11 as Undecane	1.86E-05
n-Dodecane	2.25E-06
C12 as Dodecane	1.56E-05
n-Tridecane	2.77E-06
C13 as Tridecane	1.27E-05
n-Tetradecane	1.66E-06
C14 as tetradecane	4.52E-06
n-Pentadecane	3.94E-07
C15 as Pentadecane	3.37E-07
n-Hexadecane	3.85E-08
C16 as Hexadecane	2.55E-08
n-Heptadecane	2.52E-08
C17 as Heptadecane	2.52E-08
n-Octadecane	2.54E-08
C18 as Octodecane	2.54E-08
n-Nonadecane	2.55E-08
C19 as Nonadecane	2.55E-08
n-Eicosane	2.54E-08
C20 as Eicosane	2.54E-08
n-Heneicosane	2.57E-08
C21 as Heneicosane	2.57E-08
n-Docosane	2.54E-08
C22 as Docosane	2.54E-08
n-Tricosane	2.55E-08
C23 as Tricosane	2.55E-08
n-Tetracosane	2.56E-08
C24 as Tetracosane	2.56E-08
Total Hydrocarbon	3.07E-04

THC:	**1.62E-02**	**lbs/day**	**2.96E-03**	**tons/yr**

B066A

Component	ANALYTICAL RESULTS B066A µg/m³	Flag	ND Adj µg/m³	BACKGROUND B067A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#P0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	208.9303	J	209	130.94	ND	0	355	ND	0	209	0.21	20	94	9.43E-08	0	0	0.00E+00	9.43E-08
C5 as Pentane	133.2843	J	133	130.94	ND	0	355	ND	0	133	0.13	13	60	6.02E-08	0	0	0.00E+00	6.02E-08
n-Hexane	1960.343		1,960	136.03	ND	0	375	ND	0	1,960	1.96	192	885	8.85E-07	0	0	0.00E+00	8.85E-07
C6 as Hexane	6516.658		6,517	136.03	ND	0	375	ND	0	6,517	6.52	638	2942	2.94E-06	0	0	0.00E+00	2.94E-06
n-Heptane	21086.04		21,086	142.15	ND	0	393	ND	0	21,086	21.09	2063	9521	9.52E-06	0	0	0.00E+00	9.52E-06
C7 as Heptane	53585.58		53,586	142.15	ND	0	393	ND	0	53,586	53.59	5242	24195	2.42E-05	0	0	0.00E+00	2.42E-05
n-Octane	31294.06		31,294	138.41	ND	0	160	ND	0	31,294	31.29	3061	14130	1.41E-05	0	0	0.00E+00	1.41E-05
C8 as Octane	180608.9		180,609	138.41	ND	0	160	ND	0	180,609	180.61	17669	81548	8.15E-05	0	0	0.00E+00	8.15E-05
n-Nonane	35028.64		35,029	139.44	ND	0	158	ND	0	35,029	35.03	3427	15816	1.58E-05	0	0	0.00E+00	1.58E-05
C9 as Nonane	139245.6		139,246	139.44	ND	0	158	ND	0	139,246	139.25	13622	62872	6.29E-05	0	0	0.00E+00	6.29E-05
n-Decane	20967.36		20,967	140.7	ND	0	158	ND	0	20,967	20.97	2051	9467	9.47E-06	0	0	0.00E+00	9.47E-06
C10 as Decane	88031.19		88,031	140.7	ND	0	158	ND	0	88,031	88.03	8612	39747	3.97E-05	0	0	0.00E+00	3.97E-05
n-Undecane	12085.88		12,086	140.34	ND	0	157	ND	0	12,086	12.09	1182	5457	5.46E-06	0	0	0.00E+00	5.46E-06
C11 as Undecane	44773.26		44,773	140.34	ND	0	157	ND	0	44,773	44.77	4380	20216	2.02E-05	0	0	0.00E+00	2.02E-05
n-Dodecane	5021.443		5,021	139.38	ND	0	158	ND	0	5,021	5.02	491	2267	2.27E-06	0	0	0.00E+00	2.27E-06
C12 as Dodecane	47851.9		47,852	139.38	ND	0	158	ND	0	47,852	47.85	4681	21606	2.16E-05	0	0	0.00E+00	2.16E-05
n-Tridecane	8560.097		8,560	139.72	ND	0	160	ND	0	8,560	8.56	837	3865	3.87E-06	0	0	0.00E+00	3.87E-06
C13 as Tridecane	37377.62		37,378	139.72	ND	0	160	ND	0	37,378	37.38	3657	16877	1.69E-05	0	0	0.00E+00	1.69E-05
n-Tetradecane	4048.307		4,048	139.58	ND	0	159	ND	0	4,048	4.05	396	1828	1.83E-06	0	0	0.00E+00	1.83E-06
C14 as tetradecane	11235.48		11,235	139.58	ND	0	159	ND	0	11,235	11.24	1099	5073	5.07E-06	0	0	0.00E+00	5.07E-06
n-Pentadecane	851.7026		852	140.28	ND	0	158	ND	0	852	0.85	83	385	3.85E-07	0	0	0.00E+00	3.85E-07
C15 as Pentadecane	1078.456		1,078	140.28	ND	0	158	ND	0	1,078	1.08	106	487	4.87E-07	0	0	0.00E+00	4.87E-07
n-Hexadecane	95.45731	J	95	139.52	ND	0	159	ND	0	95	0.10	9	43	4.31E-08	0	0	0.00E+00	4.31E-08
C16 as Hexadecane	75.57576	ND	38	139.52	ND	0	159	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
n-Heptadecane	74.69697	ND	37	137.9	ND	0	158	ND	0	37	0.04	4	17	1.69E-08	0	0	0.00E+00	1.69E-08
C17 as Heptadecane	74.69697	ND	37	137.9	ND	0	158	ND	0	37	0.04	4	17	1.69E-08	0	0	0.00E+00	1.69E-08
n-Octadecane	75.5303	ND	38	139.44	ND	0	159	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
C18 as Octodecane	75.5303	ND	38	139.44	ND	0	159	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
n-Nonadecane	75.68182	ND	38	139.72	ND	0	158	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
C19 as Nonadecane	75.68182	ND	38	139.72	ND	0	158	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
n-Eicosane	75.5	ND	38	139.38	ND	0	157	ND	0	38	0.04	4	17	1.70E-08	0	0	0.00E+00	1.70E-08
C20 as Eicosane	75.5	ND	38	139.38	ND	0	157	ND	0	38	0.04	4	17	1.70E-08	0	0	0.00E+00	1.70E-08
n-Heneicosane	76.21212	ND	38	140.7	ND	0	158	ND	0	38	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
C21 as Heneicosane	76.21212	ND	38	140.7	ND	0	158	ND	0	38	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
n-Docosane	75.34849	ND	38	139.1	ND	0	159	ND	0	38	0.04	4	17	1.70E-08	0	0	0.00E+00	1.70E-08
C22 as Docosane	75.34849	ND	38	139.1	ND	0	159	ND	0	38	0.04	4	17	1.70E-08	0	0	0.00E+00	1.70E-08
n-Tricosane	75.75758	ND	38	139.86	ND	0	158	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
C23 as Tricosane	75.75758	ND	38	139.86	ND	0	158	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
n-Tetracosane	75.86364	ND	38	140.06	ND	0	160	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
C24 as Tetracosane	75.86364	ND	38	140.06	ND	0	160	ND	0	38	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
Total Hydrocarbon			752,289			0			0		752.29	73595	339,670	3.40E-04	0	0	0.00E+00	3.40E-04

B066B

Component	ANALYTICAL RESULTS B066B µg/m³	Flag	ND Adj µg/m³	BACKGROUND B067A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #B028 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	140.782	ND	70	131	ND	0	355	ND	0	70	0.07	7	32	3.18E-08	3.18E-08
C5 as Pentane	140.782	ND	70	131	ND	0	355	ND	0	70	0.07	7	32	3.18E-08	3.18E-08
n-Hexane	1528.669		1,529	136	ND	0	375	ND	0	1,529	1.53	150	690	6.90E-07	6.90E-07
C6 as Hexane	5241.352		5,241	136	ND	0	375	ND	0	5,241	5.24	513	2367	2.37E-06	2.37E-06
n-Heptane	16075.43		16,075	142	ND	0	393	ND	0	16,075	16.08	1573	7258	7.26E-06	7.26E-06
C7 as Heptane	44289.62		44,290	142	ND	0	393	ND	0	44,290	44.29	4333	19997	2.00E-05	2.00E-05
n-Octane	26628		26,628	138	ND	0	160	ND	0	26,628	26.63	2605	12023	1.20E-05	1.20E-05
C8 as Octane	155553.1		155,553	138	ND	0	160	ND	0	155,553	155.55	15218	70235	7.02E-05	7.02E-05
n-Nonane	30214.36		30,214	139	ND	0	158	ND	0	30,214	30.21	2956	13642	1.36E-05	1.36E-05
C9 as Nonane	120504.5		120,505	139	ND	0	158	ND	0	120,505	120.50	11789	54410	5.44E-05	5.44E-05
n-Decane	18149.87		18,150	141	ND	0	158	ND	0	18,150	18.15	1776	8195	8.19E-06	8.19E-06
C10 as Decane	76517.08		76,517	141	ND	0	158	ND	0	76,517	76.52	7486	34549	3.45E-05	3.45E-05
n-Undecane	10748.26		10,748	140	ND	0	157	ND	0	10,748	10.75	1051	4853	4.85E-06	4.85E-06
C11 as Undecane	37590.32		37,590	140	ND	0	157	ND	0	37,590	37.59	3677	16973	1.70E-05	1.70E-05
n-Dodecane	4937.546		4,938	139	ND	0	158	ND	0	4,938	4.94	483	2229	2.23E-06	2.23E-06
C12 as Dodecane	21105.19		21,105	139	ND	0	158	ND	0	21,105	21.11	2065	9529	9.53E-06	9.53E-06
n-Tridecane	3695.582		3,696	140	ND	0	160	ND	0	3,696	3.70	362	1669	1.67E-06	1.67E-06
C13 as Tridecane	18872.27		18,872	140	ND	0	160	ND	0	18,872	18.87	1846	8521	8.52E-06	8.52E-06
n-Tetradecane	3298.676		3,299	140	ND	0	159	ND	0	3,299	3.30	323	1489	1.49E-06	1.49E-06
C14 as tetradecane	8782.503		8,783	140	ND	0	159	ND	0	8,783	8.78	859	3965	3.97E-06	3.97E-06
n-Pentadecane	893.6279	J	894	140	ND	0	158	ND	0	894	0.89	87	403	4.03E-07	4.03E-07
C15 as Pentadecane	413.2711	J	413	140	ND	0	158	ND	0	413	0.41	40	187	1.87E-07	1.87E-07
n-Hexadecane	150.015	ND	75	140	ND	0	159	ND	0	75	0.08	7	34	3.39E-08	3.39E-08
C16 as Hexadecane	150.015	ND	75	140	ND	0	159	ND	0	75	0.08	7	34	3.39E-08	3.39E-08
n-Heptadecane	148.2707	ND	74	138	ND	0	158	ND	0	74	0.07	7	33	3.35E-08	3.35E-08
C17 as Heptadecane	148.2707	ND	74	138	ND	0	158	ND	0	74	0.07	7	33	3.35E-08	3.35E-08
n-Octadecane	149.9248	ND	75	139	ND	0	159	ND	0	75	0.07	7	34	3.38E-08	3.38E-08
C18 as Octodecane	149.9248	ND	75	139	ND	0	159	ND	0	75	0.07	7	34	3.38E-08	3.38E-08
n-Nonadecane	150.2256	ND	75	140	ND	0	158	ND	0	75	0.08	7	34	3.39E-08	3.39E-08
C19 as Nonadecane	150.2256	ND	75	140	ND	0	158	ND	0	75	0.08	7	34	3.39E-08	3.39E-08
n-Eicosane	149.8647	ND	75	139	ND	0	157	ND	0	75	0.07	7	34	3.38E-08	3.38E-08
C20 as Eicosane	149.8647	ND	75	139	ND	0	157	ND	0	75	0.07	7	34	3.38E-08	3.38E-08
n-Heneicosane	151.2782	ND	76	141	ND	0	158	ND	0	76	0.08	7	34	3.42E-08	3.42E-08
C21 as Heneicosane	151.2782	ND	76	141	ND	0	158	ND	0	76	0.08	7	34	3.42E-08	3.42E-08
n-Docosane	149.5639	ND	75	139	ND	0	159	ND	0	75	0.07	7	34	3.38E-08	3.38E-08
C22 as Docosane	149.5639	ND	75	139	ND	0	159	ND	0	75	0.07	7	34	3.38E-08	3.38E-08
n-Tricosane	150.3759	ND	75	140	ND	0	158	ND	0	75	0.08	7	34	3.39E-08	3.39E-08
C23 as Tricosane	150.3759	ND	75	140	ND	0	158	ND	0	75	0.08	7	34	3.39E-08	3.39E-08
n-Tetracosane	150.5865	ND	75	140	ND	0	160	ND	0	75	0.08	7	34	3.40E-08	3.40E-08
C24 as Tetracosane	150.5865	ND	75	140	ND	0	160	ND	0	75	0.08	7	34	3.40E-08	3.40E-08
Total Hydrocarbon			606,530			0			0		606.53	59336	273,858	2.74E-04	2.74E-04

Bagging Data Form — Vacuum Method

Sample Id	**B068**					
Equipment type:	Pump - G105A			**Component ID:**	**B-668**	
Equipment Subtype:	Seal			**Plant ID:**	Refinery B	
Line Size:	6 *inches*			**Date:**	9-May-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.99 *inHg*	761.7 *mmHg*		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	77 *°F*	25.0 *°C*		**TVA ID**	36502	
Component Temp:	227 *°F*	108.3 *°C*		**Stream Pressure/Temp:**	200 *psig*	*°F*
Stream Description:	*Combined Gas Oil*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:19	Background	1	*ppmv*	8-sec Dwell	7	*ppmv*	Total Dwell	5:30	*min:sec*	Final M21	22 *ppm*
10:41	Initial Bag Vacuum	0.03	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	145	*°F*	Leak @	Top of Seal

Bag Concentrations (ppmv)

Time	10:45	10:47	10:49	10:51	10:53	10:55	10:57	11:04						
ppmv	17.4	18.6	19	19.4	19.9	20.2	20.4	20.5						

Sorbent Tube Sample Collection Parameters

B068A

Time									
10:57	Volume Start	772.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:10	Volume Stop	785.5	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.977	*L/min*

B068B

10:57	Volume Start	703.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:10	Volume Stop	716.5	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.977	*L/min*
	Total ST Vol$_{STP}$	25.40	*Liters*	DGM Vol$_{STP}$	81.24	*Liters*	Total Run Vol$_{STP}$	106.64	*Liters*

Bagging Parameters

Time									
11:02	Vacuum check	0.03	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	758.4 *mmHg*
11:02	DGM$_{10L}$ Time	01:35.6	*min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$	6.25 *liters/minute*
11:03	Bag Temp.	160.2	*°F*	71.2	*°C*	Sample$_T$	69	*°F*	20.6 *°C*

Post-Sample Data

11:22	Post Test M21	Background	1 *ppmv*	8-sec Dwell	11 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	21 *ppm*
								@	Top of Seal
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	1.38E-05 kg/hr
Percent difference THC ER =	73%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.72E-08
C5 as Pentane	2.72E-08
n-Hexane	2.83E-08
C6 as Hexane	2.83E-08
n-Heptane	2.95E-08
C7 as Heptane	2.95E-08
n-Octane	2.88E-08
C8 as Octane	1.21E-06
n-Nonane	6.22E-08
C9 as Nonane	1.20E-06
n-Decane	3.40E-07
C10 as Decane	9.11E-07
n-Undecane	5.66E-08
C11 as Undecane	1.38E-06
n-Dodecane	7.16E-07
C12 as Dodecane	1.47E-06
n-Tridecane	1.82E-07
C13 as Tridecane	2.59E-06
n-Tetradecane	1.97E-07
C14 as tetradecane	1.65E-06
n-Pentadecane	1.84E-07
C15 as Pentadecane	8.57E-07
n-Hexadecane	4.61E-08
C16 as Hexadecane	7.34E-08
n-Heptadecane	2.87E-08
C17 as Heptadecane	3.82E-08
n-Octadecane	2.90E-08
C18 as Octodecane	2.90E-08
n-Nonadecane	2.90E-08
C19 as Nonadecane	2.90E-08
n-Eicosane	2.90E-08
C20 as Eicosane	2.90E-08
n-Heneicosane	2.92E-08
C21 as Heneicosane	2.92E-08
n-Docosane	2.89E-08
C22 as Docosane	2.89E-08
n-Tricosane	2.91E-08
C23 as Tricosane	2.91E-08
n-Tetracosane	2.91E-08
C24 as Tetracosane	2.91E-08
Total Hydrocarbon	1.38E-05

THC: 7.30E-04 lbs/day 1.33E-04 tons/yr

B068A	ANALYTICAL RESULTS B068A		ND Adj	BACKGROUND B069A		ND Adj	TRIP BLANK #B028		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#P0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.71654	ND	37	144.03	ND	0	355	ND	0	37	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C5 as Pentane	73.71654	ND	37	144.03	ND	0	355	ND	0	37	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Hexane	76.58268	ND	38	149.63	ND	0	375	ND	0	38	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C6 as Hexane	76.58268	ND	38	149.63	ND	0	375	ND	0	38	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Heptane	80.0315	ND	40	156.37	ND	0	393	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C7 as Heptane	80.0315	ND	40	156.37	ND	0	393	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Octane	77.92126	ND	39	152.25	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C8 as Octane	2914.444		2,914	152.25	ND	0	160	ND	0	2,914	2.91	311	1434	1.43E-06	0	0	0.00E+00	1.43E-06
n-Nonane	174.2761	J	174	153.38	ND	0	158	ND	0	174	0.17	19	86	8.58E-08	0	0	0.00E+00	8.58E-08
C9 as Nonane	2854.772		2,855	153.38	ND	0	158	ND	0	2,855	2.85	304	1405	1.41E-06	0	0	0.00E+00	1.41E-06
n-Decane	807.6703		808	154.77	ND	0	158	ND	0	808	0.81	86	398	3.98E-07	0	0	0.00E+00	3.98E-07
C10 as Decane	2249.478		2,249	154.77	ND	0	158	ND	0	2,249	2.25	240	1107	1.11E-06	0	0	0.00E+00	1.11E-06
n-Undecane	151.1852	J	151	154.37	ND	0	157	ND	0	151	0.15	16	74	7.44E-08	0	0	0.00E+00	7.44E-08
C11 as Undecane	3442.347		3,442	154.37	ND	0	157	ND	0	3,442	3.44	367	1694	1.69E-06	0	0	0.00E+00	1.69E-06
n-Dodecane	1768.941		1,769	153.32	ND	0	158	ND	0	1,769	1.77	189	871	8.71E-07	0	0	0.00E+00	8.71E-07
C12 as Dodecane	4488.339		4,488	153.32	ND	0	158	ND	0	4,488	4.49	479	2209	2.21E-06	0	0	0.00E+00	2.21E-06
n-Tridecane	455.5733	J	456	153.69	ND	0	160	ND	0	456	0.46	49	224	2.24E-07	0	0	0.00E+00	2.24E-07
C13 as Tridecane	7867.229		7,867	153.69	ND	0	160	ND	0	7,867	7.87	839	3872	3.87E-06	0	0	0.00E+00	3.87E-06
n-Tetradecane	556.1671	J	556	153.54	ND	0	159	ND	0	556	0.56	59	274	2.74E-07	0	0	0.00E+00	2.74E-07
C14 as tetradecane	5524.774		5,525	153.54	ND	0	159	ND	0	5,525	5.52	589	2719	2.72E-06	0	0	0.00E+00	2.72E-06
n-Pentadecane	585.8635	J	586	154.31	ND	0	158	ND	0	586	0.59	62	288	2.88E-07	0	0	0.00E+00	2.88E-07
C15 as Pentadecane	3161.517		3,162	154.31	ND	0	158	ND	0	3,162	3.16	337	1556	1.56E-06	0	0	0.00E+00	1.56E-06
n-Hexadecane	108.7863	J	109	153.48	ND	0	159	ND	0	109	0.11	12	54	5.35E-08	0	0	0.00E+00	5.35E-08
C16 as Hexadecane	131.7336	J	132	153.48	ND	0	159	ND	0	132	0.13	14	65	6.48E-08	0	0	0.00E+00	6.48E-08
n-Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C17 as Heptadecane	77.75058	J	78	151.69	ND	0	158	ND	0	78	0.08	8	38	3.83E-08	0	0	0.00E+00	3.83E-08
n-Octadecane	78.50394	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C18 as Octodecane	78.50394	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Nonadecane	78.66142	ND	39	153.69	ND	0	158	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	78.66142	ND	39	153.69	ND	0	158	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	78.47244	ND	39	153.32	ND	0	157	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C20 as Eicosane	78.47244	ND	39	153.32	ND	0	157	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heneicosane	79.2126	ND	40	154.77	ND	0	158	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C21 as Heneicosane	79.2126	ND	40	154.77	ND	0	158	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Docosane	78.31496	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C22 as Docosane	78.31496	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tricosane	78.74016	ND	39	153.85	ND	0	158	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C23 as Tricosane	78.74016	ND	39	153.85	ND	0	158	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tetracosane	78.85039	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C24 as Tetracosane	78.85039	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
Total Hydrocarbon			38,180			0			0		38.18	4071	18,791	1.88E-05	0	0	0.00E+00	1.88E-05

B068B	ANALYTICAL RESULTS B068B		ND Adj	BACKGROUND B069A		ND Adj	TRIP BLANK #B028		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.4331	ND	74	144	ND	0	355	ND	0	74	0.07	8	36	3.63E-08	3.63E-08
C5 as Pentane	147.4331	ND	74	144	ND	0	355	ND	0	74	0.07	8	36	3.63E-08	3.63E-08
n-Hexane	153.1654	ND	77	150	ND	0	375	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C6 as Hexane	153.1654	ND	77	150	ND	0	375	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Heptane	160.063	ND	80	156	ND	0	393	ND	0	80	0.08	9	39	3.94E-08	3.94E-08
C7 as Heptane	160.063	ND	80	156	ND	0	393	ND	0	80	0.08	9	39	3.94E-08	3.94E-08
n-Octane	155.8425	ND	78	152	ND	0	160	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C8 as Octane	1984.336		1,984	152	ND	0	160	ND	0	1,984	1.98	212	977	9.77E-07	9.77E-07
n-Nonane	157.0079	ND	79	153	ND	0	158	ND	0	79	0.08	8	39	3.86E-08	3.86E-08
C9 as Nonane	2013.123		2,013	153	ND	0	158	ND	0	2,013	2.01	215	991	9.91E-07	9.91E-07
n-Decane	572.6089	J	573	155	ND	0	158	ND	0	573	0.57	61	282	2.82E-07	2.82E-07
C10 as Decane	1451.381	J	1,451	155	ND	0	158	ND	0	1,451	1.45	155	714	7.14E-07	7.14E-07
n-Undecane	158.0158	ND	79	154	ND	0	157	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C11 as Undecane	2148.871		2,149	154	ND	0	157	ND	0	2,149	2.15	229	1058	1.06E-06	1.06E-06
n-Dodecane	1142.572	J	1,143	153	ND	0	158	ND	0	1,143	1.14	122	562	5.62E-07	5.62E-07
C12 as Dodecane	1501.312	J	1,501	153	ND	0	158	ND	0	1,501	1.50	160	739	7.39E-07	7.39E-07
n-Tridecane	283.895	J	284	154	ND	0	160	ND	0	284	0.28	30	140	1.40E-07	1.40E-07
C13 as Tridecane	2659.045		2,659	154	ND	0	160	ND	0	2,659	2.66	284	1309	1.31E-06	1.31E-06
n-Tetradecane	245.8541	J	246	154	ND	0	159	ND	0	246	0.25	26	121	1.21E-07	1.21E-07
C14 as tetradecane	1170.845	J	1,171	154	ND	0	159	ND	0	1,171	1.17	125	576	5.76E-07	5.76E-07
n-Pentadecane	159.894	J	160	154	ND	0	158	ND	0	160	0.16	17	79	7.87E-08	7.87E-08
C15 as Pentadecane	319.8215	J	320	154	ND	0	158	ND	0	320	0.32	34	157	1.57E-07	1.57E-07
n-Hexadecane	157.1024	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C16 as Hexadecane	166.5533	J	167	153	ND	0	159	ND	0	167	0.17	18	82	8.20E-08	8.20E-08
n-Heptadecane	155.2756	ND	78	152	ND	0	158	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C17 as Heptadecane	155.2756	ND	78	152	ND	0	158	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Octadecane	157.0079	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.86E-08	3.86E-08
C18 as Octodecane	157.0079	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.86E-08	3.86E-08
n-Nonadecane	157.3228	ND	79	154	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C19 as Nonadecane	157.3228	ND	79	154	ND	0	158	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Eicosane	156.9449	ND	78	153	ND	0	157	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C20 as Eicosane	156.9449	ND	78	153	ND	0	157	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
n-Heneicosane	158.4252	ND	79	155	ND	0	158	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
C21 as Heneicosane	158.4252	ND	79	155	ND	0	158	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
n-Docosane	156.6299	ND	78	153	ND	0	159	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
C22 as Docosane	156.6299	ND	78	153	ND	0	159	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
n-Tricosane	157.4803	ND	79	154	ND	0	158	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C23 as Tricosane	157.4803	ND	79	154	ND	0	158	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Tetracosane	157.7008	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C24 as Tetracosane	157.7008	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
Total Hydrocarbon			17,852			0			0		17.85	1904	8,786	8.79E-06	8.79E-06

Refinery C Sample Results

Bagging Data Form — Vacuum Method

Sample Id C001

WSPA — Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	**401-21862-V**	
Equipment Subtype:	Gate		**Unit:**	Refinery C	
Line Size:	12	*inches*	**Date:**	17-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.02 *inHg*	762.5 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	79.6 *°F*	26.4 *°C*	**TVA ID**	37887	
Component Temp:	267 *°F*	130.6 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Draw Stripper Tar*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
9:16	Background	-3 *ppmv*	8-sec Dwell	14 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	192 *ppm*
9:56	Initial Bag Vacuum	0.02 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	110.3 *°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	10:02	10:04	10:06	10:08	10:10	10:16	10:18
ppmv	11.4	12	12	12.1	11.8	11.6	11.6

Sorbent Tube Sample Collection Parameters

C001A

Time						
10:11	Volume Start	787.0 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:24	Volume Stop	799.6 *Liters*	Total Vol	12.6 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.969 *L/min*	Sorbent $Flow_{STP}$	0.909 *L/min*

C001B

10:11	Volume Start	718.1 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:24	Volume Stop	730.8 *Liters*	Total Vol	12.7 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.977 *L/min*	Sorbent $Flow_{STP}$	0.917 *L/min*

Total ST Vol_{STP} 23.74 *Liters* — DGM Vol_{STP} 81.32 *Liters* — Total Run Vol_{STP} 105.05 *Liters*

Bagging Parameters

Time								
10:15	Vacuum check	0.02 *inches H2O*			DGM_P	2 *inches H2O vacuum*		758.8 *mmHg*
10:15	DGM_{10L} Time	01:29.7 *min:sec.frac*	DGM Time	1.500	DGM Flow	6.67	DGM $Flow_{STP}$	6.26 *liters/minute*
10:16	Bag Temp.	129.2 *°F*		54.0 *°C*	$Sample_T$	104 *°F*		40.0 *°C*

Post-Sample Data

10:51	Post Test M21	Background -3 *ppmv*	8-sec Dwell	18 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21	222 *ppm*
							Leak @	Stem

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00	*hours:min*
Organic condensate collected	N/A *ml*				
Density of organic condensate	N/A *g/ml*				

Average THC emissions =	3.86E-06 kg/hr
Percent difference THC ER =	33%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.64E-07
C5 as Pentane	2.73E-08
n-Hexane	3.56E-08
C6 as Hexane	3.56E-08
n-Heptane	3.16E-08
C7 as Heptane	3.16E-08
n-Octane	2.84E-08
C8 as Octane	3.24E-07
n-Nonane	2.86E-08
C9 as Nonane	5.12E-07
n-Decane	1.19E-07
C10 as Decane	5.46E-07
n-Undecane	2.88E-08
C11 as Undecane	5.23E-07
n-Dodecane	4.05E-08
C12 as Dodecane	1.42E-07
n-Tridecane	2.87E-08
C13 as Tridecane	5.84E-07
n-Tetradecane	2.87E-08
C14 as tetradecane	2.87E-08
n-Pentadecane	2.88E-08
C15 as Pentadecane	2.88E-08
n-Hexadecane	2.86E-08
C16 as Hexadecane	2.86E-08
n-Heptadecane	2.83E-08
C17 as Heptadecane	2.83E-08
n-Octadecane	2.86E-08
C18 as Octodecane	2.86E-08
n-Nonadecane	2.87E-08
C19 as Nonadecane	2.87E-08
n-Eicosane	2.86E-08
C20 as Eicosane	2.86E-08
n-Heneicosane	2.89E-08
C21 as Heneicosane	2.89E-08
n-Docosane	2.86E-08
C22 as Docosane	2.86E-08
n-Tricosane	2.87E-08
C23 as Tricosane	2.87E-08
n-Tetracosane	2.87E-08
C24 as Tetracosane	2.87E-08
Total Hydrocarbon	3.86E-06

THC: 2.04E-04 lbs/day 3.73E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C001A	C001A		ND Adj	C002A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	305.9783	J	306	145.55	ND	0	148	ND	0	306	0.31	32	148	1.48E-07	1.48E-07
C5 as Pentane	74.3016	ND	37	145.55	ND	0	148	ND	0	37	0.04	4	18	1.80E-08	1.80E-08
n-Hexane	77.1905	ND	39	208.57	ND	0	212	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
C6 as Hexane	77.1905	ND	39	208.57	ND	0	212	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
n-Heptane	80.6667	ND	40	173.27	ND	0	176	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
C7 as Heptane	80.6667	ND	40	173.27	ND	0	176	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
n-Octane	78.5397	ND	39	149.94	ND	0	152	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C8 as Octane	587.0695	J	587	149.94	ND	0	152	ND	0	587	0.59	62	285	2.85E-07	2.85E-07
n-Nonane	79.1270	ND	40	151.06	ND	0	153	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C9 as Nonane	954.2789		954	151.06	ND	0	153	ND	0	954	0.95	100	463	4.63E-07	4.63E-07
n-Decane	211.7652	J	212	152.42	ND	0	155	ND	0	212	0.21	22	103	1.03E-07	1.03E-07
C10 as Decane	931.0741		931	152.42	ND	0	155	ND	0	931	0.93	98	451	4.51E-07	4.51E-07
n-Undecane	79.6349	ND	40	152.03	ND	0	154	ND	0	40	0.04	4	19	1.93E-08	1.93E-08
C11 as Undecane	914.7448		915	152.03	ND	0	154	ND	0	915	0.91	96	444	4.44E-07	4.44E-07
n-Dodecane	88.7207	J	89	151	ND	0	153	ND	0	89	0.09	9	43	4.30E-08	4.30E-08
C12 as Dodecane	304.2597	J	304	151	ND	0	153	ND	0	304	0.30	32	148	1.48E-07	1.48E-07
n-Tridecane	79.2857	ND	40	151.36	ND	0	154	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C13 as Tridecane	1129.9808		1,130	151.36	ND	0	154	ND	0	1,130	1.13	119	548	5.48E-07	5.48E-07
n-Tetradecane	79.2063	ND	40	151.21	ND	0	154	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C14 as tetradecane	79.2063	ND	40	151.21	ND	0	154	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
n-Pentadecane	79.6032	ND	40	151.97	ND	0	154	ND	0	40	0.04	4	19	1.93E-08	1.93E-08
C15 as Pentadecane	79.6032	ND	40	151.97	ND	0	154	ND	0	40	0.04	4	19	1.93E-08	1.93E-08
n-Hexadecane	79.1746	ND	40	151.15	ND	0	153	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C16 as Hexadecane	79.1746	ND	40	151.15	ND	0	153	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
n-Heptadecane	78.2540	ND	39	149.39	ND	0	152	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C17 as Heptadecane	78.2540	ND	39	149.39	ND	0	152	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
n-Octadecane	79.1270	ND	40	151.06	ND	0	153	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C18 as Octodecane	79.1270	ND	40	151.06	ND	0	153	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
n-Nonadecane	79.2857	ND	40	151.36	ND	0	154	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C19 as Nonadecane	79.2857	ND	40	151.36	ND	0	154	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
n-Eicosane	79.0952	ND	40	151	ND	0	153	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C20 as Eicosane	79.0952	ND	40	151	ND	0	153	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
n-Heneicosane	79.8413	ND	40	152.42	ND	0	155	ND	0	40	0.04	4	19	1.94E-08	1.94E-08
C21 as Heneicosane	79.8413	ND	40	152.42	ND	0	155	ND	0	40	0.04	4	19	1.94E-08	1.94E-08
n-Docosane	78.9365	ND	39	150.7	ND	0	153	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
C22 as Docosane	78.9365	ND	39	150.7	ND	0	153	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
n-Tricosane	79.3651	ND	40	151.52	ND	0	154	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
C23 as Tricosane	79.3651	ND	40	151.52	ND	0	154	ND	0	40	0.04	4	19	1.92E-08	1.92E-08
n-Tetracosane	79.4762	ND	40	151.73	ND	0	154	ND	0	40	0.04	4	19	1.93E-08	1.93E-08
C24 as Tetracosane	79.4762	ND	40	151.73	ND	0	154	ND	0	40	0.04	4	19	1.93E-08	1.93E-08
Total Hydrocarbon			6,653			0			0		6.65	699	3,226	3.23E-06	3.23E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C001B	C001B		ND Adj	C002A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	369.59555	J	370	146	ND	0	148	ND	0	370	0.37	39	179	1.79E-07	1.79E-07
C5 as Pentane	151.28189	ND	76	146	ND	0	148	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
n-Hexane	216.78111	ND	108	209	ND	0	212	ND	0	108	0.11	11	53	5.26E-08	5.26E-08
C6 as Hexane	216.78111	ND	108	209	ND	0	212	ND	0	108	0.11	11	53	5.26E-08	5.26E-08
n-Heptane	180.09449	ND	90	173	ND	0	176	ND	0	90	0.09	9	44	4.37E-08	4.37E-08
C7 as Heptane	180.09449	ND	90	173	ND	0	176	ND	0	90	0.09	9	44	4.37E-08	4.37E-08
n-Octane	155.84252	ND	78	150	ND	0	152	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C8 as Octane	748.17377	J	748	150	ND	0	152	ND	0	748	0.75	79	363	3.63E-07	3.63E-07
n-Nonane	157.00788	ND	79	151	ND	0	153	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C9 as Nonane	1157.8915	J	1,158	151	ND	0	153	ND	0	1,158	1.16	122	561	5.61E-07	5.61E-07
n-Decane	279.75377	J	280	152	ND	0	155	ND	0	280	0.28	29	136	1.36E-07	1.36E-07
C10 as Decane	1319.088	J	1,319	152	ND	0	155	ND	0	1,319	1.32	139	640	6.40E-07	6.40E-07
n-Undecane	158.01575	ND	79	152	ND	0	154	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
C11 as Undecane	1242.1281	J	1,242	152	ND	0	154	ND	0	1,242	1.24	130	602	6.02E-07	6.02E-07
n-Dodecane	156.94488	ND	78	151	ND	0	153	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C12 as Dodecane	280.31523	J	280	151	ND	0	153	ND	0	280	0.28	29	136	1.36E-07	1.36E-07
n-Tridecane	157.32284	ND	79	151	ND	0	154	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C13 as Tridecane	1277.4857	J	1,277	151	ND	0	154	ND	0	1,277	1.28	134	619	6.19E-07	6.19E-07
n-Tetradecane	157.16536	ND	79	151	ND	0	154	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C14 as tetradecane	157.16536	ND	79	151	ND	0	154	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
n-Pentadecane	157.95276	ND	79	152	ND	0	154	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
C15 as Pentadecane	157.95276	ND	79	152	ND	0	154	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
n-Hexadecane	157.10236	ND	79	151	ND	0	153	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C16 as Hexadecane	157.10236	ND	79	151	ND	0	153	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
n-Heptadecane	155.27559	ND	78	149	ND	0	152	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C17 as Heptadecane	155.27559	ND	78	149	ND	0	152	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Octadecane	157.00788	ND	79	151	ND	0	153	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C18 as Octodecane	157.00788	ND	79	151	ND	0	153	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
n-Nonadecane	157.32284	ND	79	151	ND	0	154	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C19 as Nonadecane	157.32284	ND	79	151	ND	0	154	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
n-Eicosane	156.94488	ND	78	151	ND	0	153	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C20 as Eicosane	156.94488	ND	78	151	ND	0	153	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Heneicosane	158.4252	ND	79	152	ND	0	155	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
C21 as Heneicosane	158.4252	ND	79	152	ND	0	155	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
n-Docosane	156.62992	ND	78	151	ND	0	153	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C22 as Docosane	156.62992	ND	78	151	ND	0	153	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Tricosane	157.48032	ND	79	152	ND	0	154	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
C23 as Tricosane	157.48032	ND	79	152	ND	0	154	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
n-Tetracosane	157.70079	ND	79	152	ND	0	154	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
C24 as Tetracosane	157.70079	ND	79	152	ND	0	154	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
Total Hydrocarbon			9,269			0			0		9.27	974	4,494	4.49E-06	4.49E-06

Bagging Data Form **Vacuum Method** **Sample Id** C004

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	20448	
Equipment Subtype:	Gate			**Unit:**	Refinery C	
Line Size:	12 *inches*			**Date:**	17-May-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30.01 *inHg*	762.3 *mmHg*		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	83.1 *°F*	28.4 *°C*		**TVA ID**	34251	
Component Temp:	241 *°F*	116.1 *°C*		**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Asphalt*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds
STP = 294.15 K & 760 mmHg

Pre-Sample Data

Time								
12:32	Background	-1 *ppmv*	8-sec Dwell	28300 *ppmv*	Total Dwell	0:10 *min:sec*	Final M21	28300 *ppm*
13:15	Initial Bag Vacuum	0.1 *inches H2O*	DGM Vac.	1.9 *inches H2O*	Bag Temp	103.5 *°F*	Leak @	Stem

Bag Concentrations (ppmv) (vented bag with a small hole)

Time	13:19													
ppmv	97400													

(Flame-Out)

Sorbent Tube Sample Collection Parameters

C004A

Time						
13:30	Volume Start	799.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:43	Volume Stop	812.7 *Liters*	Total Vol	13.1 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 1.008 *L/min*	$Sorbent\ Flow_{STP}$	0.986 *L/min*

C004B

13:30	Volume Start	730.8 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:43	Volume Stop	744.0 *Liters*	Total Vol	13.2 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 1.015 *L/min*	$Sorbent\ Flow_{STP}$	0.993 *L/min*
	$Total\ ST\ Vol_{STP}$	25.73 *Liters*	$DGM\ Vol_{STP}$	75.56 *Liters*	$Total\ Run\ Vol_{STP}$	101.29 *Liters*

Bagging Parameters

Time								
13:37	Vacuum check	0.05 *inches H2O*			DGM_P	1.8 *inches H2O vacuum*	758.9	*mmHg*
13:36	DGM_{10L} Time	01:40.5 *min:sec.frac*	DGM Time	1.683	DGM Flow	5.94	$DGM\ Flow_{STP}$ 5.81	*liters/minute*
13:36	Bag Temp.	110.1 *°F*	43.4	*°C*	$Sample_T$	81 *°F*	27.2	*°C*

Post-Sample Data

13:57	Post Test M21	Background -1.9 *ppmv*	8-sec Dwell	N/A *ppmv*	Total Dwell 0:30 *min:sec*	Final M21	17000 (FLA *ppm*
						@	Stem

Condensate accumulation: starting time 13:19 *hour:min* Final time 13:44 *hour:min* 0:25 *hours:min*
Organic condensate collected 4 *ml*
Density of organic condensate *g/ml*

Average THC emissions =	1.38E-02	kg/hr
Percent difference THC ER =	35%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.35E-02
C5 as Pentane	7.66E-05
n-Hexane	2.59E-05
C6 as Hexane	3.87E-05
n-Heptane	1.83E-05
C7 as Heptane	2.11E-05
n-Octane	9.86E-06
C8 as Octane	1.75E-05
n-Nonane	5.12E-06
C9 as Nonane	1.24E-05
n-Decane	2.81E-06
C10 as Decane	8.24E-06
n-Undecane	2.10E-06
C11 as Undecane	7.09E-06
n-Dodecane	1.64E-06
C12 as Dodecane	7.52E-06
n-Tridecane	1.91E-06
C13 as Tridecane	1.45E-05
n-Tetradecane	5.76E-07
C14 as tetradecane	1.31E-06
n-Pentadecane	1.19E-07
C15 as Pentadecane	5.37E-08
n-Hexadecane	2.83E-08
C16 as Hexadecane	2.83E-08
n-Heptadecane	2.80E-08
C17 as Heptadecane	3.20E-08
n-Octadecane	2.83E-08
C18 as Octodecane	2.83E-08
n-Nonadecane	2.83E-08
C19 as Nonadecane	3.27E-08
n-Eicosane	2.83E-08
C20 as Eicosane	2.83E-08
n-Heneicosane	2.85E-08
C21 as Heneicosane	3.05E-08
n-Docosane	2.82E-08
C22 as Docosane	2.82E-08
n-Tricosane	2.84E-08
C23 as Tricosane	2.84E-08
n-Tetracosane	2.84E-08
C24 as Tetracosane	2.84E-08
C25 (n-Pentacosane)	1.73E-09
Other C25 as n-Pentacosane	1.73E-09
C26 (n-Hexacosane)	1.72E-09
Other C26 as n-Hexacosane	1.72E-09
C27 (n-Heptacosane)	1.74E-09
Other C27 as n-Heptacosane	1.74E-09
C28 (n-Octacosane)	4.39E-09
Other C28 as n-Octacosane	1.71E-09
C29 (n-Nonacosane)	7.40E-09
Other C29 as n-Nonacosane	1.71E-09
C30 (n-Triacontane)	1.01E-08
Other C30 as n-Triacontane	9.85E-08
Total Hydrocarbon	1.38E-02

THC:	**7.28E-01**	**lbs/day**	**1.33E-01**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS				COMBINED
C004A	C004A		ND Adj	C005A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#C004LIQ			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	23640558		23,640,558	145.55	ND	0	148	ND	0	23,640,558	23640.56	2394452	11051319	1.11E-02	1.55	ND	0.03	1.66E-09	1.11E-02
C5 as Pentane	182178.3		182,178	145.55	ND	0	148	ND	0	182,178	182.18	18452	85163	8.52E-05	1.55	ND	0.03	1.66E-09	8.52E-05
n-Hexane	53684.35		53,684	208.57	ND	0	212	ND	0	53,684	53.68	5437	25096	2.51E-05	2.22	ND	0.04	2.38E-09	2.51E-05
C6 as Hexane	89369.09		89,369	208.57	ND	0	212	ND	0	89,369	89.37	9052	41778	4.18E-05	2.22	ND	0.04	2.38E-09	4.18E-05
n-Heptane	38634.42		38,634	173.27	ND	0	176	ND	0	38,634	38.63	3913	18061	1.81E-05	1.84	ND	0.03	1.97E-09	1.81E-05
C7 as Heptane	64396.12		64,396	173.27	ND	0	176	ND	0	64,396	64.40	6522	30103	3.01E-05	1.84	ND	0.03	1.97E-09	3.01E-05
n-Octane	19481.4		19,481	149.94	ND	0	152	ND	0	19,481	19.48	1973	9107	9.11E-06	1.59	ND	0.03	1.71E-09	9.11E-06
C8 as Octane	34293.62		34,294	149.94	ND	0	152	ND	0	34,294	34.29	3473	16031	1.60E-05	4.22	J	0.15	9.05E-09	1.60E-05
n-Nonane	10087.71		10,088	151.06	ND	0	153	ND	0	10,088	10.09	1022	4716	4.72E-06	1.61	ND	0.03	1.72E-09	4.72E-06
C9 as Nonane	24328.3		24,328	151.06	ND	0	153	ND	0	24,328	24.33	2464	11373	1.14E-05	1.61	ND	0.03	1.72E-09	1.14E-05
n-Decane	5561.137		5,561	152.42	ND	0	155	ND	0	5,561	5.56	563	2600	2.60E-06	1.62	ND	0.03	1.74E-09	2.60E-06
C10 as Decane	16210.28		16,210	152.42	ND	0	155	ND	0	16,210	16.21	1642	7578	7.58E-06	7.57	J	0.27	1.62E-08	7.59E-06
n-Undecane	4171.515		4,172	152.03	ND	0	154	ND	0	4,172	4.17	423	1950	1.95E-06	1.62	ND	0.03	1.73E-09	1.95E-06
C11 as Undecane	13917.64		13,918	152.03	ND	0	154	ND	0	13,918	13.92	1410	6506	6.51E-06	8.10	J	0.29	1.74E-08	6.52E-06
n-Dodecane	3250.907		3,251	151	ND	0	153	ND	0	3,251	3.25	329	1520	1.52E-06	2.67	J	0.10	5.71E-09	1.53E-06
C12 as Dodecane	14835.08		14,835	151	ND	0	153	ND	0	14,835	14.84	1503	6935	6.93E-06	2.97	J	0.11	6.35E-09	6.94E-06
n-Tridecane	3778.528		3,779	151.36	ND	0	154	ND	0	3,779	3.78	383	1766	1.77E-06	1.61	ND	0.03	1.72E-09	1.77E-06
C13 as Tridecane	28703.19		28,703	151.36	ND	0	154	ND	0	28,703	28.70	2907	13418	1.34E-05	8.76	J	0.31	1.88E-08	1.34E-05
n-Tetradecane	1107.165		1,107	151.21	ND	0	154	ND	0	1,107	1.11	112	518	5.18E-07	2.53	J	0.09	5.42E-09	5.23E-07
C14 as tetradecane	2567.559		2,568	151.21	ND	0	154	ND	0	2,568	2.57	260	1200	1.20E-06	1.61	ND	0.03	1.72E-09	1.20E-06
n-Pentadecane	211.77	J	212	151.97	ND	0	154	ND	0	212	0.21	21	99	9.90E-08	1.62	ND	0.03	1.73E-09	1.01E-07
C15 as Pentadecane	90.94283	J	91	151.97	ND	0	154	ND	0	91	0.09	9	43	4.25E-08	6.87	J	0.25	1.47E-08	5.72E-08
n-Hexadecane	76.15267	ND	38	151.15	ND	0	153	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.72E-09	1.95E-08
C16 as Hexadecane	76.15267	ND	38	151.15	ND	0	153	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.72E-09	1.95E-08
n-Heptadecane	75.26717	ND	38	149.39	ND	0	152	ND	0	38	0.04	4	18	1.76E-08	1.59	ND	0.03	1.70E-09	1.93E-08
C17 as Heptadecane	75.26717	ND	38	149.39	ND	0	152	ND	0	38	0.04	4	18	1.76E-08	2.67	J	0.10	5.71E-09	2.33E-08
n-Octadecane	76.10687	ND	38	151.06	ND	0	153	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.72E-09	1.95E-08
C18 as Octodecane	76.10687	ND	38	151.06	ND	0	153	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.72E-09	1.95E-08
n-Nonadecane	76.25954	ND	38	151.36	ND	0	154	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.72E-09	1.95E-08
C19 as Nonadecane	76.25954	ND	38	151.36	ND	0	154	ND	0	38	0.04	4	18	1.78E-08	2.86	J	0.10	6.13E-09	2.40E-08
n-Eicosane	76.07633	ND	38	151	ND	0	153	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.72E-09	1.95E-08
C20 as Eicosane	76.07633	ND	38	151	ND	0	153	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.72E-09	1.95E-08
n-Heneicosane	76.79389	ND	38	152.42	ND	0	155	ND	0	38	0.04	4	18	1.79E-08	1.62	ND	0.03	1.74E-09	1.97E-08
C21 as Heneicosane	76.79389	ND	38	152.42	ND	0	155	ND	0	38	0.04	4	18	1.79E-08	1.71	J	0.06	3.67E-09	2.16E-08
n-Docosane	75.92366	ND	38	150.7	ND	0	153	ND	0	38	0.04	4	18	1.77E-08	1.60	ND	0.03	1.72E-09	1.95E-08
C22 as Docosane	75.92366	ND	38	150.7	ND	0	153	ND	0	38	0.04	4	18	1.77E-08	1.60	ND	0.03	1.72E-09	1.95E-08
n-Tricosane	76.33588	ND	38	151.52	ND	0	154	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.73E-09	1.96E-08
C23 as Tricosane	76.33588	ND	38	151.52	ND	0	154	ND	0	38	0.04	4	18	1.78E-08	1.61	ND	0.03	1.73E-09	1.96E-08
n-Tetracosane	76.44275	ND	38	151.73	ND	0	154	ND	0	38	0.04	4	18	1.79E-08	1.61	ND	0.03	1.73E-09	1.96E-08
C24 as Tetracosane	76.44275	ND	38	151.73	ND	0	154	ND	0	38	0.04	4	18	1.79E-08	1.61	ND	0.03	1.73E-09	1.96E-08
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	1.62	ND	0.03	1.73E-09	1.73E-09
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	1.62	ND	0.03	1.73E-09	1.73E-09
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	1.60	ND	0.03	1.72E-09	1.72E-09
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	1.60	ND	0.03	1.72E-09	1.72E-09
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	1.62	ND	0.03	1.74E-09	1.74E-09
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	1.62	ND	0.03	1.74E-09	1.74E-09
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	2.05	J	0.07	4.39E-09	4.39E-09
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	1.60	ND	0.03	1.71E-09	1.71E-09
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	3.45	J	0.12	7.40E-09	7.40E-09
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	1.60	ND	0.03	1.71E-09	1.71E-09
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	4.69	J	0.17	1.01E-08	1.01E-08
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	45.98		1.64	9.85E-08	9.85E-08
Total Hydrocarbon			24,252,102			0			0		24252.10	2456393	11,337,199	1.13E-02	168		4.92	2.95E-07	1.13E-02

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS				COMBINED
C004B	C004B		ND Adj	C005A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#S017			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	34076689		34,076,689	146	ND	0	148	ND	0	34,076,689	34076.69	3451484	15929927	1.59E-02	2	ND	0.03	1.66E-09	1.59E-02
C5 as Pentane	145479.6		145,480	146	ND	0	148	ND	0	145,480	145.48	14735	68008	6.80E-05	2	ND	0.03	1.66E-09	6.80E-05
n-Hexane	57272.45		57,272	209	ND	0	212	ND	0	57,272	57.27	5801	26773	2.68E-05	2	ND	0.04	2.38E-09	2.68E-05
C6 as Hexane	76234.15		76,234	209	ND	0	212	ND	0	76,234	76.23	7721	35637	3.56E-05	2	ND	0.04	2.38E-09	3.56E-05
n-Heptane	39697.1		39,697	173	ND	0	176	ND	0	39,697	39.70	4021	18557	1.86E-05	2	ND	0.03	1.97E-09	1.86E-05
C7 as Heptane	26078.1		26,078	173	ND	0	176	ND	0	26,078	26.08	2641	12191	1.22E-05	2	ND	0.03	1.97E-09	1.22E-05
n-Octane	22706.34		22,706	150	ND	0	152	ND	0	22,706	22.71	2300	10615	1.06E-05	2	ND	0.03	1.71E-09	1.06E-05
C8 as Octane	40418.06		40,418	150	ND	0	152	ND	0	40,418	40.42	4094	18894	1.89E-05	4	J	0.15	9.05E-09	1.89E-05
n-Nonane	11791.68		11,792	151	ND	0	153	ND	0	11,792	11.79	1194	5512	5.51E-06	2	ND	0.03	1.72E-09	5.51E-06
C9 as Nonane	28547.26		28,547	151	ND	0	153	ND	0	28,547	28.55	2891	13345	1.33E-05	2	ND	0.03	1.72E-09	1.33E-05
n-Decane	6442.996		6,443	152	ND	0	155	ND	0	6,443	6.44	653	3012	3.01E-06	2	ND	0.03	1.74E-09	3.01E-06
C10 as Decane	18969.51		18,970	152	ND	0	155	ND	0	18,970	18.97	1921	8868	8.87E-06	8	J	0.27	1.62E-08	8.88E-06
n-Undecane	4806.647		4,807	152	ND	0	154	ND	0	4,807	4.81	487	2247	2.25E-06	2	ND	0.03	1.73E-09	2.25E-06
C11 as Undecane	16362.06		16,362	152	ND	0	154	ND	0	16,362	16.36	1657	7649	7.65E-06	8	J	0.29	1.74E-08	7.67E-06
n-Dodecane	3759.746		3,760	151	ND	0	153	ND	0	3,760	3.76	381	1758	1.76E-06	3	J	0.10	5.71E-09	1.76E-06
C12 as Dodecane	17302.41		17,302	151	ND	0	153	ND	0	17,302	17.30	1752	8088	8.09E-06	3	J	0.11	6.35E-09	8.09E-06
n-Tridecane	4371.226		4,371	151	ND	0	154	ND	0	4,371	4.37	443	2043	2.04E-06	2	ND	0.03	1.72E-09	2.05E-06
C13 as Tridecane	33191.53		33,192	151	ND	0	154	ND	0	33,192	33.19	3362	15516	1.55E-05	9	J	0.31	1.88E-08	1.55E-05
n-Tetradecane	1334.666	J	1,335	151	ND	0	154	ND	0	1,335	1.33	135	624	6.24E-07	3	J	0.09	5.42E-09	6.29E-07
C14 as tetradecane	3046.604		3,047	151	ND	0	154	ND	0	3,047	3.05	309	1424	1.42E-06	2	ND	0.03	1.72E-09	1.43E-06
n-Pentadecane	290.9649	J	291	152	ND	0	154	ND	0	291	0.29	29	136	1.36E-07	2	ND	0.03	1.73E-09	1.38E-07
C15 as Pentadecane	151.9697	ND	76	152	ND	0	154	ND	0	76	0.08	8	36	3.55E-08	7	J	0.25	1.47E-08	5.02E-08
n-Hexadecane	151.1515	ND	76	151	ND	0	153	ND	0	76	0.08	8	35	3.53E-08	2	ND	0.03	1.72E-09	3.71E-08
C16 as Hexadecane	151.1515	ND	76	151	ND	0	153	ND	0	76	0.08	8	35	3.53E-08	2	ND	0.03	1.72E-09	3.71E-08
n-Heptadecane	149.3939	ND	75	149	ND	0	152	ND	0	75	0.07	8	35	3.49E-08	2	ND	0.03	1.70E-09	3.66E-08
C17 as Heptadecane	149.3939	ND	75	149	ND	0	152	ND	0	75	0.07	8	35	3.49E-08	3	J	0.10	5.71E-09	4.06E-08
n-Octadecane	151.0606	ND	76	151	ND	0	153	ND	0	76	0.08	8	35	3.53E-08	2	ND	0.03	1.72E-09	3.70E-08
C18 as Octodecane	151.0606	ND	76	151	ND	0	153	ND	0	76	0.08	8	35	3.53E-08	2	ND	0.03	1.72E-09	3.70E-08
n-Nonadecane	151.3636	ND	76	151	ND	0	154	ND	0	76	0.08	8	35	3.54E-08	2	ND	0.03	1.72E-09	3.71E-08
C19 as Nonadecane	151.3636	ND	76	151	ND	0	154	ND	0	76	0.08	8	35	3.54E-08	3	J	0.10	6.13E-09	4.15E-08
n-Eicosane	151	ND	76	151	ND	0	153	ND	0	76	0.08	8	35	3.53E-08	2	ND	0.03	1.72E-09	3.70E-08
C20 as Eicosane	151	ND	76	151	ND	0	153	ND	0	76	0.08	8	35	3.53E-08	2	ND	0.03	1.72E-09	3.70E-08
n-Heneicosane	152.4242	ND	76	152	ND	0	155	ND	0	76	0.08	8	36	3.56E-08	2	ND	0.03	1.74E-09	3.74E-08
C21 as Heneicosane	152.4242	ND	76	152	ND	0	155	ND	0	76	0.08	8	36	3.56E-08	2	J	0.06	3.67E-09	3.93E-08
n-Docosane	150.697	ND	75	151	ND	0	153	ND	0	75	0.08	8	35	3.52E-08	2	ND	0.03	1.72E-09	3.69E-08
C22 as Docosane	150.697	ND	75	151	ND	0	153	ND	0	75	0.08	8	35	3.52E-08	2	ND	0.03	1.72E-09	3.69E-08
n-Tricosane	151.5152	ND	76	152	ND	0	154	ND	0	76	0.08	8	35	3.54E-08	2	ND	0.03	1.73E-09	3.71E-08
C23 as Tricosane	151.5152	ND	76	152	ND	0	154	ND	0	76	0.08	8	35	3.54E-08	2	ND	0.03	1.73E-09	3.71E-08
n-Tetracosane	151.7273	ND	76	152	ND	0	154	ND	0	76	0.08	8	35	3.55E-08	2	ND	0.03	1.73E-09	3.72E-08
C24 as Tetracosane	151.7273	ND	76	152	ND	0	154	ND	0	76	0.08	8	35	3.55E-08	2	ND	0.03	1.73E-09	3.72E-08
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.73E-09	1.73E-09
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.73E-09	1.73E-09
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.72E-09	1.72E-09
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.72E-09	1.72E-09
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.74E-09	1.74E-09
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.74E-09	1.74E-09
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	2	J	0.07	4.39E-09	4.39E-09
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.71E-09	1.71E-09
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	3	J	0.12	7.40E-09	7.40E-09
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	2	ND	0.03	1.71E-09	1.71E-09
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	5	J	0.17	1.01E-08	1.01E-08
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	46	0	1.64	9.85E-08	9.85E-08
Total Hydrocarbon			34,636,229			0			0		34636.23	3508158	16,191,496	1.62E-02					1.62E-02

Bagging Data Form **Vacuum Method** **Sample Id** **C007**

Equipment type:	Valve		**Component ID:**	**21210**	
Equipment Subtype:	Gate		**Unit:**	Refinery C	
Line Size:	2 *inches*		**Date:**	18-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.98 *inHg*	761.5 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	66.8 *°F*	19.3 *°C*	**TVA ID**	36502	
Component Temp:	82 *°F*	27.8 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*DAO to NISO - Wash Oil*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:41	Background	4	*ppmv*	8-sec Dwell	12	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	55 *ppm*
9:21	Initial Bag Vacuum	0.03	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	70.2	*°F*	Leak @	Stem

Bag Concentrations (ppmv) (background corrected)

Time	9:24	9:26	9:28	9:30	9:36	9:40								
ppmv	1	1.5	1.5	1.4	1.3	1.3								

Sorbent Tube Sample Collection Parameters

C007A

Time									
9:31	Volume Start	815.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
9:44	Volume Stop	827.8	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.980	*L/min*

C007B

9:31	Volume Start	746.4	*Liters*		Design Sample Flow Rate = 1 liter/min				
9:44	Volume Stop	759.1	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.988	*L/min*
	Total ST Vol$_{STP}$	25.58	*Liters*	DGM Vol$_{STP}$	83.89	*Liters*	Total Run Vol$_{STP}$	109.47	*Liters*

Bagging Parameters

Time										
9:36	Vacuum check	0.025	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	758.1	*mmHg*
9:35	DGM$_{10L}$ Time	01:34.0	*min:sec.frac*	DGM Time	1.567	DGM Flow	6.38	DGM Flow$_{STP}$	6.45	*liters/minute*
9:36	Bag Temp.	84.6	*°F*	29.2	*°C*	Sample$_T$	63	*°F*	17.2	*°C*

Post-Sample Data

9:54	Post Test M21	Background	7 *ppmv*	8-sec Dwell	24 *ppmv*	Total Dwell	2:00	*min:sec*	Final M21	60 *ppm*
									Leak @	Stem

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00	*hours:min*
Organic condensate collected	N/A *ml*				
Density of organic condensate	N/A *g/ml*				

Average THC emissions =	1.59E-06 kg/hr
Percent difference THC ER =	11%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.85E-08
C5 as Pentane	2.85E-08
n-Hexane	3.71E-08
C6 as Hexane	3.71E-08
n-Heptane	3.29E-08
C7 as Heptane	3.29E-08
n-Octane	2.96E-08
C8 as Octane	6.13E-08
n-Nonane	2.98E-08
C9 as Nonane	1.44E-07
n-Decane	3.01E-08
C10 as Decane	6.51E-08
n-Undecane	3.00E-08
C11 as Undecane	4.14E-08
n-Dodecane	2.98E-08
C12 as Dodecane	5.95E-08
n-Tridecane	2.99E-08
C13 as Tridecane	1.84E-07
n-Tetradecane	2.99E-08
C14 as tetradecane	2.99E-08
n-Pentadecane	3.00E-08
C15 as Pentadecane	3.00E-08
n-Hexadecane	2.98E-08
C16 as Hexadecane	2.98E-08
n-Heptadecane	2.95E-08
C17 as Heptadecane	2.95E-08
n-Octadecane	2.98E-08
C18 as Octodecane	2.98E-08
n-Nonadecane	2.99E-08
C19 as Nonadecane	2.99E-08
n-Eicosane	2.98E-08
C20 as Eicosane	2.98E-08
n-Heneicosane	3.01E-08
C21 as Heneicosane	3.01E-08
n-Docosane	2.98E-08
C22 as Docosane	2.98E-08
n-Tricosane	2.99E-08
C23 as Tricosane	2.99E-08
n-Tetracosane	3.00E-08
C24 as Tetracosane	3.00E-08
Total Hydrocarbon	1.59E-06

THC:	**8.41E-05**	**lbs/day**	**1.53E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C007A	C007A		ND Adj	C008A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	148.94	ND	0	148	ND	0	37	0.04	4	19	1.88E-08	1.88E-08
C5 as Pentane	74.30159	ND	37	148.94	ND	0	148	ND	0	37	0.04	4	19	1.88E-08	1.88E-08
n-Hexane	77.19047	ND	39	213.42	ND	0	212	ND	0	39	0.04	4	20	1.95E-08	1.95E-08
C6 as Hexane	77.19047	ND	39	213.42	ND	0	212	ND	0	39	0.04	4	20	1.95E-08	1.95E-08
n-Heptane	80.66666	ND	40	177.3	ND	0	176	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
C7 as Heptane	80.66666	ND	40	177.3	ND	0	176	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
n-Octane	78.53968	ND	39	153.43	ND	0	152	ND	0	39	0.04	4	20	1.98E-08	1.98E-08
C8 as Octane	164.8329	J	165	153.43	ND	0	152	ND	0	165	0.16	18	83	8.33E-08	8.33E-08
n-Nonane	79.12698	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C9 as Nonane	493.3876	J	493	154.57	ND	0	153	ND	0	493	0.49	54	249	2.49E-07	2.49E-07
n-Decane	79.84127	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	2.02E-08	2.02E-08
C10 as Decane	178.3851	J	178	155.97	ND	0	155	ND	0	178	0.18	20	90	9.01E-08	9.01E-08
n-Undecane	79.63492	ND	40	155.57	ND	0	154	ND	0	40	0.04	4	20	2.01E-08	2.01E-08
C11 as Undecane	84.83394	J	85	155.57	ND	0	154	ND	0	85	0.08	9	43	4.29E-08	4.29E-08
n-Dodecane	79.09524	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C12 as Dodecane	157.1339	J	157	154.51	ND	0	153	ND	0	157	0.16	17	79	7.94E-08	7.94E-08
n-Tridecane	79.28571	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C13 as Tridecane	553.5765	J	554	154.88	ND	0	154	ND	0	554	0.55	61	280	2.80E-07	2.80E-07
n-Tetradecane	79.20635	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C14 as tetradecane	79.20635	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
n-Pentadecane	79.60317	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	20	2.01E-08	2.01E-08
C15 as Pentadecane	79.60317	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	20	2.01E-08	2.01E-08
n-Hexadecane	79.1746	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C16 as Hexadecane	79.1746	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
n-Heptadecane	78.25397	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	20	1.98E-08	1.98E-08
C17 as Heptadecane	78.25397	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	20	1.98E-08	1.98E-08
n-Octadecane	79.12698	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C18 as Octodecane	79.12698	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
n-Nonadecane	79.28571	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C19 as Nonadecane	79.28571	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
n-Eicosane	79.09524	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
C20 as Eicosane	79.09524	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	20	2.00E-08	2.00E-08
n-Heneicosane	79.84127	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	2.02E-08	2.02E-08
C21 as Heneicosane	79.84127	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	2.02E-08	2.02E-08
n-Docosane	78.93651	ND	39	154.2	ND	0	153	ND	0	39	0.04	4	20	1.99E-08	1.99E-08
C22 as Docosane	78.93651	ND	39	154.2	ND	0	153	ND	0	39	0.04	4	20	1.99E-08	1.99E-08
n-Tricosane	79.36508	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	20	2.01E-08	2.01E-08
C23 as Tricosane	79.36508	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	20	2.01E-08	2.01E-08
n-Tetracosane	79.47619	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	20	2.01E-08	2.01E-08
C24 as Tetracosane	79.47619	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	20	2.01E-08	2.01E-08
Total Hydrocarbon			2,973			0			0		2.97	326	1,502	1.50E-06	1.50E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C007B	C007B		ND Adj	C008A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.2819	ND	76	149	ND	0	148	ND	0	76	0.08	8	38	3.82E-08	3.82E-08
C5 as Pentane	151.2819	ND	76	149	ND	0	148	ND	0	76	0.08	8	38	3.82E-08	3.82E-08
n-Hexane	216.7811	ND	108	213	ND	0	212	ND	0	108	0.11	12	55	5.48E-08	5.48E-08
C6 as Hexane	216.7811	ND	108	213	ND	0	212	ND	0	108	0.11	12	55	5.48E-08	5.48E-08
n-Heptane	180.0945	ND	90	177	ND	0	176	ND	0	90	0.09	10	45	4.55E-08	4.55E-08
C7 as Heptane	180.0945	ND	90	177	ND	0	176	ND	0	90	0.09	10	45	4.55E-08	4.55E-08
n-Octane	155.8425	ND	78	153	ND	0	152	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
C8 as Octane	155.8425	ND	78	153	ND	0	152	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
n-Nonane	157.0079	ND	79	155	ND	0	153	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C9 as Nonane	157.0079	ND	79	155	ND	0	153	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
n-Decane	158.4252	ND	79	156	ND	0	155	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
C10 as Decane	158.4252	ND	79	156	ND	0	155	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
n-Undecane	158.0158	ND	79	156	ND	0	154	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
C11 as Undecane	158.0158	ND	79	156	ND	0	154	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
n-Dodecane	156.9449	ND	78	155	ND	0	153	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C12 as Dodecane	156.9449	ND	78	155	ND	0	153	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Tridecane	157.3228	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C13 as Tridecane	175.9114	J	176	155	ND	0	154	ND	0	176	0.18	19	89	8.89E-08	8.89E-08
n-Tetradecane	157.1654	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C14 as tetradecane	157.1654	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
n-Pentadecane	157.9528	ND	79	156	ND	0	154	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
C15 as Pentadecane	157.9528	ND	79	156	ND	0	154	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
n-Hexadecane	157.1024	ND	79	155	ND	0	153	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C16 as Hexadecane	157.1024	ND	79	155	ND	0	153	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
n-Heptadecane	155.2756	ND	78	153	ND	0	152	ND	0	78	0.08	8	39	3.92E-08	3.92E-08
C17 as Heptadecane	155.2756	ND	78	153	ND	0	152	ND	0	78	0.08	8	39	3.92E-08	3.92E-08
n-Octadecane	157.0079	ND	79	155	ND	0	153	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C18 as Octodecane	157.0079	ND	79	155	ND	0	153	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
n-Nonadecane	157.3228	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
C19 as Nonadecane	157.3228	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.97E-08	3.97E-08
n-Eicosane	156.9449	ND	78	155	ND	0	153	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C20 as Eicosane	156.9449	ND	78	155	ND	0	153	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Heneicosane	158.4252	ND	79	156	ND	0	155	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
C21 as Heneicosane	158.4252	ND	79	156	ND	0	155	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
n-Docosane	156.6299	ND	78	154	ND	0	153	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C22 as Docosane	156.6299	ND	78	154	ND	0	153	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Tricosane	157.4803	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
C23 as Tricosane	157.4803	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
n-Tetracosane	157.7008	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
C24 as Tetracosane	157.7008	ND	79	155	ND	0	154	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
Total Hydrocarbon			3,318			0			0		3.32	363	1,676	1.68E-06	1.68E-06

Bagging Data Form — Vacuum Method

Sample Id: C009

WSPA Western States Petroleum Association

Equipment type:	Pump (P1169)	**Component ID:**	20145
Equipment Subtype:	Seal	**Unit:**	Refinery C
Line Size:	6 *inches*	**Date:**	21-May-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.86 *inHg* / 758.4 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	72.2 °F / 22.3 °C	**TVA ID**	37887
Component Temp:	242 °F / 116.7 °C	**Stream Pressure/Temp:**	240 *psig* / °F
Stream Description:	*Crude Vac SC6 (Pump On)*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:54	Background	-6	*ppmv*	8-sec Dwell	12	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	38 *ppm*
12:15	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	111.4	°F	Leak @	Seal

Bag Concentrations (ppmv)

Time	12:16	12:18	12:20	12:22	12:24	12:26	12:28	12:30	12:35	12:39	12:42			
ppmv	18.4	22.1	23.3	24.4	24.9	26	26.2	26.5	25.5	25.7	25.6			

Sorbent Tube Sample Collection Parameters

C009A

Time									
12:30	Volume Start	830.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:43	Volume Stop	842.4	*Liters*	Total Vol	12.3	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.946 *L/min*	Sorbent $Flow_{STP}$	0.947	*L/min*

C009B

12:30	Volume Start	761.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:43	Volume Stop	773.3	*Liters*	Total Vol	12.3	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.946 *L/min*	Sorbent $Flow_{STP}$	0.947	*L/min*
	Total ST Vol_{STP}	24.62	*Liters*	DGM Vol_{STP}	8.48	*Liters*	Total Run Vol_{STP}	33.10	*Liters*

Bagging Parameters

Time										
12:32	Vacuum check	0.005	*inches H2O*			DGM_P	2	*inches H2O vacuum*	754.7	*mmHg*
12:35	DGM_{1L} Time	01:32.2	*min:sec.frac*	DGM Time	1.533	DGM Flow	0.65	DGM $Flow_{STP}$	0.65	*liters/minute*
12:36	Bag Temp.	115.7	°F	46.5	°C	$Sample_T$	66	°F	18.9	°C

Post-Sample Data

13:01	Post Test M21	Background	-6	*ppmv*	8-sec Dwell	13	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21 50 *ppm* @ Seal
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*		0:00	*hours:min*	
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	7.24E-06 kg/hr
Percent difference THC ER =	32%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	7.26E-08
C5 as Pentane	4.08E-08
n-Hexane	9.96E-08
C6 as Hexane	1.20E-07
n-Heptane	1.65E-07
C7 as Heptane	2.83E-07
n-Octane	1.79E-07
C8 as Octane	5.49E-07
n-Nonane	2.31E-07
C9 as Nonane	7.77E-07
n-Decane	2.70E-07
C10 as Decane	8.95E-07
n-Undecane	3.02E-07
C11 as Undecane	7.60E-07
n-Dodecane	3.29E-07
C12 as Dodecane	6.99E-07
n-Tridecane	2.52E-07
C13 as Tridecane	4.93E-07
n-Tetradecane	1.81E-07
C14 as tetradecane	2.42E-07
n-Pentadecane	8.86E-08
C15 as Pentadecane	3.60E-08
n-Hexadecane	1.70E-08
C16 as Hexadecane	9.29E-09
n-Heptadecane	9.19E-09
C17 as Heptadecane	9.19E-09
n-Octadecane	9.29E-09
C18 as Octodecane	9.29E-09
n-Nonadecane	9.31E-09
C19 as Nonadecane	9.31E-09
n-Eicosane	9.28E-09
C20 as Eicosane	9.28E-09
n-Heneicosane	9.37E-09
C21 as Heneicosane	9.37E-09
n-Docosane	9.27E-09
C22 as Docosane	9.27E-09
n-Tricosane	9.32E-09
C23 as Tricosane	9.32E-09
n-Tetracosane	9.33E-09
C24 as Tetracosane	9.33E-09
Total Hydrocarbon	7.24E-06

THC: 3.83E-04 lbs/day 6.99E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C009A	C009A		ND Adj	C010A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	533.4512	J	533	152.48	ND	0	148	ND	0	533	0.53	18	82	8.15E-08	8.15E-08
C5 as Pentane	294.4385	J	294	152.48	ND	0	148	ND	0	294	0.29	10	45	4.50E-08	4.50E-08
n-Hexane	701.4434	J	701	218.5	ND	0	212	ND	0	701	0.70	23	107	1.07E-07	1.07E-07
C6 as Hexane	861.574		862	218.5	ND	0	212	ND	0	862	0.86	29	132	1.32E-07	1.32E-07
n-Heptane	1262.762		1,263	181.52	ND	0	176	ND	0	1,263	1.26	42	193	1.93E-07	1.93E-07
C7 as Heptane	1883.725		1,884	181.52	ND	0	176	ND	0	1,884	1.88	62	288	2.88E-07	2.88E-07
n-Octane	1343.365		1,343	157.08	ND	0	152	ND	0	1,343	1.34	44	205	2.05E-07	2.05E-07
C8 as Octane	4135.54		4,136	157.08	ND	0	152	ND	0	4,136	4.14	137	632	6.32E-07	6.32E-07
n-Nonane	1747.44		1,747	158.25	ND	0	153	ND	0	1,747	1.75	58	267	2.67E-07	2.67E-07
C9 as Nonane	5833.457		5,833	158.25	ND	0	153	ND	0	5,833	5.83	193	891	8.91E-07	8.91E-07
n-Decane	2019.875		2,020	159.68	ND	0	155	ND	0	2,020	2.02	67	309	3.09E-07	3.09E-07
C10 as Decane	6784.214		6,784	159.68	ND	0	155	ND	0	6,784	6.78	225	1036	1.04E-06	1.04E-06
n-Undecane	2244.746		2,245	159.27	ND	0	154	ND	0	2,245	2.24	74	343	3.43E-07	3.43E-07
C11 as Undecane	5866.717		5,867	159.27	ND	0	154	ND	0	5,867	5.87	194	896	8.96E-07	8.96E-07
n-Dodecane	2506.559		2,507	158.19	ND	0	153	ND	0	2,507	2.51	83	383	3.83E-07	3.83E-07
C12 as Dodecane	5541.294		5,541	158.19	ND	0	153	ND	0	5,541	5.54	183	847	8.47E-07	8.47E-07
n-Tridecane	1955.578		1,956	158.57	ND	0	154	ND	0	1,956	1.96	65	299	2.99E-07	2.99E-07
C13 as Tridecane	4046.589		4,047	158.57	ND	0	154	ND	0	4,047	4.05	134	618	6.18E-07	6.18E-07
n-Tetradecane	1347.082		1,347	158.41	ND	0	154	ND	0	1,347	1.35	45	206	2.06E-07	2.06E-07
C14 as tetradecane	2268.771		2,269	158.41	ND	0	154	ND	0	2,269	2.27	75	347	3.47E-07	3.47E-07
n-Pentadecane	680.8948	J	681	159.21	ND	0	154	ND	0	681	0.68	23	104	1.04E-07	1.04E-07
C15 as Pentadecane	389.6413	J	390	159.21	ND	0	154	ND	0	390	0.39	13	60	5.95E-08	5.95E-08
n-Hexadecane	141.7061	J	142	158.35	ND	0	153	ND	0	142	0.14	5	22	2.16E-08	2.16E-08
C16 as Hexadecane	81.10569	ND	41	158.35	ND	0	153	ND	0	41	0.04	1	6	6.20E-09	6.20E-09
n-Heptadecane	80.1626	ND	40	156.51	ND	0	152	ND	0	40	0.04	1	6	6.12E-09	6.12E-09
C17 as Heptadecane	80.1626	ND	40	156.51	ND	0	152	ND	0	40	0.04	1	6	6.12E-09	6.12E-09
n-Octadecane	81.05691	ND	41	158.25	ND	0	153	ND	0	41	0.04	1	6	6.19E-09	6.19E-09
C18 as Octodecane	81.05691	ND	41	158.25	ND	0	153	ND	0	41	0.04	1	6	6.19E-09	6.19E-09
n-Nonadecane	81.21951	ND	41	158.57	ND	0	154	ND	0	41	0.04	1	6	6.20E-09	6.20E-09
C19 as Nonadecane	81.21951	ND	41	158.57	ND	0	154	ND	0	41	0.04	1	6	6.20E-09	6.20E-09
n-Eicosane	81.02439	ND	41	158.19	ND	0	153	ND	0	41	0.04	1	6	6.19E-09	6.19E-09
C20 as Eicosane	81.02439	ND	41	158.19	ND	0	153	ND	0	41	0.04	1	6	6.19E-09	6.19E-09
n-Heneicosane	81.78862	ND	41	159.68	ND	0	155	ND	0	41	0.04	1	6	6.25E-09	6.25E-09
C21 as Heneicosane	81.78862	ND	41	159.68	ND	0	155	ND	0	41	0.04	1	6	6.25E-09	6.25E-09
n-Docosane	80.86179	ND	40	157.87	ND	0	153	ND	0	40	0.04	1	6	6.18E-09	6.18E-09
C22 as Docosane	80.86179	ND	40	157.87	ND	0	153	ND	0	40	0.04	1	6	6.18E-09	6.18E-09
n-Tricosane	81.30081	ND	41	158.73	ND	0	154	ND	0	41	0.04	1	6	6.21E-09	6.21E-09
C23 as Tricosane	81.30081	ND	41	158.73	ND	0	154	ND	0	41	0.04	1	6	6.21E-09	6.21E-09
n-Tetracosane	81.41463	ND	41	158.95	ND	0	154	ND	0	41	0.04	1	6	6.22E-09	6.22E-09
C24 as Tetracosane	81.41463	ND	41	158.95	ND	0	154	ND	0	41	0.04	1	6	6.22E-09	6.22E-09
Total Hydrocarbon			55,080			0			0		55.08	1823	8,415	8.42E-06	8.42E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C009B	C009B		ND Adj	C010A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	417.063	J	417	152	ND	0	148	ND	0	417	0.42	14	64	6.37E-08	6.37E-08
C5 as Pentane	239.3533	J	239	152	ND	0	148	ND	0	239	0.24	8	37	3.66E-08	3.66E-08
n-Hexane	602.3282	J	602	219	ND	0	212	ND	0	602	0.60	20	92	9.20E-08	9.20E-08
C6 as Hexane	715.303	J	715	219	ND	0	212	ND	0	715	0.72	24	109	1.09E-07	1.09E-07
n-Heptane	891.7889	J	892	182	ND	0	176	ND	0	892	0.89	30	136	1.36E-07	1.36E-07
C7 as Heptane	1824.77		1,825	182	ND	0	176	ND	0	1,825	1.82	60	279	2.79E-07	2.79E-07
n-Octane	994.3989	J	994	157	ND	0	152	ND	0	994	0.99	33	152	1.52E-07	1.52E-07
C8 as Octane	3056.476		3,056	157	ND	0	152	ND	0	3,056	3.06	101	467	4.67E-07	4.67E-07
n-Nonane	1280.321	J	1,280	158	ND	0	153	ND	0	1,280	1.28	42	196	1.96E-07	1.96E-07
C9 as Nonane	4342.659		4,343	158	ND	0	153	ND	0	4,343	4.34	144	663	6.63E-07	6.63E-07
n-Decane	1515.907	J	1,516	160	ND	0	155	ND	0	1,516	1.52	50	232	2.32E-07	2.32E-07
C10 as Decane	4930.926		4,931	160	ND	0	155	ND	0	4,931	4.93	163	753	7.53E-07	7.53E-07
n-Undecane	1706.793		1,707	159	ND	0	154	ND	0	1,707	1.71	56	261	2.61E-07	2.61E-07
C11 as Undecane	4079.675		4,080	159	ND	0	154	ND	0	4,080	4.08	135	623	6.23E-07	6.23E-07
n-Dodecane	1803.42		1,803	158	ND	0	153	ND	0	1,803	1.80	60	276	2.76E-07	2.76E-07
C12 as Dodecane	3604.692		3,605	158	ND	0	153	ND	0	3,605	3.60	119	551	5.51E-07	5.51E-07
n-Tridecane	1344.504	J	1,345	159	ND	0	154	ND	0	1,345	1.34	45	205	2.05E-07	2.05E-07
C13 as Tridecane	2403.922		2,404	159	ND	0	154	ND	0	2,404	2.40	80	367	3.67E-07	3.67E-07
n-Tetradecane	1023.223	J	1,023	158	ND	0	154	ND	0	1,023	1.02	34	156	1.56E-07	1.56E-07
C14 as tetradecane	900.9639	J	901	158	ND	0	154	ND	0	901	0.90	30	138	1.38E-07	1.38E-07
n-Pentadecane	479.3035	J	479	159	ND	0	154	ND	0	479	0.48	16	73	7.32E-08	7.32E-08
C15 as Pentadecane	163.0894	ND	82	159	ND	0	154	ND	0	82	0.08	3	12	1.25E-08	1.25E-08
n-Hexadecane	162.2114	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
C16 as Hexadecane	162.2114	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
n-Heptadecane	160.3252	ND	80	157	ND	0	152	ND	0	80	0.08	3	12	1.22E-08	1.22E-08
C17 as Heptadecane	160.3252	ND	80	157	ND	0	152	ND	0	80	0.08	3	12	1.22E-08	1.22E-08
n-Octadecane	162.1138	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
C18 as Octodecane	162.1138	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
n-Nonadecane	162.439	ND	81	159	ND	0	154	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
C19 as Nonadecane	162.439	ND	81	159	ND	0	154	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
n-Eicosane	162.0488	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
C20 as Eicosane	162.0488	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
n-Heneicosane	163.5772	ND	82	160	ND	0	155	ND	0	82	0.08	3	12	1.25E-08	1.25E-08
C21 as Heneicosane	163.5772	ND	82	160	ND	0	155	ND	0	82	0.08	3	12	1.25E-08	1.25E-08
n-Docosane	161.7236	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
C22 as Docosane	161.7236	ND	81	158	ND	0	153	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
n-Tricosane	162.6016	ND	81	159	ND	0	154	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
C23 as Tricosane	162.6016	ND	81	159	ND	0	154	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
n-Tetracosane	162.8293	ND	81	159	ND	0	154	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
C24 as Tetracosane	162.8293	ND	81	159	ND	0	154	ND	0	81	0.08	3	12	1.24E-08	1.24E-08
Total Hydrocarbon			39,699			0			0		39.70	1314	6,065	6.07E-06	6.07E-06

Bagging Data Form — Vacuum Method

Sample Id: C011

WSPA Western States Petroleum Association

Equipment type:	Pump (P6703)			**Component ID:**	20085	
Equipment Subtype:	Seal			**Unit:**	Refinery C	
Line Size:	4	*inches*		**Date:**	22-May-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.9 *inHg*	759.5	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	64.7 °F	18.2	°C	**TVA ID**	36502	
Component Temp:	318 °F	158.9	°C	**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Pentamer*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds
STP = 294.15 K & 760 mmHg

Pre-Sample Data

Time											
9:08	Background	2	*ppmv*	8-sec Dwell	6	*ppmv*	Total Dwell	3:30	*min:sec*	Final M21	61 *ppm*
10:13	Initial Bag Vacuum	0.01	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	191.5	°F	Leak @	Seal

Bag Concentrations (ppmv) (vented bag with a small hole)

Time	10:14	10:16	10:18	10:24	10:26	10:28	10:30	10:32	10:34	10:36	10:38	10:40	10:49
ppmv	12.9	14.7	16.6	22.7	24.5	26.5	28.4	30.5	31.9	34.1	35.4	36.4	40.8

Sorbent Tube Sample Collection Parameters

C011A

Time									
10:40	Volume Start	844.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:53	Volume Stop	857.6	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*	Sorbent Flow	0.977	*L/min*	Sorbent Flow$_{STP}$	0.989	*L/min*

C011B

10:40	Volume Start	775.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:53	Volume Stop	788.0	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*	Sorbent Flow	0.985	*L/min*	Sorbent Flow$_{STP}$	0.997	*L/min*
	Total ST Vol$_{STP}$	25.81	*Liters*	DGM Vol$_{STP}$	78.95	*Liters*	Total Run Vol$_{STP}$	104.76	*Liters*

Bagging Parameters

Time										
10:44	Vacuum check	0.01	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	756.1	*mmHg*
10:43	DGM$_{10L}$ Time	01:40.1	*min:sec.frac*	DGM Time	1.667	DGM Flow	6.00	DGM Flow$_{STP}$	6.07	*liters/minute*
10:44	Bag Temp.	198.1	°F	92.3	°C	Sample$_T$	61	°F	16.1	°C

Post-Sample Data

10:59	Post Test M21	Background	11	*ppmv*	8-sec Dwell	16	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21 87 *ppm* @ Seal

Condensate accumulation: starting time 10:40 *hour:min* Final time 10:53 *hour:min* 0:13 *hours:min*
Organic condensate collected <1 *ml* (in main sample line, no liquid @ bottom of bag)
Density of organic condensate 0.25 *g/ml*

Average THC emissions =	8.17E-04 kg/hr
Percent difference THC ER =	2%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	5.54E-08
C5 as Pentane	4.27E-08
n-Hexane	5.76E-08
C6 as Hexane	1.81E-07
n-Heptane	3.17E-08
C7 as Heptane	1.10E-07
n-Octane	2.73E-06
C8 as Octane	2.93E-06
n-Nonane	2.77E-06
C9 as Nonane	3.11E-06
n-Decane	2.79E-06
C10 as Decane	3.27E-06
n-Undecane	2.77E-06
C11 as Undecane	2.98E-06
n-Dodecane	2.79E-06
C12 as Dodecane	7.95E-05
n-Tridecane	3.74E-05
C13 as Tridecane	5.47E-04
n-Tetradecane	3.37E-06
C14 as tetradecane	3.30E-05
n-Pentadecane	1.09E-06
C15 as Pentadecane	1.09E-05
n-Hexadecane	2.75E-06
C16 as Hexadecane	2.75E-06
n-Heptadecane	2.72E-06
C17 as Heptadecane	2.72E-06
n-Octadecane	2.75E-06
C18 as Octodecane	2.75E-06
n-Nonadecane	2.76E-06
C19 as Nonadecane	2.76E-06
n-Eicosane	2.75E-06
C20 as Eicosane	2.75E-06
n-Heneicosane	2.78E-06
C21 as Heneicosane	1.87E-07
n-Docosane	2.74E-06
C22 as Docosane	2.74E-06
n-Tricosane	2.76E-06
C23 as Tricosane	2.76E-06
n-Tetracosane	2.76E-06
C24 as Tetracosane	2.76E-06
C25 (n-Pentacosane)	2.74E-06
Other C25 as n-Pentacosane	2.74E-06
C26 (n-Hexacosane)	2.72E-06
Other C26 as n-Hexacosane	2.72E-06
C27 (n-Heptacosane)	2.75E-06
Other C27 as n-Heptacosane	2.75E-06
C28 (n-Octacosane)	2.71E-06
Other C28 as n-Octacosane	2.71E-06
C29 (n-Nonacosane)	2.70E-06
Other C29 as n-Nonacosane	2.70E-06
C30 (n-Triacontane)	2.73E-06
Other C30 as n-Triacontane	7.08E-07
Total Hydrocarbon	8.17E-04

THC: 4.32E-02 lbs/day 7.89E-03 tons/yr

C011A

ANALYTICAL RESULTS	C011A		ND Adj	BACKGROUND C012A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#C011LIQ			COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	80.0171	ND	40	146.28	ND	0	148	ND	0	40	0.04	4	19	1.93E-08	1	ND	0	2.81E-08	4.74E-08
C5 as Pentane	80.0171	ND	40	146.28	ND	0	148	ND	0	40	0.04	4	19	1.93E-08	10		0	1.54E-08	3.47E-08
n-Hexane	83.12821	ND	42	151.97	ND	0	212	ND	0	42	0.04	4	20	2.01E-08	1	ND	0	2.92E-08	4.93E-08
C6 as Hexane	206.916	J	207	151.97	ND	0	212	ND	0	207	0.21	22	100	1.00E-07	58		1	8.76E-08	1.88E-07
n-Heptane	86.8718	ND	43	158.81	ND	0	176	ND	0	43	0.04	5	21	2.10E-08	1	J	0	2.03E-09	2.30E-08
C7 as Heptane	100.3548	J	100	158.81	ND	0	176	ND	0	100	0.10	11	49	4.85E-08	44		1	6.62E-08	1.15E-07
n-Octane	84.5812	ND	42	154.62	ND	0	152	ND	0	42	0.04	4	20	2.04E-08	90	ND	45	2.70E-06	2.72E-06
C8 as Octane	565.6485	J	566	154.62	ND	0	152	ND	0	566	0.57	59	274	2.74E-07	90	ND	45	2.70E-06	2.98E-06
n-Nonane	133.0543	J	133	155.78	ND	0	153	ND	0	133	0.13	14	64	6.43E-08	91	ND	45	2.72E-06	2.79E-06
C9 as Nonane	902.4074		902	155.78	ND	0	153	ND	0	902	0.90	95	436	4.36E-07	91	ND	45	2.72E-06	3.16E-06
n-Decane	114.4299	J	114	157.19	ND	0	155	ND	0	114	0.11	12	55	5.53E-08	92	ND	46	2.75E-06	2.80E-06
C10 as Decane	1219.422		1,219	157.19	ND	0	155	ND	0	1,219	1.22	128	590	5.90E-07	92	ND	46	2.75E-06	3.34E-06
n-Undecane	85.76069	ND	43	156.78	ND	0	154	ND	0	43	0.04	4	21	2.07E-08	91	ND	46	2.74E-06	2.76E-06
C11 as Undecane	611.9134	J	612	156.78	ND	0	154	ND	0	612	0.61	64	296	2.96E-07	91	ND	46	2.74E-06	3.04E-06
n-Dodecane	210.4065	J	210	155.72	ND	0	153	ND	0	210	0.21	22	102	1.02E-07	91	ND	45	2.72E-06	2.82E-06
C12 as Dodecane	58854.74		58,855	155.72	ND	0	153	ND	0	58,855	58.85	6166	28458	2.85E-05	34,955		874	5.24E-05	8.09E-05
n-Tridecane	22157.23		22,157	156.09	ND	0	154	ND	0	22,157	22.16	2321	10714	1.07E-05	18,254		456	2.74E-05	3.81E-05
C13 as Tridecane	208253.7		208,254	156.09	ND	0	154	ND	0	208,254	208.25	21817	100695	1.01E-04	301,055		7,526	4.52E-04	5.52E-04
n-Tetradecane	1914.162		1,914	155.94	ND	0	154	ND	0	1,914	1.91	201	926	9.26E-07	1,670		42	2.50E-06	3.43E-06
C14 as tetradecane	3444.801		3,445	155.94	ND	0	154	ND	0	3,445	3.44	361	1666	1.67E-06	20,983		525	3.15E-05	3.31E-05
n-Pentadecane	85.7265	ND	43	156.72	ND	0	154	ND	0	43	0.04	4	21	2.07E-08	704	J	18	1.06E-06	1.08E-06
C15 as Pentadecane	85.7265	ND	43	156.72	ND	0	154	ND	0	43	0.04	4	21	2.07E-08	7,242		181	1.09E-05	1.09E-05
n-Hexadecane	85.26496	ND	43	155.87	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
C16 as Hexadecane	85.26496	ND	43	155.87	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
n-Heptadecane	84.27351	ND	42	154.06	ND	0	152	ND	0	42	0.04	4	20	2.04E-08	90	ND	45	2.69E-06	2.71E-06
C17 as Heptadecane	84.27351	ND	42	154.06	ND	0	152	ND	0	42	0.04	4	20	2.04E-08	90	ND	45	2.69E-06	2.71E-06
n-Octadecane	85.21368	ND	43	155.78	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
C18 as Octodecane	85.21368	ND	43	155.78	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
n-Nonadecane	85.38462	ND	43	156.09	ND	0	154	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.73E-06	2.75E-06
C19 as Nonadecane	85.38462	ND	43	156.09	ND	0	154	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.73E-06	2.75E-06
n-Eicosane	85.17949	ND	43	155.72	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
C20 as Eicosane	85.17949	ND	43	155.72	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
n-Heneicosane	85.98291	ND	43	157.19	ND	0	155	ND	0	43	0.04	5	21	2.08E-08	92	ND	46	2.75E-06	2.77E-06
C21 as Heneicosane	85.98291	ND	43	157.19	ND	0	155	ND	0	43	0.04	5	21	2.08E-08	105	J	3	1.57E-07	1.78E-07
n-Docosane	85.00855	ND	43	155.41	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
C22 as Docosane	85.00855	ND	43	155.41	ND	0	153	ND	0	43	0.04	4	21	2.06E-08	91	ND	45	2.72E-06	2.74E-06
n-Tricosane	85.47009	ND	43	156.25	ND	0	154	ND	0	43	0.04	4	21	2.07E-08	91	ND	46	2.73E-06	2.75E-06
C23 as Tricosane	85.47009	ND	43	156.25	ND	0	154	ND	0	43	0.04	4	21	2.07E-08	91	ND	46	2.73E-06	2.75E-06
n-Tetracosane	85.58974	ND	43	156.47	ND	0	154	ND	0	43	0.04	4	21	2.07E-08	91	ND	46	2.73E-06	2.75E-06
C24 as Tetracosane	85.58974	ND	43	156.47	ND	0	154	ND	0	43	0.04	4	21	2.07E-08	91	ND	46	2.73E-06	2.75E-06
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	91	ND	46	2.74E-06	2.74E-06
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	91	ND	46	2.74E-06	2.74E-06
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	91	ND	45	2.72E-06	2.72E-06
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	91	ND	45	2.72E-06	2.72E-06
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	92	ND	46	2.75E-06	2.75E-06
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	92	ND	46	2.75E-06	2.75E-06
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.71E-06	2.71E-06
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.71E-06	2.71E-06
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.70E-06	2.70E-06
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.70E-06	2.70E-06
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	91	ND	46	2.73E-06	2.73E-06
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	472	J	12	7.08E-07	7.08E-07
Total Hydrocarbon			299,792			0			0		299.79	31407	144,956	1.45E-04	388,915		11,319	6.79E-04	8.24E-04

C011B

ANALYTICAL RESULTS	C011B		ND Adj	BACKGROUND C012A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#S017			COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	146.2812	ND	73	146	ND	0	148	ND	0	73	0.07	8	35	3.54E-08	1	ND	0	2.81E-08	6.35E-08
C5 as Pentane	146.2812	ND	73	146	ND	0	148	ND	0	73	0.07	8	35	3.54E-08	10	0	0	1.54E-08	5.07E-08
n-Hexane	151.9687	ND	76	152	ND	0	212	ND	0	76	0.08	8	37	3.67E-08	1	ND	0	2.92E-08	6.59E-08
C6 as Hexane	180.9301	J	181	152	ND	0	212	ND	0	181	0.18	19	87	8.75E-08	58	0	1	8.76E-08	1.75E-07
n-Heptane	158.8125	ND	79	159	ND	0	176	ND	0	79	0.08	8	38	3.84E-08	1	J	0	2.03E-09	4.04E-08
C7 as Heptane	158.8125	ND	79	159	ND	0	176	ND	0	79	0.08	8	38	3.84E-08	44	0	1	6.62E-08	1.05E-07
n-Octane	154.625	ND	77	155	ND	0	152	ND	0	77	0.08	8	37	3.74E-08	90	ND	45	2.70E-06	2.74E-06
C8 as Octane	384.0467	J	384	155	ND	0	152	ND	0	384	0.38	40	186	1.86E-07	90	ND	45	2.70E-06	2.89E-06
n-Nonane	155.7812	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.77E-08	91	ND	45	2.72E-06	2.76E-06
C9 as Nonane	707.8803	J	708	156	ND	0	153	ND	0	708	0.71	74	342	3.42E-07	91	ND	45	2.72E-06	3.06E-06
n-Decane	157.1875	ND	79	157	ND	0	155	ND	0	79	0.08	8	38	3.80E-08	92	ND	46	2.75E-06	2.78E-06
C10 as Decane	931.5748	J	932	157	ND	0	155	ND	0	932	0.93	98	450	4.50E-07	92	ND	46	2.75E-06	3.20E-06
n-Undecane	156.7812	ND	78	157	ND	0	154	ND	0	78	0.08	8	38	3.79E-08	91	ND	46	2.74E-06	2.78E-06
C11 as Undecane	365.4217	J	365	157	ND	0	154	ND	0	365	0.37	38	177	1.77E-07	91	ND	46	2.74E-06	2.92E-06
n-Dodecane	155.7187	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	91	ND	45	2.72E-06	2.76E-06
C12 as Dodecane	53188.79		53,189	156	ND	0	153	ND	0	53,189	53.19	5572	25718	2.57E-05	34,955	0	874	5.24E-05	7.82E-05
n-Tridecane	19484.4		19,484	156	ND	0	154	ND	0	19,484	19.48	2041	9421	9.42E-06	18,254	0	456	2.74E-05	3.68E-05
C13 as Tridecane	188383.4		188,383	156	ND	0	154	ND	0	188,383	188.38	19736	91088	9.11E-05	301,055		7,526	4.52E-04	5.43E-04
n-Tetradecane	1667.677		1,668	156	ND	0	154	ND	0	1,668	1.67	175	806	8.06E-07	1,670	0	42	2.50E-06	3.31E-06
C14 as tetradecane	2906.571		2,907	156	ND	0	154	ND	0	2,907	2.91	305	1405	1.41E-06	20,983	0	525	3.15E-05	3.29E-05
n-Pentadecane	156.7187	ND	78	157	ND	0	154	ND	0	78	0.08	8	38	3.79E-08	704	J	18	1.06E-06	1.09E-06
C15 as Pentadecane	156.7187	ND	78	157	ND	0	154	ND	0	78	0.08	8	38	3.79E-08	7,242	0	181	1.09E-05	1.09E-05
n-Hexadecane	155.875	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.77E-08	91	ND	45	2.72E-06	2.76E-06
C16 as Hexadecane	155.875	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.77E-08	91	ND	45	2.72E-06	2.76E-06
n-Heptadecane	154.0625	ND	77	154	ND	0	152	ND	0	77	0.08	8	37	3.72E-08	90	ND	45	2.69E-06	2.73E-06
C17 as Heptadecane	154.0625	ND	77	154	ND	0	152	ND	0	77	0.08	8	37	3.72E-08	90	ND	45	2.69E-06	2.73E-06
n-Octadecane	155.7812	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.77E-08	91	ND	45	2.72E-06	2.76E-06
C18 as Octodecane	155.7812	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.77E-08	91	ND	45	2.72E-06	2.76E-06
n-Nonadecane	156.0937	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.77E-08	91	ND	45	2.73E-06	2.77E-06
C19 as Nonadecane	156.0937	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.77E-08	91	ND	45	2.73E-06	2.77E-06
n-Eicosane	155.7187	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	91	ND	45	2.72E-06	2.76E-06
C20 as Eicosane	155.7187	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	91	ND	45	2.72E-06	2.76E-06
n-Heneicosane	157.1875	ND	79	157	ND	0	155	ND	0	79	0.08	8	38	3.80E-08	92	ND	46	2.75E-06	2.78E-06
C21 as Heneicosane	157.1875	ND	79	157	ND	0	155	ND	0	79	0.08	8	38	3.80E-08	105	J	3	1.57E-07	1.95E-07
n-Docosane	155.4062	ND	78	155	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	91	ND	45	2.72E-06	2.75E-06
C22 as Docosane	155.4062	ND	78	155	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	91	ND	45	2.72E-06	2.75E-06
n-Tricosane	156.25	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	91	ND	46	2.73E-06	2.77E-06
C23 as Tricosane	156.25	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	91	ND	46	2.73E-06	2.77E-06
n-Tetracosane	156.4687	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	91	ND	46	2.73E-06	2.77E-06
C24 as Tetracosane	156.4687	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	91	ND	46	2.73E-06	2.77E-06
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	91	ND	46	2.74E-06	2.74E-06
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	91	ND	46	2.74E-06	2.74E-06
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	91	ND	45	2.72E-06	2.72E-06
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	91	ND	45	2.72E-06	2.72E-06
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	92	ND	46	2.75E-06	2.75E-06
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	92	ND	46	2.75E-06	2.75E-06
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.71E-06	2.71E-06
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.71E-06	2.71E-06
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.70E-06	2.70E-06
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	90	ND	45	2.70E-06	2.70E-06
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	91	ND	46	2.73E-06	2.73E-06
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	472	J	12	7.08E-07	7.08E-07
Total Hydrocarbon			270,531			0			0		270.53	28342	130,808	1.31E-04					8.10E-04

Bagging Data Form — Vacuum Method

Sample Id: C013

Equipment type:	Pump		**Component ID:**	20059	
Equipment Subtype:	Seal		**Unit:**	Refinery C	
Line Size:	4 inches		**Date:**	23-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.95 inHg	760.7 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	62.6 °F	17.0 °C	**TVA ID**	37887	
Component Temp:	92 °F	33.3 °C	**Stream Pressure/Temp:**	175 psig	°F
Stream Description:	*Reflux and Tetramer Product (Pump On)*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds
STP = 294.15 K & 760 mmHg

Pre-Sample Data

Time								
9:00	Background	-1.7 ppmv	8-sec Dwell	13 ppmv	Total Dwell	2:00 min:sec	Final M21	37 ppm
10:03	Initial Bag Vacuum	0.01 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	91.4 °F	Leak @	Bottom of Seal

Bag Concentrations (ppmv)

Time	10:05	10:07	10:09	10:10	10:12	10:14	10:16	10:18	10:20	10:22	10:24	10:26	10:28	10:32
ppmv	22.4	45.7	60.7	66.6	72.2	77.1	79.9	82	85.7	88.7	91.2	93.1	95.4	98.2
Time	10:40	10:54												
ppmv	97.6	107												

Sorbent Tube Sample Collection Parameters

C013A

Time						
10:28	Volume Start	860.0 Liters		Design Sample Flow Rate = 1 liter/min		
10:41	Volume Stop	872.5 Liters	Total Vol	12.5 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.962 L/min	Sorbent Flow$_{STP}$	0.971 L/min

C013B

10:28	Volume Start	790.0 Liters		Design Sample Flow Rate = 1 liter/min		
10:41	Volume Stop	802.6 Liters	Total Vol	12.6 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.969 L/min	Sorbent Flow$_{STP}$	0.979 L/min
	Total ST Vol$_{STP}$	25.35 Liters	DGM Vol$_{STP}$	80.39 Liters	Total Run Vol$_{STP}$	105.74 Liters

Bagging Parameters

Time								
10:32	Vacuum check	0.01 inches H2O			DGM$_P$	1.8 inches H2O vacuum		757.4 mmHg
10:31	DGM$_{10L}$ Time	01:38.5 min:sec.frac	DGM Time	1.633	DGM Flow	6.12	DGM Flow$_{STP}$	6.18 liters/minute
10:33	Bag Temp.	92.7 °F	33.7 °C		Sample$_T$	63 °F		17.2 °C

Post-Sample Data

11:09	Post Test M21	Background 6 ppmv	8-sec Dwell	20 ppmv	Total Dwell	3:00 min:sec	Final M21	58 ppm
							@	Bottom of Seal

Condensate accumulation: starting time	N/A hour:min	Final time	N/A hour:min	0:00 hours:min
Organic condensate collected	N/A ml			
Density of organic condensate	N/A g/ml			

Average THC emissions =	1.15E-04	kg/hr
Percent difference THC ER =	6%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.73E-08
C5 as Pentane	2.73E-08
n-Hexane	2.83E-08
C6 as Hexane	2.83E-08
n-Heptane	2.96E-08
C7 as Heptane	2.96E-08
n-Octane	2.88E-08
C8 as Octane	2.88E-08
n-Nonane	2.90E-08
C9 as Nonane	2.41E-06
n-Decane	3.86E-07
C10 as Decane	5.36E-05
n-Undecane	3.74E-06
C11 as Undecane	3.94E-05
n-Dodecane	6.26E-07
C12 as Dodecane	8.85E-06
n-Tridecane	6.55E-07
C13 as Tridecane	4.94E-06
n-Tetradecane	2.91E-08
C14 as tetradecane	2.91E-08
n-Pentadecane	2.92E-08
C15 as Pentadecane	2.92E-08
n-Hexadecane	2.91E-08
C16 as Hexadecane	2.91E-08
n-Heptadecane	2.87E-08
C17 as Heptadecane	2.87E-08
n-Octadecane	2.90E-08
C18 as Octodecane	2.90E-08
n-Nonadecane	2.91E-08
C19 as Nonadecane	2.91E-08
n-Eicosane	2.90E-08
C20 as Eicosane	2.90E-08
n-Heneicosane	2.93E-08
C21 as Heneicosane	2.93E-08
n-Docosane	2.90E-08
C22 as Docosane	2.90E-08
n-Tricosane	2.91E-08
C23 as Tricosane	2.91E-08
n-Tetracosane	2.92E-08
C24 as Tetracosane	2.92E-08
Total Hydrocarbon	1.15E-04

THC: 6.11E-03 lbs/day 1.12E-03 tons/yr

C013A

ANALYTICAL RESULTS	C013A		ND Adj	BACKGROUND C014A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#P0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.896	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C5 as Pentane	74.896	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Hexane	77.808	ND	39	150.79	ND	0	212	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C6 as Hexane	77.808	ND	39	150.79	ND	0	212	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptane	81.312	ND	41	157.58	ND	0	176	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C7 as Heptane	81.312	ND	41	157.58	ND	0	176	ND	0	41	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Octane	79.168	ND	40	153.43	ND	0	152	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C8 as Octane	79.168	ND	40	153.43	ND	0	152	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Nonane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C9 as Nonane	5792.089		5,792	154.57	ND	0	153	ND	0	5,792	5.79	612	2827	2.83E-06	0	0	0.00E+00	2.83E-06
n-Decane	771.7087	J	772	155.97	ND	0	155	ND	0	772	0.77	82	377	3.77E-07	0	0	0.00E+00	3.77E-07
C10 as Decane	105442.8		105,443	155.97	ND	0	155	ND	0	105,443	105.44	11150	51460	5.15E-05	0	0	0.00E+00	5.15E-05
n-Undecane	7384.602		7,385	155.57	ND	0	154	ND	0	7,385	7.38	781	3604	3.60E-06	0	0	0.00E+00	3.60E-06
C11 as Undecane	77686.14		77,686	155.57	ND	0	154	ND	0	77,686	77.69	8215	37914	3.79E-05	0	0	0.00E+00	3.79E-05
n-Dodecane	1534.846		1,535	154.51	ND	0	153	ND	0	1,535	1.53	162	749	7.49E-07	0	0	0.00E+00	7.49E-07
C12 as Dodecane	18037.13		18,037	154.51	ND	0	153	ND	0	18,037	18.04	1907	8803	8.80E-06	0	0	0.00E+00	8.80E-06
n-Tridecane	1338.335		1,338	154.88	ND	0	154	ND	0	1,338	1.34	142	653	6.53E-07	0	0	0.00E+00	6.53E-07
C13 as Tridecane	9945.025		9,945	154.88	ND	0	154	ND	0	9,945	9.95	1052	4854	4.85E-06	0	0	0.00E+00	4.85E-06
n-Tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C14 as tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C15 as Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C16 as Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C17 as Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Octadecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C18 as Octodecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C19 as Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C20 as Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C21 as Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C22 as Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C23 as Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C24 as Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
Total Hydrocarbon			229,164			0			0		229.16	24232	111,840	1.12E-04	0	0	0.00E+00	1.12E-04

C013B

ANALYTICAL RESULTS	C013B		ND Adj	BACKGROUND C014A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE			COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	148.6032	ND	74	145	ND	0	148	ND	0	74	0.07	8	36	3.63E-08		3.63E-08
C5 as Pentane	148.6032	ND	74	145	ND	0	148	ND	0	74	0.07	8	36	3.63E-08		3.63E-08
n-Hexane	154.3809	ND	77	151	ND	0	212	ND	0	77	0.08	8	38	3.77E-08		3.77E-08
C6 as Hexane	154.3809	ND	77	151	ND	0	212	ND	0	77	0.08	8	38	3.77E-08		3.77E-08
n-Heptane	161.3333	ND	81	158	ND	0	176	ND	0	81	0.08	9	39	3.94E-08		3.94E-08
C7 as Heptane	161.3333	ND	81	158	ND	0	176	ND	0	81	0.08	9	39	3.94E-08		3.94E-08
n-Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	8	38	3.83E-08		3.83E-08
C8 as Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	8	38	3.83E-08		3.83E-08
n-Nonane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
C9 as Nonane	4080.635		4,081	155	ND	0	153	ND	0	4,081	4.08	431	1991	1.99E-06		1.99E-06
n-Decane	808.725	J	809	156	ND	0	155	ND	0	809	0.81	86	395	3.95E-07		3.95E-07
C10 as Decane	114148.3		114,148	156	ND	0	155	ND	0	114,148	114.15	12070	55708	5.57E-05		5.57E-05
n-Undecane	7954.815		7,955	156	ND	0	154	ND	0	7,955	7.95	841	3882	3.88E-06		3.88E-06
C11 as Undecane	83775.33		83,775	156	ND	0	154	ND	0	83,775	83.78	8858	40885	4.09E-05		4.09E-05
n-Dodecane	1031.103	J	1,031	155	ND	0	153	ND	0	1,031	1.03	109	503	5.03E-07		5.03E-07
C12 as Dodecane	18227.6		18,228	155	ND	0	153	ND	0	18,228	18.23	1927	8896	8.90E-06		8.90E-06
n-Tridecane	1347.213	J	1,347	155	ND	0	154	ND	0	1,347	1.35	142	657	6.57E-07		6.57E-07
C13 as Tridecane	10310.26		10,310	155	ND	0	154	ND	0	10,310	10.31	1090	5032	5.03E-06		5.03E-06
n-Tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
C14 as tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
n-Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	8	39	3.88E-08		3.88E-08
C15 as Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	8	39	3.88E-08		3.88E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
n-Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	8	38	3.82E-08		3.82E-08
C17 as Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	8	38	3.82E-08		3.82E-08
n-Octadecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
C18 as Octodecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
n-Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
C19 as Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
n-Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
C20 as Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.86E-08		3.86E-08
n-Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
C21 as Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	8	39	3.90E-08		3.90E-08
n-Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	8	39	3.85E-08		3.85E-08
C22 as Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	8	39	3.85E-08		3.85E-08
n-Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
C23 as Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.87E-08		3.87E-08
n-Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.88E-08		3.88E-08
C24 as Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.88E-08		3.88E-08
Total Hydrocarbon			244,127			0			0		244.13	25814	119,143	1.19E-04		1.19E-04

Bagging Data Form **Vacuum Method** **Sample Id** C016

WSPA Western States Petroleum Association

Equipment type:	Pump (MP1269)			**Component ID:**	20706
Equipment Subtype:	Seal			**Unit:**	Refinery C
Line Size:	4 *inches*			**Date:**	25-May-18
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR
Barometric pressure	30.11 *inHg*	764.8 *mmHg*		**Sample Pump A**	LP52979
				Sample Pump B	LP52975
Ambient Temp:	67.9 *°F*	19.9 *°C*		**TVA ID**	37887
Component Temp:	75 *°F*	23.9 *°C*		**Stream Pressure/Temp:**	*psig* *°F*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Stream Description: *#5 Sidecut (Pump is Off and has been for 15 yrs per Operator)*

Pre-Sample Data

Time								
9:25	Background	-2 *ppmv*	8-sec Dwell	-2 *ppmv*	Total Dwell	10:00 *min:sec*	Final M21	-2 *ppm*
10:40	Initial Bag Vacuum	0.012 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	70.5 *°F*	Leak @	Seal

Bag Concentrations (ppmv)

Time	10:42	10:44	10:46	10:50	10:56	11:00								
ppmv	1.4	2.1	2	1.9	1.5	1.7								

Sorbent Tube Sample Collection Parameters

C016A

Time						
10:51	Volume Start	877.9 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:04	Volume Stop	890.9 *Liters*	Total Vol	13.0 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 1.000 *L/min*	$Sorbent Flow_{STP}$	1.013 *L/min*

C016B

10:51	Volume Start	805.7 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:04	Volume Stop	818.7 *Liters*	Total Vol	13.0 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 1.000 *L/min*	$Sorbent Flow_{STP}$	1.013 *L/min*
	$Total ST Vol_{STP}$	26.34 *Liters*	$DGM Vol_{STP}$	88.78 *Liters*	$Total Run Vol_{STP}$	115.12 *Liters*

Bagging Parameters

Time								
10:55	Vacuum check	0.012 *inches H2O*			DGM_P	2 *inches H2O vacuum*	761.1	*mmHg*
10:54	DGM_{10L} Time	01:29.0 *min:sec.frac*	DGM Time	1.483	DGM Flow	6.74	$DGM Flow_{STP}$ 6.83	*liters/minute*
10:56	Bag Temp.	71.6 *°F*	22.0	*°C*	$Sample_T$	64 *°F*	17.8	*°C*

Post-Sample Data

11:14	Post Test M21	Background -2.7 *ppmv*	8-sec Dwell	-2.7 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21 1 *ppm* @ Seal

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*	
Organic condensate collected	N/A *ml*				
Density of organic condensate	N/A *g/ml*				

Average THC emissions =	2.61E-06	kg/hr
Percent difference THC ER =	56%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	5.74E-08
C5 as Pentane	5.74E-08
n-Hexane	5.96E-08
C6 as Hexane	5.96E-08
n-Heptane	6.23E-08
C7 as Heptane	6.23E-08
n-Octane	6.07E-08
C8 as Octane	6.07E-08
n-Nonane	6.11E-08
C9 as Nonane	1.69E-07
n-Decane	6.17E-08
C10 as Decane	1.21E-07
n-Undecane	6.15E-08
C11 as Undecane	6.15E-08
n-Dodecane	6.11E-08
C12 as Dodecane	6.11E-08
n-Tridecane	6.12E-08
C13 as Tridecane	6.12E-08
n-Tetradecane	6.12E-08
C14 as tetradecane	6.12E-08
n-Pentadecane	6.15E-08
C15 as Pentadecane	6.15E-08
n-Hexadecane	6.12E-08
C16 as Hexadecane	6.12E-08
n-Heptadecane	6.04E-08
C17 as Heptadecane	6.04E-08
n-Octadecane	6.11E-08
C18 as Octodecane	6.11E-08
n-Nonadecane	6.12E-08
C19 as Nonadecane	6.12E-08
n-Eicosane	6.11E-08
C20 as Eicosane	6.11E-08
n-Heneicosane	6.17E-08
C21 as Heneicosane	6.17E-08
n-Docosane	6.10E-08
C22 as Docosane	6.10E-08
n-Tricosane	6.13E-08
C23 as Tricosane	6.13E-08
n-Tetracosane	6.14E-08
C24 as Tetracosane	6.14E-08
Total Hydrocarbon	2.61E-06

THC:	**1.38E-04**	**lbs/day**	**2.52E-05**	**tons/yr**

ANALYTICAL RESULTS C016A Component	C016A µg/m³	Flag	ND Adj µg/m³	BACKGROUND C017A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#P0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	72.01538	ND	36	142.93	ND	0	148	ND	0	36	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08	3.83E-08
C5 as Pentane	72.01538	ND	36	142.93	ND	0	148	ND	0	36	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08	3.83E-08
n-Hexane	74.81538	ND	37	148.49	ND	0	212	ND	0	37	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08	3.98E-08
C6 as Hexane	74.81538	ND	37	148.49	ND	0	212	ND	0	37	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08	3.98E-08
n-Heptane	78.18462	ND	39	155.18	ND	0	176	ND	0	39	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08	4.15E-08
C7 as Heptane	78.18462	ND	39	155.18	ND	0	176	ND	0	39	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08	4.15E-08
n-Octane	76.12308	ND	38	151.08	ND	0	152	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08	4.04E-08
C8 as Octane	76.12308	ND	38	151.08	ND	0	152	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08	4.04E-08
n-Nonane	76.69231	ND	38	152.21	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.07E-08
C9 as Nonane	158.6482	J	159	152.21	ND	0	153	ND	0	159	0.16	18	84	8.43E-08	0	0	0.00E+00	8.43E-08	1.69E-07
n-Decane	77.38462	ND	39	153.59	ND	0	155	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08	4.11E-08
C10 as Decane	151.0491	J	151	153.59	ND	0	155	ND	0	151	0.15	17	80	8.03E-08	0	0	0.00E+00	8.03E-08	1.61E-07
n-Undecane	77.18462	ND	39	153.19	ND	0	154	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08	4.10E-08
C11 as Undecane	77.18462	ND	39	153.19	ND	0	154	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08	4.10E-08
n-Dodecane	76.66154	ND	38	152.15	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.07E-08
C12 as Dodecane	76.66154	ND	38	152.15	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.07E-08
n-Tridecane	76.84615	ND	38	152.52	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
C13 as Tridecane	76.84615	ND	38	152.52	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
n-Tetradecane	76.76923	ND	38	152.37	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
C14 as tetradecane	76.76923	ND	38	152.37	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
n-Pentadecane	77.15385	ND	39	153.13	ND	0	154	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08	4.10E-08
C15 as Pentadecane	77.15385	ND	39	153.13	ND	0	154	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08	4.10E-08
n-Hexadecane	76.73846	ND	38	152.31	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
C16 as Hexadecane	76.73846	ND	38	152.31	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
n-Heptadecane	75.84615	ND	38	150.53	ND	0	152	ND	0	38	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08	4.03E-08
C17 as Heptadecane	75.84615	ND	38	150.53	ND	0	152	ND	0	38	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08	4.03E-08
n-Octadecane	76.69231	ND	38	152.21	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.07E-08
C18 as Octodecane	76.69231	ND	38	152.21	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.07E-08
n-Nonadecane	76.84615	ND	38	152.52	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
C19 as Nonadecane	76.84615	ND	38	152.52	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.08E-08
n-Eicosane	76.66154	ND	38	152.15	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.07E-08
C20 as Eicosane	76.66154	ND	38	152.15	ND	0	153	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.07E-08
n-Heneicosane	77.38462	ND	39	153.59	ND	0	155	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08	4.11E-08
C21 as Heneicosane	77.38462	ND	39	153.59	ND	0	155	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08	4.11E-08
n-Docosane	76.50769	ND	38	151.85	ND	0	153	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08	4.06E-08
C22 as Docosane	76.50769	ND	38	151.85	ND	0	153	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08	4.06E-08
n-Tricosane	76.92308	ND	38	152.67	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.09E-08
C23 as Tricosane	76.92308	ND	38	152.67	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08	4.09E-08
n-Tetracosane	77.03077	ND	39	152.89	ND	0	154	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08	4.09E-08
C24 as Tetracosane	77.03077	ND	39	152.89	ND	0	154	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08	4.09E-08
Total Hydrocarbon			1,763			0			0		1.76	203	937	9.37E-07	0	0	0.00E+00	9.37E-07	1.87E-06

ANALYTICAL RESULTS C016B Component	C016B µg/m³	Flag	ND Adj µg/m³	BACKGROUND C017A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	144.0308	ND	72	143	ND	0	148	ND	0	72	0.07	8	38	3.83E-08	3.83E-08	7.65E-08
C5 as Pentane	144.0308	ND	72	143	ND	0	148	ND	0	72	0.07	8	38	3.83E-08	3.83E-08	7.65E-08
n-Hexane	149.6308	ND	75	148	ND	0	212	ND	0	75	0.07	9	40	3.98E-08	3.98E-08	7.95E-08
C6 as Hexane	149.6308	ND	75	148	ND	0	212	ND	0	75	0.07	9	40	3.98E-08	3.98E-08	7.95E-08
n-Heptane	156.3692	ND	78	155	ND	0	176	ND	0	78	0.08	9	42	4.15E-08	4.15E-08	8.31E-08
C7 as Heptane	156.3692	ND	78	155	ND	0	176	ND	0	78	0.08	9	42	4.15E-08	4.15E-08	8.31E-08
n-Octane	152.2462	ND	76	151	ND	0	152	ND	0	76	0.08	9	40	4.04E-08	4.04E-08	8.09E-08
C8 as Octane	152.2462	ND	76	151	ND	0	152	ND	0	76	0.08	9	40	4.04E-08	4.04E-08	8.09E-08
n-Nonane	153.3846	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.07E-08	4.07E-08	8.15E-08
C9 as Nonane	159.9678	J	160	152	ND	0	153	ND	0	160	0.16	18	85	8.50E-08	8.50E-08	1.70E-07
n-Decane	154.7692	ND	77	154	ND	0	155	ND	0	77	0.08	9	41	4.11E-08	4.11E-08	8.22E-08
C10 as Decane	154.7692	ND	77	154	ND	0	155	ND	0	77	0.08	9	41	4.11E-08	4.11E-08	8.22E-08
n-Undecane	154.3692	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.10E-08	4.10E-08	8.20E-08
C11 as Undecane	154.3692	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.10E-08	4.10E-08	8.20E-08
n-Dodecane	153.3231	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.07E-08	4.07E-08	8.15E-08
C12 as Dodecane	153.3231	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.07E-08	4.07E-08	8.15E-08
n-Tridecane	153.6923	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.17E-08
C13 as Tridecane	153.6923	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.17E-08
n-Tetradecane	153.5385	ND	77	152	ND	0	154	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.16E-08
C14 as tetradecane	153.5385	ND	77	152	ND	0	154	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.16E-08
n-Pentadecane	154.3077	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.10E-08	4.10E-08	8.20E-08
C15 as Pentadecane	154.3077	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.10E-08	4.10E-08	8.20E-08
n-Hexadecane	153.4769	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.15E-08
C16 as Hexadecane	153.4769	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.15E-08
n-Heptadecane	151.6923	ND	76	151	ND	0	152	ND	0	76	0.08	9	40	4.03E-08	4.03E-08	8.06E-08
C17 as Heptadecane	151.6923	ND	76	151	ND	0	152	ND	0	76	0.08	9	40	4.03E-08	4.03E-08	8.06E-08
n-Octadecane	153.3846	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.07E-08	4.07E-08	8.15E-08
C18 as Octodecane	153.3846	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.07E-08	4.07E-08	8.15E-08
n-Nonadecane	153.6923	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.17E-08
C19 as Nonadecane	153.6923	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.08E-08	4.08E-08	8.17E-08
n-Eicosane	153.3231	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.07E-08	4.07E-08	8.15E-08
C20 as Eicosane	153.3231	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.07E-08	4.07E-08	8.15E-08
n-Heneicosane	154.7692	ND	77	154	ND	0	155	ND	0	77	0.08	9	41	4.11E-08	4.11E-08	8.22E-08
C21 as Heneicosane	154.7692	ND	77	154	ND	0	155	ND	0	77	0.08	9	41	4.11E-08	4.11E-08	8.22E-08
n-Docosane	153.0154	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.06E-08	4.06E-08	8.13E-08
C22 as Docosane	153.0154	ND	77	152	ND	0	153	ND	0	77	0.08	9	41	4.06E-08	4.06E-08	8.13E-08
n-Tricosane	153.8462	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.09E-08	4.09E-08	8.17E-08
C23 as Tricosane	153.8462	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.09E-08	4.09E-08	8.17E-08
n-Tetracosane	154.0615	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.09E-08	4.09E-08	8.19E-08
C24 as Tetracosane	154.0615	ND	77	153	ND	0	154	ND	0	77	0.08	9	41	4.09E-08	4.09E-08	8.19E-08
Total Hydrocarbon			3,144			0			0		3.14	362	1,671	1.67E-06	1.67E-06	3.34E-06

Bagging Data Form	Vacuum Method		Sample Id	C018
Equipment type:	Connector		Component ID:	20402.2
Equipment Subtype:	Flange		Unit:	Refinery C
Line Size:	4 inches		Date:	25-May-18
Phase (G, LL, HL):	HL		Analysis team:	EG/DR
Barometric pressure	30.13 inHg	765.3 mmHg	Sample Pump A	LP52979
			Sample Pump B	LP52975
Ambient Temp:	67.7 °F	19.8 °C	TVA ID	34251
Component Temp:	388 °F	197.8 °C	Stream Pressure/Temp:	psig °F
Stream Description:	TKC Vac btms (asked Ops to turn on CL)			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
13:50	Background	0	ppmv	8-sec Dwell	12	ppmv	Total Dwell	1:30	min:sec	Final M21	32	ppm
14:07	Initial Bag Vacuum	0.055	inches H2O	DGM Vac.	1.9	inches H2O	Bag Temp	223	°F	Leak @	Flange	

Bag Concentrations (ppmv)

Time	14:12	14:14	14:16	14:18	14:20	14:25	14:32							
ppmv	62	60.8	72	74	72	70	60.3							

Sorbent Tube Sample Collection Parameters

C018A

Time										
14:20	Volume Start	890.9	Liters		Design Sample Flow Rate = 1 liter/min					
14:33	Volume Stop	903.7	Liters	Total Vol	12.8	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.985	L/min	Sorbent Flow$_{STP}$	0.999	L/min

C018B

14:20	Volume Start	818.7	Liters		Design Sample Flow Rate = 1 liter/min					
14:33	Volume Stop	831.6	Liters	Total Vol	12.9	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.992	L/min	Sorbent Flow$_{STP}$	1.006	L/min
	Total ST Vol$_{STP}$	26.06	Liters	DGM Vol$_{STP}$	72.57	Liters	Total Run Vol$_{STP}$	98.64	Liters	

Bagging Parameters

Time											
14:24	Vacuum check	0.065	inches H2O			DGM$_P$	1.8	inches H2O vacuum	761.9	mmHg
14:24	DGM$_{10L}$ Time	01:49.0	min:sec.frac	DGM Time	1.817	DGM Flow	5.50	DGM Flow$_{STP}$	5.58	liters/minute
14:25	Bag Temp.	240.3	°F	115.7	°C	Sample$_T$	64	°F	17.8	°C

Post-Sample Data

14:43	Post Test M21	Background	10	ppmv	8-sec Dwell	20	ppmv	Total Dwell	1:30	min:sec	Final M21	57 ppm @ Flange

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00 hours:min
Organic condensate collected	N/A	ml				
Density of organic condensate	N/A	g/ml				

Average THC emissions =	2.60E-05 kg/hr
Percent difference THC ER =	25%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	7.73E-08
C5 as Pentane	1.52E-07
n-Hexane	7.22E-08
C6 as Hexane	1.78E-06
n-Heptane	1.16E-07
C7 as Heptane	1.44E-06
n-Octane	1.49E-07
C8 as Octane	2.46E-06
n-Nonane	1.85E-07
C9 as Nonane	2.94E-06
n-Decane	2.18E-07
C10 as Decane	3.54E-06
n-Undecane	2.26E-07
C11 as Undecane	3.15E-06
n-Dodecane	1.87E-07
C12 as Dodecane	2.45E-06
n-Tridecane	1.84E-07
C13 as Tridecane	2.68E-06
n-Tetradecane	2.23E-07
C14 as tetradecane	1.57E-06
n-Pentadecane	1.29E-07
C15 as Pentadecane	7.87E-07
n-Hexadecane	3.71E-08
C16 as Hexadecane	1.74E-07
n-Heptadecane	9.83E-08
C17 as Heptadecane	4.58E-08
n-Octadecane	2.65E-08
C18 as Octodecane	3.84E-08
n-Nonadecane	2.65E-08
C19 as Nonadecane	2.85E-07
n-Eicosane	2.64E-08
C20 as Eicosane	2.64E-08
n-Heneicosane	2.67E-08
C21 as Heneicosane	2.10E-07
n-Docosane	2.64E-08
C22 as Docosane	4.16E-08
n-Tricosane	2.65E-08
C23 as Tricosane	8.16E-08
n-Tetracosane	2.66E-08
C24 as Tetracosane	1.03E-07
Total Hydrocarbon	2.60E-05

THC:	1.38E-03	lbs/day	2.52E-04	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C018A	C018A		ND Adj	C019A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	157.6404	J	158	146.28	ND	0	148	ND	0	158	0.16	16	72	7.18E-08	7.18E-08
C5 as Pentane	301.5738	J	302	146.28	ND	0	148	ND	0	302	0.30	30	137	1.37E-07	1.37E-07
n-Hexane	145.5785	J	146	151.97	ND	0	212	ND	0	146	0.15	14	66	6.63E-08	6.63E-08
C6 as Hexane	3622.784		3,623	151.97	ND	0	212	ND	0	3,623	3.62	357	1649	1.65E-06	1.65E-06
n-Heptane	247.5102	J	248	158.81	ND	0	176	ND	0	248	0.25	24	113	1.13E-07	1.13E-07
C7 as Heptane	3236.38		3,236	158.81	ND	0	176	ND	0	3,236	3.24	319	1473	1.47E-06	1.47E-06
n-Octane	407.1534	J	407	154.62	ND	0	152	ND	0	407	0.41	40	185	1.85E-07	1.85E-07
C8 as Octane	4903.109		4,903	154.62	ND	0	152	ND	0	4,903	4.90	484	2232	2.23E-06	2.23E-06
n-Nonane	366.9996	J	367	155.78	ND	0	153	ND	0	367	0.37	36	167	1.67E-07	1.67E-07
C9 as Nonane	5686.525		5,687	155.78	ND	0	153	ND	0	5,687	5.69	561	2589	2.59E-06	2.59E-06
n-Decane	448.1105	J	448	157.19	ND	0	155	ND	0	448	0.45	44	204	2.04E-07	2.04E-07
C10 as Decane	7115.66		7,116	157.19	ND	0	155	ND	0	7,116	7.12	702	3239	3.24E-06	3.24E-06
n-Undecane	443.1261	J	443	156.78	ND	0	154	ND	0	443	0.44	44	202	2.02E-07	2.02E-07
C11 as Undecane	6193.966		6,194	156.78	ND	0	154	ND	0	6,194	6.19	611	2820	2.82E-06	2.82E-06
n-Dodecane	365.8023	J	366	155.72	ND	0	153	ND	0	366	0.37	36	167	1.67E-07	1.67E-07
C12 as Dodecane	4657.692		4,658	155.72	ND	0	153	ND	0	4,658	4.66	459	2120	2.12E-06	2.12E-06
n-Tridecane	357.0297	J	357	156.09	ND	0	154	ND	0	357	0.36	35	163	1.63E-07	1.63E-07
C13 as Tridecane	5027.26		5,027	156.09	ND	0	154	ND	0	5,027	5.03	496	2289	2.29E-06	2.29E-06
n-Tetradecane	334.7416	J	335	155.94	ND	0	154	ND	0	335	0.33	33	152	1.52E-07	1.52E-07
C14 as tetradecane	2709.019		2,709	155.94	ND	0	154	ND	0	2,709	2.71	267	1233	1.23E-06	1.23E-06
n-Pentadecane	225.0774	J	225	156.72	ND	0	154	ND	0	225	0.23	22	102	1.02E-07	1.02E-07
C15 as Pentadecane	1341.209		1,341	156.72	ND	0	154	ND	0	1,341	1.34	132	611	6.11E-07	6.11E-07
n-Hexadecane	85.85577	J	86	155.87	ND	0	153	ND	0	86	0.09	8	39	3.91E-08	3.91E-08
C16 as Hexadecane	335.3364	J	335	155.87	ND	0	153	ND	0	335	0.34	33	153	1.53E-07	1.53E-07
n-Heptadecane	189.2155	J	189	154.06	ND	0	152	ND	0	189	0.19	19	86	8.61E-08	8.61E-08
C17 as Heptadecane	77.03125	ND	39	154.06	ND	0	152	ND	0	39	0.04	4	18	1.75E-08	1.75E-08
n-Octadecane	77.89062	ND	39	155.78	ND	0	153	ND	0	39	0.04	4	18	1.77E-08	1.77E-08
C18 as Octodecane	91.57739	J	92	155.78	ND	0	153	ND	0	92	0.09	9	42	4.17E-08	4.17E-08
n-Nonadecane	78.04687	ND	39	156.09	ND	0	154	ND	0	39	0.04	4	18	1.78E-08	1.78E-08
C19 as Nonadecane	78.04687	ND	39	156.09	ND	0	154	ND	0	39	0.04	4	18	1.78E-08	1.78E-08
n-Eicosane	77.85937	ND	39	155.72	ND	0	153	ND	0	39	0.04	4	18	1.77E-08	1.77E-08
C20 as Eicosane	77.85937	ND	39	155.72	ND	0	153	ND	0	39	0.04	4	18	1.77E-08	1.77E-08
n-Heneicosane	78.59375	ND	39	157.19	ND	0	155	ND	0	39	0.04	4	18	1.79E-08	1.79E-08
C21 as Heneicosane	78.59375	ND	39	157.19	ND	0	155	ND	0	39	0.04	4	18	1.79E-08	1.79E-08
n-Docosane	77.70312	ND	39	155.41	ND	0	153	ND	0	39	0.04	4	18	1.77E-08	1.77E-08
C22 as Docosane	105.7313	J	106	155.41	ND	0	153	ND	0	106	0.11	10	48	4.81E-08	4.81E-08
n-Tricosane	78.125	ND	39	156.25	ND	0	154	ND	0	39	0.04	4	18	1.78E-08	1.78E-08
C23 as Tricosane	280.7884	J	281	156.25	ND	0	154	ND	0	281	0.28	28	128	1.28E-07	1.28E-07
n-Tetracosane	78.23437	ND	39	156.47	ND	0	154	ND	0	39	0.04	4	18	1.78E-08	1.78E-08
C24 as Tetracosane	373.3377	J	373	156.47	ND	0	154	ND	0	373	0.37	37	170	1.70E-07	1.70E-07
Total Hydrocarbon			50,185			0			0		50.18	4950	22,847	2.28E-05	2.28E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C018B	C018B		ND Adj	C019A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	181.7509	J	182	146	ND	0	148	ND	0	182	0.18	18	83	8.27E-08	8.27E-08
C5 as Pentane	365.0083	J	365	146	ND	0	148	ND	0	365	0.37	36	166	1.66E-07	1.66E-07
n-Hexane	171.4168	J	171	152	ND	0	212	ND	0	171	0.17	17	78	7.80E-08	7.80E-08
C6 as Hexane	4197.609		4,198	152	ND	0	212	ND	0	4,198	4.20	414	1911	1.91E-06	1.91E-06
n-Heptane	263.4982	J	263	159	ND	0	176	ND	0	263	0.26	26	120	1.20E-07	1.20E-07
C7 as Heptane	3098.28		3,098	159	ND	0	176	ND	0	3,098	3.10	306	1411	1.41E-06	1.41E-06
n-Octane	248.7669	J	249	155	ND	0	152	ND	0	249	0.25	25	113	1.13E-07	1.13E-07
C8 as Octane	5887.707		5,888	155	ND	0	152	ND	0	5,888	5.89	581	2680	2.68E-06	2.68E-06
n-Nonane	445.6132	J	446	156	ND	0	153	ND	0	446	0.45	44	203	2.03E-07	2.03E-07
C9 as Nonane	7239.616		7,240	156	ND	0	153	ND	0	7,240	7.24	714	3296	3.30E-06	3.30E-06
n-Decane	511.3569	J	511	157	ND	0	155	ND	0	511	0.51	50	233	2.33E-07	2.33E-07
C10 as Decane	8456.279		8,456	157	ND	0	155	ND	0	8,456	8.46	834	3850	3.85E-06	3.85E-06
n-Undecane	551.0905	J	551	157	ND	0	154	ND	0	551	0.55	54	251	2.51E-07	2.51E-07
C11 as Undecane	7643.646		7,644	157	ND	0	154	ND	0	7,644	7.64	754	3480	3.48E-06	3.48E-06
n-Dodecane	456.4245	J	456	156	ND	0	153	ND	0	456	0.46	45	208	2.08E-07	2.08E-07
C12 as Dodecane	6112.531		6,113	156	ND	0	153	ND	0	6,113	6.11	603	2783	2.78E-06	2.78E-06
n-Tridecane	449.2142	J	449	156	ND	0	154	ND	0	449	0.45	44	205	2.05E-07	2.05E-07
C13 as Tridecane	6750.904		6,751	156	ND	0	154	ND	0	6,751	6.75	666	3073	3.07E-06	3.07E-06
n-Tetradecane	645.2682	J	645	156	ND	0	154	ND	0	645	0.65	64	294	2.94E-07	2.94E-07
C14 as tetradecane	4185.414		4,185	156	ND	0	154	ND	0	4,185	4.19	413	1905	1.91E-06	1.91E-06
n-Pentadecane	341.0014	J	341	157	ND	0	154	ND	0	341	0.34	34	155	1.55E-07	1.55E-07
C15 as Pentadecane	2114.229		2,114	157	ND	0	154	ND	0	2,114	2.11	209	963	9.63E-07	9.63E-07
n-Hexadecane	154.6667	ND	77	156	ND	0	153	ND	0	77	0.08	8	35	3.52E-08	3.52E-08
C16 as Hexadecane	429.2513	J	429	156	ND	0	153	ND	0	429	0.43	42	195	1.95E-07	1.95E-07
n-Heptadecane	242.8319	J	243	154	ND	0	152	ND	0	243	0.24	24	111	1.11E-07	1.11E-07
C17 as Heptadecane	162.4736	J	162	154	ND	0	152	ND	0	162	0.16	16	74	7.40E-08	7.40E-08
n-Octadecane	154.5736	ND	77	156	ND	0	153	ND	0	77	0.08	8	35	3.52E-08	3.52E-08
C18 as Octodecane	154.5736	ND	77	156	ND	0	153	ND	0	77	0.08	8	35	3.52E-08	3.52E-08
n-Nonadecane	154.8837	ND	77	156	ND	0	154	ND	0	77	0.08	8	35	3.53E-08	3.53E-08
C19 as Nonadecane	1214.701	J	1,215	156	ND	0	154	ND	0	1,215	1.21	120	553	5.53E-07	5.53E-07
n-Eicosane	154.5116	ND	77	156	ND	0	153	ND	0	77	0.08	8	35	3.52E-08	3.52E-08
C20 as Eicosane	154.5116	ND	77	156	ND	0	153	ND	0	77	0.08	8	35	3.52E-08	3.52E-08
n-Heneicosane	155.969	ND	78	157	ND	0	155	ND	0	78	0.08	8	36	3.55E-08	3.55E-08
C21 as Heneicosane	882.462	J	882	157	ND	0	155	ND	0	882	0.88	87	402	4.02E-07	4.02E-07
n-Docosane	154.2016	ND	77	155	ND	0	153	ND	0	77	0.08	8	35	3.51E-08	3.51E-08
C22 as Docosane	154.2016	ND	77	155	ND	0	153	ND	0	77	0.08	8	35	3.51E-08	3.51E-08
n-Tricosane	155.0388	ND	78	156	ND	0	154	ND	0	78	0.08	8	35	3.53E-08	3.53E-08
C23 as Tricosane	155.0388	ND	78	156	ND	0	154	ND	0	78	0.08	8	35	3.53E-08	3.53E-08
n-Tetracosane	155.2558	ND	78	156	ND	0	154	ND	0	78	0.08	8	35	3.53E-08	3.53E-08
C24 as Tetracosane	155.2558	ND	78	156	ND	0	154	ND	0	78	0.08	8	35	3.53E-08	3.53E-08
Total Hydrocarbon			64,255			0			0		64.25	6338	29,252	2.93E-05	2.93E-05

Bagging Data Form — Vacuum Method

Sample Id: C020

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	20252		
Equipment Subtype:	Gate			**Unit:**	Refinery C		
Line Size:	3	*inches*		**Date:**	29-May-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/M		
Barometric pressure	29.83	*inHg*	757.7 *mmHg*	**Sample Pump A**	LP52975		
				Sample Pump B	LP52979		
Ambient Temp:	75.5	°F	24.2 °C	**TVA ID**	37887		
Component Temp:	273	°F	133.9 °C	**Stream Pressure/Temp:**		*psig*	°F
Stream Description:	*Hot Oil Vacuum Feed C1750*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
9:12	Background	0 *ppmv*	8-sec Dwell	1 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	9 *ppm*
9:52	Initial Bag Vacuum	0.02 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	141.4 °F	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:55	9:57	9:59	10:01	10:03	10:06								
ppmv	4.9	6.7	6.7	6.7	6.5	6.7								

Sorbent Tube Sample Collection Parameters

C020A

Time						
10:01	Volume Start	906.0 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:14	Volume Stop	918.5 *Liters*	Total Vol	12.5 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.962 *L/min*	$\text{Sorbent Flow}_{STP}$	0.943 *L/min*

C020B

10:01	Volume Start	833.5 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:14	Volume Stop	846.0 *Liters*	Total Vol	12.5 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.962 *L/min*	$\text{Sorbent Flow}_{STP}$	0.943 *L/min*

$\text{Total ST Vol}_{STP}$ 24.53 *Liters* — DGM Vol_{STP} 81.41 *Liters* — $\text{Total Run Vol}_{STP}$ 105.93 *Liters*

Bagging Parameters

Time								
10:06	Vacuum check	0.02 *inches H2O*			DGM_P	2 *inches H2O vacuum*		753.9 *mmHg*
10:05	DGM_{10L} Time	01:34.0 *min:sec.frac*	DGM Time	1.567	DGM Flow	6.38	DGM Flow_{STP}	6.26 *liters/minute*
10:06	Bag Temp.	151.3 °F	66.3 °C		Sample_T	76 °F		24.4 °C

Post-Sample Data

10:23 Post Test M21	Background	-1 *ppmv*	8-sec Dwell	-1 *ppmv*	Total Dwell	2:30 *min:sec*	Final M21 4 *ppm* @ Packing
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A *ml*					
Density of organic condensate		N/A *g/ml*					

Average THC emissions =	1.65E-06	kg/hr
Percent difference THC ER =	42%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.75E-08
C5 as Pentane	2.75E-08
n-Hexane	2.85E-08
C6 as Hexane	2.85E-08
n-Heptane	2.98E-08
C7 as Heptane	2.98E-08
n-Octane	2.90E-08
C8 as Octane	4.45E-08
n-Nonane	2.92E-08
C9 as Nonane	3.19E-07
n-Decane	2.95E-08
C10 as Decane	1.03E-07
n-Undecane	2.94E-08
C11 as Undecane	3.98E-08
n-Dodecane	2.92E-08
C12 as Dodecane	2.92E-08
n-Tridecane	2.93E-08
C13 as Tridecane	2.93E-08
n-Tetradecane	2.93E-08
C14 as tetradecane	2.93E-08
n-Pentadecane	2.94E-08
C15 as Pentadecane	2.94E-08
n-Hexadecane	2.93E-08
C16 as Hexadecane	2.93E-08
n-Heptadecane	2.89E-08
C17 as Heptadecane	2.89E-08
n-Octadecane	2.92E-08
C18 as Octodecane	2.92E-08
n-Nonadecane	2.93E-08
C19 as Nonadecane	7.88E-08
n-Eicosane	2.92E-08
C20 as Eicosane	2.92E-08
n-Heneicosane	2.95E-08
C21 as Heneicosane	7.01E-08
n-Docosane	2.92E-08
C22 as Docosane	2.92E-08
n-Tricosane	2.93E-08
C23 as Tricosane	2.93E-08
n-Tetracosane	2.94E-08
C24 as Tetracosane	2.94E-08
Total Hydrocarbon	1.65E-06

THC: 8.71E-05 lbs/day 1.59E-05 tons/yr

C020A	ANALYTICAL RESULTS C020A		ND Adj	BACKGROUND C021A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.896	ND	37	149.79	ND	0	148	ND	0	37	0.04	4	18	1.83E-08	1.83E-08
C5 as Pentane	74.896	ND	37	149.79	ND	0	148	ND	0	37	0.04	4	18	1.83E-08	1.83E-08
n-Hexane	77.808	ND	39	155.62	ND	0	212	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C6 as Hexane	77.808	ND	39	155.62	ND	0	212	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
n-Heptane	81.312	ND	41	162.62	ND	0	176	ND	0	41	0.04	4	20	1.99E-08	1.99E-08
C7 as Heptane	81.312	ND	41	162.62	ND	0	176	ND	0	41	0.04	4	20	1.99E-08	1.99E-08
n-Octane	79.168	ND	40	158.34	ND	0	152	ND	0	40	0.04	4	19	1.94E-08	1.94E-08
C8 as Octane	102.7447	J	103	158.34	ND	0	152	ND	0	103	0.10	11	50	5.02E-08	5.02E-08
n-Nonane	79.76	ND	40	159.52	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
C9 as Nonane	779.0265	J	779	159.52	ND	0	153	ND	0	779	0.78	83	381	3.81E-07	3.81E-07
n-Decane	80.48	ND	40	160.96	ND	0	155	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C10 as Decane	257.1841	J	257	160.96	ND	0	155	ND	0	257	0.26	27	126	1.26E-07	1.26E-07
n-Undecane	80.272	ND	40	160.54	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
C11 as Undecane	82.49071	J	82	160.54	ND	0	154	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
n-Dodecane	79.728	ND	40	159.46	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
C12 as Dodecane	79.728	ND	40	159.46	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
n-Tridecane	79.92	ND	40	159.84	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
C13 as Tridecane	79.92	ND	40	159.84	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
n-Tetradecane	79.84	ND	40	159.68	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
C14 as tetradecane	79.84	ND	40	159.68	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
n-Pentadecane	80.24	ND	40	160.48	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
C15 as Pentadecane	80.24	ND	40	160.48	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
n-Hexadecane	79.808	ND	40	159.62	ND	0	153	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
C16 as Hexadecane	79.808	ND	40	159.62	ND	0	153	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
n-Heptadecane	78.88	ND	39	157.76	ND	0	152	ND	0	39	0.04	4	19	1.93E-08	1.93E-08
C17 as Heptadecane	78.88	ND	39	157.76	ND	0	152	ND	0	39	0.04	4	19	1.93E-08	1.93E-08
n-Octadecane	79.76	ND	40	159.52	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
C18 as Octodecane	79.76	ND	40	159.52	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
n-Nonadecane	79.92	ND	40	159.84	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
C19 as Nonadecane	79.92	ND	40	159.84	ND	0	154	ND	0	40	0.04	4	20	1.95E-08	1.95E-08
n-Eicosane	79.728	ND	40	159.46	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
C20 as Eicosane	79.728	ND	40	159.46	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
n-Heneicosane	80.48	ND	40	160.96	ND	0	155	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C21 as Heneicosane	80.48	ND	40	160.96	ND	0	155	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Docosane	79.568	ND	40	159.14	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
C22 as Docosane	79.568	ND	40	159.14	ND	0	153	ND	0	40	0.04	4	19	1.95E-08	1.95E-08
n-Tricosane	80	ND	40	160	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
C23 as Tricosane	80	ND	40	160	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
n-Tetracosane	80.112	ND	40	160.22	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
C24 as Tetracosane	80.112	ND	40	160.22	ND	0	154	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
Total Hydrocarbon			2,653			0			0		2.65	281	1,297	1.30E-06	1.30E-06

C020B	ANALYTICAL RESULTS C020B		ND Adj	BACKGROUND C021A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	149.792	ND	75	150	ND	0	148	ND	0	75	0.07	8	37	3.66E-08	3.66E-08
C5 as Pentane	149.792	ND	75	150	ND	0	148	ND	0	75	0.07	8	37	3.66E-08	3.66E-08
n-Hexane	155.616	ND	78	156	ND	0	212	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C6 as Hexane	155.616	ND	78	156	ND	0	212	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Heptane	162.624	ND	81	163	ND	0	176	ND	0	81	0.08	9	40	3.98E-08	3.98E-08
C7 as Heptane	162.624	ND	81	163	ND	0	176	ND	0	81	0.08	9	40	3.98E-08	3.98E-08
n-Octane	158.336	ND	79	158	ND	0	152	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C8 as Octane	158.336	ND	79	158	ND	0	152	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Nonane	159.52	ND	80	160	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C9 as Nonane	524.4331	J	524	160	ND	0	153	ND	0	524	0.52	56	256	2.56E-07	2.56E-07
n-Decane	160.96	ND	80	161	ND	0	155	ND	0	80	0.08	9	39	3.93E-08	3.93E-08
C10 as Decane	162.3684	J	162	161	ND	0	155	ND	0	162	0.16	17	79	7.94E-08	7.94E-08
n-Undecane	160.544	ND	80	161	ND	0	154	ND	0	80	0.08	9	39	3.92E-08	3.92E-08
C11 as Undecane	160.544	ND	80	161	ND	0	154	ND	0	80	0.08	9	39	3.92E-08	3.92E-08
n-Dodecane	159.456	ND	80	159	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C12 as Dodecane	159.456	ND	80	159	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
n-Tridecane	159.84	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
C13 as Tridecane	159.84	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
n-Tetradecane	159.68	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C14 as tetradecane	159.68	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
n-Pentadecane	160.48	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
C15 as Pentadecane	160.48	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
n-Hexadecane	159.616	ND	80	160	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C16 as Hexadecane	159.616	ND	80	160	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
n-Heptadecane	157.76	ND	79	158	ND	0	152	ND	0	79	0.08	8	39	3.86E-08	3.86E-08
C17 as Heptadecane	157.76	ND	79	158	ND	0	152	ND	0	79	0.08	8	39	3.86E-08	3.86E-08
n-Octadecane	159.52	ND	80	160	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C18 as Octodecane	159.52	ND	80	160	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
n-Nonadecane	159.84	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
C19 as Nonadecane	282.3109	J	282	160	ND	0	154	ND	0	282	0.28	30	138	1.38E-07	1.38E-07
n-Eicosane	159.456	ND	80	159	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C20 as Eicosane	159.456	ND	80	159	ND	0	153	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
n-Heneicosane	160.96	ND	80	161	ND	0	155	ND	0	80	0.08	9	39	3.93E-08	3.93E-08
C21 as Heneicosane	246.5982	J	247	161	ND	0	155	ND	0	247	0.25	26	121	1.21E-07	1.21E-07
n-Docosane	159.136	ND	80	159	ND	0	153	ND	0	80	0.08	8	39	3.89E-08	3.89E-08
C22 as Docosane	159.136	ND	80	159	ND	0	153	ND	0	80	0.08	8	39	3.89E-08	3.89E-08
n-Tricosane	160	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
C23 as Tricosane	160	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
n-Tetracosane	160.224	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
C24 as Tetracosane	160.224	ND	80	160	ND	0	154	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
Total Hydrocarbon			4,078			0			0		4.08	432	1,994	1.99E-06	1.99E-06

Bagging Data Form — Vacuum Method

Sample Id: C022

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	21885	
Equipment Subtype:	Gate		**Unit:**	Refinery C	
Line Size:	12 inches		**Date:**	29-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/MM	
Barometric pressure	29.8 inHg	756.9 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	78.3 °F	25.7 °C	**TVA ID**	36502	
Component Temp:	316 °F	157.8 °C	**Stream Pressure/Temp:**	15 psig	°F

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Stream Description: *Tar (had to ventilate bag)*

Pre-Sample Data

Time											
12:35	Background	-7	ppmv	8-sec Dwell	0	ppmv	Total Dwell	3:00	min:sec	Final M21	7 ppm
13:24	Initial Bag Vacuum	0.045	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	136.4	°F	Leak @	Stem

Bag Concentrations (ppmv) (had to ventilate bag)

Time	13:26	13:28	13:30	13:32	13:34	13:36	13:41	13:47						
ppmv	7	10.4	10.7	10.9	11.1	11.1	11.3	11.8						

Sorbent Tube Sample Collection Parameters

C022A

Time									
13:36	Volume Start	918.5	Liters		Design Sample Flow Rate = 1 liter/min				
13:49	Volume Stop	931.0	Liters	Total Vol	12.5	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.962 L/min	Sorbent $Flow_{STP}$	0.945	L/min

C022B

13:36	Volume Start	846.0	Liters		Design Sample Flow Rate = 1 liter/min				
13:49	Volume Stop	858.6	Liters	Total Vol	12.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.969 L/min	Sorbent $Flow_{STP}$	0.952	L/min
	Total ST Vol_{STP}	24.66	Liters	DGM Vol_{STP}	76.63	Liters	Total Run Vol_{STP}	101.28	Liters

Bagging Parameters

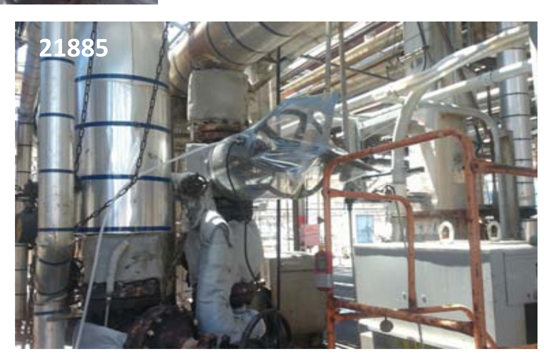
Time										
13:40	Vacuum check	0.065	inches H2O			DGM_P	1.8	inches H2O vacuum	753.6	mmHg
13:39	DGM_{10L} Time	01:40.3	min:sec.frac	DGM Time	1.667	DGM Flow	6.00	DGM $Flow_{STP}$	5.89	liters/minute
13:40	Bag Temp.	144.1	°F	62.3	°C	$Sample_T$	75	°F	23.9	°C

Post-Sample Data

14:22	Post Test M21	Background	-2	ppmv	8-sec Dwell	4 ppmv	Total Dwell	2:00 min:sec	Final M21	13 ppm @ Stem

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00 hours:min
Organic condensate collected	N/A	ml				
Density of organic condensate	N/A	g/ml				

Average THC emissions =	2.53E-06 kg/hr
Percent difference THC ER =	22%
Acceptable?	No



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.61E-08
C5 as Pentane	2.61E-08
n-Hexane	2.71E-08
C6 as Hexane	2.71E-08
n-Heptane	2.84E-08
C7 as Heptane	2.84E-08
n-Octane	2.76E-08
C8 as Octane	3.89E-08
n-Nonane	2.78E-08
C9 as Nonane	1.15E-07
n-Decane	4.55E-08
C10 as Decane	8.14E-07
n-Undecane	2.80E-08
C11 as Undecane	1.42E-07
n-Dodecane	4.41E-08
C12 as Dodecane	2.78E-08
n-Tridecane	2.79E-08
C13 as Tridecane	4.19E-07
n-Tetradecane	2.78E-08
C14 as tetradecane	2.78E-08
n-Pentadecane	2.80E-08
C15 as Pentadecane	2.80E-08
n-Hexadecane	2.78E-08
C16 as Hexadecane	2.78E-08
n-Heptadecane	2.75E-08
C17 as Heptadecane	2.75E-08
n-Octadecane	2.78E-08
C18 as Octodecane	2.78E-08
n-Nonadecane	2.79E-08
C19 as Nonadecane	2.79E-08
n-Eicosane	2.78E-08
C20 as Eicosane	2.78E-08
n-Heneicosane	2.81E-08
C21 as Heneicosane	2.81E-08
n-Docosane	2.77E-08
C22 as Docosane	2.77E-08
n-Tricosane	2.79E-08
C23 as Tricosane	2.79E-08
n-Tetracosane	2.79E-08
C24 as Tetracosane	2.79E-08
Total Hydrocarbon	2.53E-06

THC:	1.34E-04	lbs/day	2.45E-05 tons/yr

C022A

ANALYTICAL RESULTS	C022A		ND Adj	BACKGROUND C023A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.896	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	18	1.75E-08	1.75E-08
C5 as Pentane	74.896	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	18	1.75E-08	1.75E-08
n-Hexane	77.808	ND	39	150.79	ND	0	212	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
C6 as Hexane	77.808	ND	39	150.79	ND	0	212	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
n-Heptane	81.312	ND	41	157.58	ND	0	176	ND	0	41	0.04	4	19	1.90E-08	1.90E-08
C7 as Heptane	81.312	ND	41	157.58	ND	0	176	ND	0	41	0.04	4	19	1.90E-08	1.90E-08
n-Octane	79.168	ND	40	153.43	ND	0	152	ND	0	40	0.04	4	19	1.85E-08	1.85E-08
C8 as Octane	87.68762	J	88	153.43	ND	0	152	ND	0	88	0.09	9	41	4.10E-08	4.10E-08
n-Nonane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
C9 as Nonane	251.5902	J	252	154.57	ND	0	153	ND	0	252	0.25	25	118	1.18E-07	1.18E-07
n-Decane	114.9037	J	115	155.97	ND	0	155	ND	0	115	0.11	12	54	5.37E-08	5.37E-08
C10 as Decane	1706.507		1,707	155.97	ND	0	155	ND	0	1,707	1.71	173	798	7.98E-07	7.98E-07
n-Undecane	80.272	ND	40	155.57	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C11 as Undecane	294.0325	J	294	155.57	ND	0	154	ND	0	294	0.29	30	137	1.37E-07	1.37E-07
n-Dodecane	109.7722	J	110	154.51	ND	0	153	ND	0	110	0.11	11	51	5.13E-08	5.13E-08
C12 as Dodecane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
n-Tridecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C13 as Tridecane	961.0996		961	154.88	ND	0	154	ND	0	961	0.96	97	449	4.49E-07	4.49E-07
n-Tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C14 as tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
n-Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C15 as Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C16 as Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
n-Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	18	1.84E-08	1.84E-08
C17 as Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	18	1.84E-08	1.84E-08
n-Octadecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
C18 as Octodecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
n-Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C19 as Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
n-Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
C20 as Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
n-Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C21 as Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
C22 as Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
n-Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C23 as Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
n-Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C24 as Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
Total Hydrocarbon			4,837			0			0		4.84	490	2,261	2.26E-06	2.26E-06

C022B

ANALYTICAL RESULTS	C022B		ND Adj	BACKGROUND C023A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.6032	ND	74	145	ND	0	148	ND	0	74	0.07	8	35	3.47E-08	3.47E-08
C5 as Pentane	148.6032	ND	74	145	ND	0	148	ND	0	74	0.07	8	35	3.47E-08	3.47E-08
n-Hexane	154.3809	ND	77	151	ND	0	212	ND	0	77	0.08	8	36	3.61E-08	3.61E-08
C6 as Hexane	154.3809	ND	77	151	ND	0	212	ND	0	77	0.08	8	36	3.61E-08	3.61E-08
n-Heptane	161.3333	ND	81	158	ND	0	176	ND	0	81	0.08	8	38	3.77E-08	3.77E-08
C7 as Heptane	161.3333	ND	81	158	ND	0	176	ND	0	81	0.08	8	38	3.77E-08	3.77E-08
n-Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
C8 as Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
n-Nonane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
C9 as Nonane	240.3742	J	240	155	ND	0	153	ND	0	240	0.24	24	112	1.12E-07	1.12E-07
n-Decane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
C10 as Decane	1774.586		1,775	156	ND	0	155	ND	0	1,775	1.77	180	830	8.30E-07	8.30E-07
n-Undecane	159.2698	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
C11 as Undecane	315.4968	J	315	156	ND	0	154	ND	0	315	0.32	32	147	1.47E-07	1.47E-07
n-Dodecane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
C12 as Dodecane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
n-Tridecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
C13 as Tridecane	832.2985	J	832	155	ND	0	154	ND	0	832	0.83	84	389	3.89E-07	3.89E-07
n-Tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
C14 as tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
n-Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
C15 as Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
n-Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	8	37	3.66E-08	3.66E-08
C17 as Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	8	37	3.66E-08	3.66E-08
n-Octadecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
C18 as Octodecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
n-Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
C19 as Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
n-Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
C20 as Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
n-Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
C21 as Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
n-Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	8	37	3.69E-08	3.69E-08
C22 as Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	8	37	3.69E-08	3.69E-08
n-Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
C23 as Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
n-Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
C24 as Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
Total Hydrocarbon			6,003			0			0		6.00	608	2,806	2.81E-06	2.81E-06

Bagging Data Form — Vacuum Method

Sample Id C025

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	**20464**	
Equipment Subtype:	Gate		**Unit:**	Refinery C	
Line Size:	1	*inches*	**Date:**	30-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/MM	
Barometric pressure	29.81 *inHg*	757.2 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	74.3 °F	23.5 °C	**TVA ID**	37887	
Component Temp:	138 °F	58.9 °C	**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Asphalt*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:04	Background	0	*ppmv*	8-sec Dwell	5	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	6.8 *ppm*
9:32	Initial Bag Vacuum	0.018	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	96.6	°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	9:36	9:38	9:40	9:42	9:44	9:50								
ppmv	3.2	4.3	6	5.4	5.7	6.1								

Sorbent Tube Sample Collection Parameters

C025A

Time								
9:44	Volume Start	933.4 *Liters*		Design Sample Flow Rate = 1 liter/min				
9:58	Volume Stop	947.1 *Liters*	Total Vol	13.7 *Liters*				
	Sample Run Time	14 *Minutes*		Sorbent Flow	0.979 *L/min*	$Sorbent Flow_{STP}$	0.954	*L/min*

C025B

9:44	Volume Start	860.6 *Liters*		Design Sample Flow Rate = 1 liter/min				
9:58	Volume Stop	874.4 *Liters*	Total Vol	13.8 *Liters*				
	Sample Run Time	14 *Minutes*		Sorbent Flow	0.986 *L/min*	$Sorbent Flow_{STP}$	0.961	*L/min*
	$Total ST Vol_{STP}$	26.81 *Liters*	$DGM Vol_{STP}$	87.12 *Liters*		$Total Run Vol_{STP}$	113.93	*Liters*

Bagging Parameters

Time									
9:48	Vacuum check	0.03	*inches H2O*			DGM_P	2 *inches H2O vacuum*	753.4	*mmHg*
9:47	DGM_{10L} Time	01:33.5	*min:sec.frac*	DGM Time	1.567	DGM Flow	6.38	$DGM Flow_{STP}$ 6.22	*liters/minute*
9:49	Bag Temp.	112.3	°F	44.6	°C	$Sample_T$	79 °F	26.1	°C

Post-Sample Data

	Post Test M21	Background	*ppmv*	8-sec Dwell	*ppmv*	Total Dwell	*min:sec*	Final M21	*ppm* @ Stem
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A *hour:min*	0:00	*hours:min*		
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	1.41E-06 kg/hr
Percent difference THC ER =	42%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.08E-07
C5 as Pentane	2.49E-08
n-Hexane	2.59E-08
C6 as Hexane	2.59E-08
n-Heptane	2.70E-08
C7 as Heptane	2.70E-08
n-Octane	2.63E-08
C8 as Octane	3.97E-08
n-Nonane	2.65E-08
C9 as Nonane	2.61E-07
n-Decane	2.68E-08
C10 as Decane	5.07E-08
n-Undecane	2.67E-08
C11 as Undecane	2.67E-08
n-Dodecane	2.65E-08
C12 as Dodecane	2.65E-08
n-Tridecane	2.66E-08
C13 as Tridecane	2.66E-08
n-Tetradecane	2.65E-08
C14 as tetradecane	2.65E-08
n-Pentadecane	2.67E-08
C15 as Pentadecane	2.67E-08
n-Hexadecane	2.65E-08
C16 as Hexadecane	2.65E-08
n-Heptadecane	2.62E-08
C17 as Heptadecane	2.62E-08
n-Octadecane	2.65E-08
C18 as Octodecane	2.65E-08
n-Nonadecane	2.66E-08
C19 as Nonadecane	2.66E-08
n-Eicosane	2.65E-08
C20 as Eicosane	2.65E-08
n-Heneicosane	2.68E-08
C21 as Heneicosane	2.68E-08
n-Docosane	2.65E-08
C22 as Docosane	2.65E-08
n-Tricosane	2.66E-08
C23 as Tricosane	2.66E-08
n-Tetracosane	2.66E-08
C24 as Tetracosane	2.66E-08
Total Hydrocarbon	1.41E-06

THC:	7.48E-05	lbs/day	1.36E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C025A	C025A		ND Adj	C026A		ND Adj	#C006A		ND Adj						
Component	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	212.6659	J	213	135.68	ND	0	148	ND	0	213	0.21	24	104	1.04E-07	1.04E-07
C5 as Pentane	68.33577	ND	34	135.68	ND	0	148	ND	0	34	0.03	4	17	1.67E-08	1.67E-08
n-Hexane	70.9927	ND	35	140.96	ND	0	212	ND	0	35	0.04	4	17	1.73E-08	1.73E-08
C6 as Hexane	70.9927	ND	35	140.96	ND	0	212	ND	0	35	0.04	4	17	1.73E-08	1.73E-08
n-Heptane	74.18978	ND	37	147.3	ND	0	176	ND	0	37	0.04	4	18	1.81E-08	1.81E-08
C7 as Heptane	74.18978	ND	37	147.3	ND	0	176	ND	0	37	0.04	4	18	1.81E-08	1.81E-08
n-Octane	72.23358	ND	36	143.42	ND	0	152	ND	0	36	0.04	4	18	1.76E-08	1.76E-08
C8 as Octane	91.05468	J	91	143.42	ND	0	152	ND	0	91	0.09	10	44	4.45E-08	4.45E-08
n-Nonane	72.77372	ND	36	144.49	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C9 as Nonane	541.3748	J	541	144.49	ND	0	153	ND	0	541	0.54	62	264	2.64E-07	2.64E-07
n-Decane	73.43066	ND	37	145.8	ND	0	155	ND	0	37	0.04	4	18	1.79E-08	1.79E-08
C10 as Decane	134.9459	J	135	145.8	ND	0	155	ND	0	135	0.13	15	66	6.59E-08	6.59E-08
n-Undecane	73.24088	ND	37	145.42	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	1.79E-08
C11 as Undecane	73.24088	ND	37	145.42	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	1.79E-08
n-Dodecane	72.74453	ND	36	144.43	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C12 as Dodecane	72.74453	ND	36	144.43	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Tridecane	72.91971	ND	36	144.78	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C13 as Tridecane	72.91971	ND	36	144.78	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Tetradecane	72.84672	ND	36	144.64	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C14 as tetradecane	72.84672	ND	36	144.64	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Pentadecane	73.21168	ND	37	145.36	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	1.79E-08
C15 as Pentadecane	73.21168	ND	37	145.36	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	1.79E-08
n-Hexadecane	72.81752	ND	36	144.58	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C16 as Hexadecane	72.81752	ND	36	144.58	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Heptadecane	71.9708	ND	36	142.9	ND	0	152	ND	0	36	0.04	4	18	1.76E-08	1.76E-08
C17 as Heptadecane	71.9708	ND	36	142.9	ND	0	152	ND	0	36	0.04	4	18	1.76E-08	1.76E-08
n-Octadecane	72.77372	ND	36	144.49	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C18 as Octodecane	72.77372	ND	36	144.49	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Nonadecane	72.91971	ND	36	144.78	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C19 as Nonadecane	72.91971	ND	36	144.78	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Eicosane	72.74453	ND	36	144.43	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C20 as Eicosane	72.74453	ND	36	144.43	ND	0	153	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Heneicosane	73.43066	ND	37	145.8	ND	0	155	ND	0	37	0.04	4	18	1.79E-08	1.79E-08
C21 as Heneicosane	73.43066	ND	37	145.8	ND	0	155	ND	0	37	0.04	4	18	1.79E-08	1.79E-08
n-Docosane	72.59854	ND	36	144.14	ND	0	153	ND	0	36	0.04	4	18	1.77E-08	1.77E-08
C22 as Docosane	72.59854	ND	36	144.14	ND	0	153	ND	0	36	0.04	4	18	1.77E-08	1.77E-08
n-Tricosane	72.9927	ND	36	144.93	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
C23 as Tricosane	72.9927	ND	36	144.93	ND	0	154	ND	0	36	0.04	4	18	1.78E-08	1.78E-08
n-Tetracosane	73.09489	ND	37	145.13	ND	0	154	ND	0	37	0.04	4	18	1.78E-08	1.78E-08
C24 as Tetracosane	73.09489	ND	37	145.13	ND	0	154	ND	0	37	0.04	4	18	1.78E-08	1.78E-08
Total Hydrocarbon			2,289			0			0		2.29	261	1,118	1.12E-06	1.12E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C025B	C025B		ND Adj	C026A		ND Adj	#C006A		ND Adj						
Component	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	228.1474	J	228	136	ND	0	148	ND	0	228	0.23	26	111	1.11E-07	1.11E-07
C5 as Pentane	135.6812	ND	68	136	ND	0	148	ND	0	68	0.07	8	33	3.31E-08	3.31E-08
n-Hexane	140.9565	ND	70	141	ND	0	212	ND	0	70	0.07	8	34	3.44E-08	3.44E-08
C6 as Hexane	140.9565	ND	70	141	ND	0	212	ND	0	70	0.07	8	34	3.44E-08	3.44E-08
n-Heptane	147.3043	ND	74	147	ND	0	176	ND	0	74	0.07	8	36	3.60E-08	3.60E-08
C7 as Heptane	147.3043	ND	74	147	ND	0	176	ND	0	74	0.07	8	36	3.60E-08	3.60E-08
n-Octane	143.4203	ND	72	143	ND	0	152	ND	0	72	0.07	8	35	3.50E-08	3.50E-08
C8 as Octane	143.4203	ND	72	143	ND	0	152	ND	0	72	0.07	8	35	3.50E-08	3.50E-08
n-Nonane	144.4928	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C9 as Nonane	529.6205	J	530	144	ND	0	153	ND	0	530	0.53	60	259	2.59E-07	2.59E-07
n-Decane	145.7971	ND	73	146	ND	0	155	ND	0	73	0.07	8	36	3.56E-08	3.56E-08
C10 as Decane	145.7971	ND	73	146	ND	0	155	ND	0	73	0.07	8	36	3.56E-08	3.56E-08
n-Undecane	145.4203	ND	73	145	ND	0	154	ND	0	73	0.07	8	36	3.55E-08	3.55E-08
C11 as Undecane	145.4203	ND	73	145	ND	0	154	ND	0	73	0.07	8	36	3.55E-08	3.55E-08
n-Dodecane	144.4348	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C12 as Dodecane	144.4348	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Tridecane	144.7826	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C13 as Tridecane	144.7826	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Tetradecane	144.6377	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C14 as tetradecane	144.6377	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Pentadecane	145.3623	ND	73	145	ND	0	154	ND	0	73	0.07	8	35	3.55E-08	3.55E-08
C15 as Pentadecane	145.3623	ND	73	145	ND	0	154	ND	0	73	0.07	8	35	3.55E-08	3.55E-08
n-Hexadecane	144.5797	ND	72	145	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C16 as Hexadecane	144.5797	ND	72	145	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Heptadecane	142.8985	ND	71	143	ND	0	152	ND	0	71	0.07	8	35	3.49E-08	3.49E-08
C17 as Heptadecane	142.8985	ND	71	143	ND	0	152	ND	0	71	0.07	8	35	3.49E-08	3.49E-08
n-Octadecane	144.4928	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C18 as Octodecane	144.4928	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Nonadecane	144.7826	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C19 as Nonadecane	144.7826	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Eicosane	144.4348	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
C20 as Eicosane	144.4348	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.53E-08	3.53E-08
n-Heneicosane	145.7971	ND	73	146	ND	0	155	ND	0	73	0.07	8	36	3.56E-08	3.56E-08
C21 as Heneicosane	145.7971	ND	73	146	ND	0	155	ND	0	73	0.07	8	36	3.56E-08	3.56E-08
n-Docosane	144.1449	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.52E-08	3.52E-08
C22 as Docosane	144.1449	ND	72	144	ND	0	153	ND	0	72	0.07	8	35	3.52E-08	3.52E-08
n-Tricosane	144.9275	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.54E-08	3.54E-08
C23 as Tricosane	144.9275	ND	72	145	ND	0	154	ND	0	72	0.07	8	35	3.54E-08	3.54E-08
n-Tetracosane	145.1304	ND	73	145	ND	0	154	ND	0	73	0.07	8	35	3.54E-08	3.54E-08
C24 as Tetracosane	145.1304	ND	73	145	ND	0	154	ND	0	73	0.07	8	35	3.54E-08	3.54E-08
Total Hydrocarbon			3,501			0			0		3.50	399	1,710	1.71E-06	1.71E-06

Bagging Data Form **Vacuum Method** **Sample Id** C027

WSPA Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	**20522.3**	
Equipment Subtype:	Flange		**Unit:**	Refinery C	
Line Size:	2 *inches*		**Date:**	30-May-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/MM	
Barometric pressure	29.84 *inHg*	757.9 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	76.4 *°F*	24.7 *°C*	**TVA ID**	37887	
Component Temp:	470 *°F*	243.3 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:					

<u>CONVERSIONS</u>:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
10:12	Background	-2 *ppmv*	8-sec Dwell	1 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	3.8 *ppm*
11:06	Initial Bag Vacuum	0.01 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	- *°F*	Leak @	Flange 2 o'clock

Bag Concentrations (ppmv) (Melted Mylar - Used Tinfoil Bag)

Time	11:07	11:09	11:13	11:18	11:21									
ppmv	34	34.6		24	14.5									

Sorbent Tube Sample Collection Parameters

C027A

Time							
11:09	Volume Start	947.1 *Liters*		Design Sample Flow Rate = 1 liter/min			
11:22	Volume Stop	959.9 *Liters*	Total Vol	12.8 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.974 *L/min*

C027B

11:09	Volume Start	874.4 *Liters*		Design Sample Flow Rate = 1 liter/min			
11:22	Volume Stop	887.4 *Liters*	Total Vol	13.0 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	0.989 *L/min*
	Total ST Vol$_{STP}$	25.53 *Liters*	DGM Vol$_{STP}$	77.18 *Liters*	Total Run Vol$_{STP}$	102.71 *Liters*	

Bagging Parameters

Time							
11:12	Vacuum check	0.005 *inches H2O*			DGM$_P$	1.7 *inches H2O vacuum*	754.8 *mmHg*
11:12	DGM$_{10L}$ Time	01:40.1 *min:sec.frac*	DGM Time	1.667	DGM Flow	6.00	DGM Flow$_{STP}$ 5.94 *liters/minute*
11:13	Bag Temp.	*°F*	-17.8 *°C*		Sample$_T$	72 *°F*	22.2 *°C*

Post-Sample Data

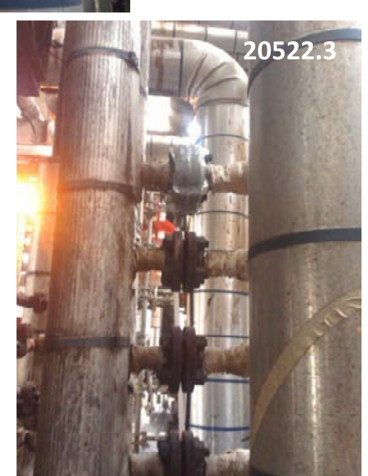
11:32 Post Test M21	Background	-6 *ppmv*	8-sec Dwell	0 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21 4 *ppm* @ Flange 2 o'clock
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A *ml*					
Density of organic condensate		N/A *g/ml*					

Average THC emissions =	6.70E-06	kg/hr
Percent difference THC ER =	1%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.37E-07
C5 as Pentane	2.72E-08
n-Hexane	2.82E-08
C6 as Hexane	3.72E-07
n-Heptane	2.95E-08
C7 as Heptane	1.25E-07
n-Octane	2.87E-08
C8 as Octane	9.24E-08
n-Nonane	2.89E-08
C9 as Nonane	1.26E-07
n-Decane	4.97E-08
C10 as Decane	9.10E-07
n-Undecane	2.91E-08
C11 as Undecane	2.39E-07
n-Dodecane	2.49E-07
C12 as Dodecane	8.03E-08
n-Tridecane	2.90E-08
C13 as Tridecane	1.46E-06
n-Tetradecane	4.27E-08
C14 as tetradecane	1.75E-07
n-Pentadecane	1.03E-07
C15 as Pentadecane	4.04E-07
n-Hexadecane	1.55E-07
C16 as Hexadecane	2.20E-07
n-Heptadecane	2.11E-07
C17 as Heptadecane	6.45E-07
n-Octadecane	4.81E-08
C18 as Octodecane	4.91E-08
n-Nonadecane	2.90E-08
C19 as Nonadecane	2.90E-08
n-Eicosane	2.89E-08
C20 as Eicosane	1.62E-07
n-Heneicosane	2.92E-08
C21 as Heneicosane	2.92E-08
n-Docosane	2.89E-08
C22 as Docosane	4.11E-08
n-Tricosane	2.90E-08
C23 as Tricosane	2.90E-08
n-Tetracosane	4.07E-08
C24 as Tetracosane	2.91E-08
Total Hydrocarbon	6.70E-06

THC:	**3.55E-04**	**lbs/day**	**6.47E-05**	**tons/yr**



ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C027A	C027A		ND Adj	C028A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	473.3058	J	473	156.03	ND	0	148	ND	0	473	0.47	49	224	2.24E-07	2.24E-07
C5 as Pentane	73.14062	ND	37	156.03	ND	0	148	ND	0	37	0.04	4	17	1.73E-08	1.73E-08
n-Hexane	75.98437	ND	38	162.1	ND	0	212	ND	0	38	0.04	4	18	1.80E-08	1.80E-08
C6 as Hexane	683.5608	J	684	162.1	ND	0	212	ND	0	684	0.68	70	324	3.24E-07	3.24E-07
n-Heptane	79.40625	ND	40	169.4	ND	0	176	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C7 as Heptane	310.8831	J	311	169.4	ND	0	176	ND	0	311	0.31	32	147	1.47E-07	1.47E-07
n-Octane	77.3125	ND	39	164.93	ND	0	152	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
C8 as Octane	199.6839	J	200	164.93	ND	0	152	ND	0	200	0.20	21	95	9.47E-08	9.47E-08
n-Nonane	77.89062	ND	39	166.17	ND	0	153	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
C9 as Nonane	274.9944	J	275	166.17	ND	0	153	ND	0	275	0.27	28	130	1.30E-07	1.30E-07
n-Decane	125.6402	J	126	167.67	ND	0	155	ND	0	126	0.13	13	60	5.96E-08	5.96E-08
C10 as Decane	1958.523		1,959	167.67	ND	0	155	ND	0	1,959	1.96	201	928	9.28E-07	9.28E-07
n-Undecane	78.39062	ND	39	167.23	ND	0	154	ND	0	39	0.04	4	19	1.86E-08	1.86E-08
C11 as Undecane	571.8434	J	572	167.23	ND	0	154	ND	0	572	0.57	59	271	2.71E-07	2.71E-07
n-Dodecane	533.1969	J	533	166.1	ND	0	153	ND	0	533	0.53	55	253	2.53E-07	2.53E-07
C12 as Dodecane	255.612	J	256	166.1	ND	0	153	ND	0	256	0.26	26	121	1.21E-07	1.21E-07
n-Tridecane	78.04687	ND	39	166.5	ND	0	154	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
C13 as Tridecane	3175.312		3,175	166.5	ND	0	154	ND	0	3,175	3.18	326	1505	1.51E-06	1.51E-06
n-Tetradecane	97.13656	J	97	166.33	ND	0	154	ND	0	97	0.10	10	46	4.60E-08	4.60E-08
C14 as tetradecane	385.4742	J	385	166.33	ND	0	154	ND	0	385	0.39	40	183	1.83E-07	1.83E-07
n-Pentadecane	212.9709	J	213	167.17	ND	0	154	ND	0	213	0.21	22	101	1.01E-07	1.01E-07
C15 as Pentadecane	916.4441		916	167.17	ND	0	154	ND	0	916	0.92	94	434	4.34E-07	4.34E-07
n-Hexadecane	303.4224	J	303	166.27	ND	0	153	ND	0	303	0.30	31	144	1.44E-07	1.44E-07
C16 as Hexadecane	522.8572	J	523	166.27	ND	0	153	ND	0	523	0.52	54	248	2.48E-07	2.48E-07
n-Heptadecane	438.354	J	438	164.33	ND	0	152	ND	0	438	0.44	45	208	2.08E-07	2.08E-07
C17 as Heptadecane	1296.955		1,297	164.33	ND	0	152	ND	0	1,297	1.30	133	615	6.15E-07	6.15E-07
n-Octadecane	119.6486	J	120	166.17	ND	0	153	ND	0	120	0.12	12	57	5.67E-08	5.67E-08
C18 as Octodecane	124.2125	J	124	166.17	ND	0	153	ND	0	124	0.12	13	59	5.89E-08	5.89E-08
n-Nonadecane	78.04687	ND	39	166.5	ND	0	154	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
C19 as Nonadecane	78.04687	ND	39	166.5	ND	0	154	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
n-Eicosane	77.85937	ND	39	166.1	ND	0	153	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
C20 as Eicosane	300.182	J	300	166.1	ND	0	153	ND	0	300	0.30	31	142	1.42E-07	1.42E-07
n-Heneicosane	78.59375	ND	39	167.67	ND	0	155	ND	0	39	0.04	4	19	1.86E-08	1.86E-08
C21 as Heneicosane	78.59375	ND	39	167.67	ND	0	155	ND	0	39	0.04	4	19	1.86E-08	1.86E-08
n-Docosane	77.70312	ND	39	165.77	ND	0	153	ND	0	39	0.04	4	18	1.84E-08	1.84E-08
C22 as Docosane	90.67269	J	91	165.77	ND	0	153	ND	0	91	0.09	9	43	4.30E-08	4.30E-08
n-Tricosane	78.125	ND	39	166.67	ND	0	154	ND	0	39	0.04	4	19	1.85E-08	1.85E-08
C23 as Tricosane	78.125	ND	39	166.67	ND	0	154	ND	0	39	0.04	4	19	1.85E-08	1.85E-08
n-Tetracosane	88.26645	J	88	166.9	ND	0	154	ND	0	88	0.09	9	42	4.18E-08	4.18E-08
C24 as Tetracosane	78.23437	ND	39	166.9	ND	0	154	ND	0	39	0.04	4	19	1.85E-08	1.85E-08
Total Hydrocarbon			14,081			0			0		14.08	1446	6,675	6.67E-06	6.67E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C027B	C027B		ND Adj	C028A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	524.7024	J	525	156	ND	0	148	ND	0	525	0.52	54	249	2.49E-07	2.49E-07
C5 as Pentane	156.0333	ND	78	156	ND	0	148	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
n-Hexane	162.1	ND	81	162	ND	0	212	ND	0	81	0.08	8	38	3.84E-08	3.84E-08
C6 as Hexane	886.1234	J	886	162	ND	0	212	ND	0	886	0.89	91	420	4.20E-07	4.20E-07
n-Heptane	169.4	ND	85	169	ND	0	176	ND	0	85	0.08	9	40	4.02E-08	4.02E-08
C7 as Heptane	216.4032	J	216	169	ND	0	176	ND	0	216	0.22	22	103	1.03E-07	1.03E-07
n-Octane	164.9333	ND	82	165	ND	0	152	ND	0	82	0.08	8	39	3.91E-08	3.91E-08
C8 as Octane	190.2749	J	190	165	ND	0	152	ND	0	190	0.19	20	90	9.02E-08	9.02E-08
n-Nonane	166.1667	ND	83	166	ND	0	153	ND	0	83	0.08	9	39	3.94E-08	3.94E-08
C9 as Nonane	256.1598	J	256	166	ND	0	153	ND	0	256	0.26	26	121	1.21E-07	1.21E-07
n-Decane	167.6667	ND	84	168	ND	0	155	ND	0	84	0.08	9	40	3.97E-08	3.97E-08
C10 as Decane	1882.394		1,882	168	ND	0	155	ND	0	1,882	1.88	193	892	8.92E-07	8.92E-07
n-Undecane	167.2333	ND	84	167	ND	0	154	ND	0	84	0.08	9	40	3.96E-08	3.96E-08
C11 as Undecane	435.2587	J	435	167	ND	0	154	ND	0	435	0.44	45	206	2.06E-07	2.06E-07
n-Dodecane	516.281	J	516	166	ND	0	153	ND	0	516	0.52	53	245	2.45E-07	2.45E-07
C12 as Dodecane	166.1	ND	83	166	ND	0	153	ND	0	83	0.08	9	39	3.94E-08	3.94E-08
n-Tridecane	166.5	ND	83	167	ND	0	154	ND	0	83	0.08	9	39	3.95E-08	3.95E-08
C13 as Tridecane	2994.646		2,995	167	ND	0	154	ND	0	2,995	2.99	308	1420	1.42E-06	1.42E-06
n-Tetradecane	166.3333	ND	83	166	ND	0	154	ND	0	83	0.08	9	39	3.94E-08	3.94E-08
C14 as tetradecane	352.7777	J	353	166	ND	0	154	ND	0	353	0.35	36	167	1.67E-07	1.67E-07
n-Pentadecane	223.5197	J	224	167	ND	0	154	ND	0	224	0.22	23	106	1.06E-07	1.06E-07
C15 as Pentadecane	786.9623	J	787	167	ND	0	154	ND	0	787	0.79	81	373	3.73E-07	3.73E-07
n-Hexadecane	349.7022	J	350	166	ND	0	153	ND	0	350	0.35	36	166	1.66E-07	1.66E-07
C16 as Hexadecane	407.0502	J	407	166	ND	0	153	ND	0	407	0.41	42	193	1.93E-07	1.93E-07
n-Heptadecane	453.6651	J	454	164	ND	0	152	ND	0	454	0.45	47	215	2.15E-07	2.15E-07
C17 as Heptadecane	1425.713	J	1,426	164	ND	0	152	ND	0	1,426	1.43	146	676	6.76E-07	6.76E-07
n-Octadecane	166.1667	ND	83	166	ND	0	153	ND	0	83	0.08	9	39	3.94E-08	3.94E-08
C18 as Octodecane	166.1667	ND	83	166	ND	0	153	ND	0	83	0.08	9	39	3.94E-08	3.94E-08
n-Nonadecane	166.5	ND	83	167	ND	0	154	ND	0	83	0.08	9	39	3.95E-08	3.95E-08
C19 as Nonadecane	166.5	ND	83	167	ND	0	154	ND	0	83	0.08	9	39	3.95E-08	3.95E-08
n-Eicosane	166.1	ND	83	166	ND	0	153	ND	0	83	0.08	9	39	3.94E-08	3.94E-08
C20 as Eicosane	383.7222	J	384	166	ND	0	153	ND	0	384	0.38	39	182	1.82E-07	1.82E-07
n-Heneicosane	167.6667	ND	84	168	ND	0	155	ND	0	84	0.08	9	40	3.97E-08	3.97E-08
C21 as Heneicosane	167.6667	ND	84	168	ND	0	155	ND	0	84	0.08	9	40	3.97E-08	3.97E-08
n-Docosane	165.7667	ND	83	166	ND	0	153	ND	0	83	0.08	9	39	3.93E-08	3.93E-08
C22 as Docosane	165.7667	ND	83	166	ND	0	153	ND	0	83	0.08	9	39	3.93E-08	3.93E-08
n-Tricosane	166.6667	ND	83	167	ND	0	154	ND	0	83	0.08	9	40	3.95E-08	3.95E-08
C23 as Tricosane	166.6667	ND	83	167	ND	0	154	ND	0	83	0.08	9	40	3.95E-08	3.95E-08
n-Tetracosane	166.9	ND	83	167	ND	0	154	ND	0	83	0.08	9	40	3.96E-08	3.96E-08
C24 as Tetracosane	166.9	ND	83	167	ND	0	154	ND	0	83	0.08	9	40	3.96E-08	3.96E-08
Total Hydrocarbon			14,194			0			0		14.19	1458	6,729	6.73E-06	6.73E-06

Bagging Data Form — Vacuum Method

Sample Id: C029

WSPA Western States Petroleum Association

Equipment type:	Valve	**Component ID:**	21210
Equipment Subtype:	Gate	**Unit:**	Refinery C
Line Size:	4 *inches*	**Date:**	30-May-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR/MM
Barometric pressure	29.81 *inHg* / 757.2 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	84.5 *°F* / 29.2 *°C*	**TVA ID**	34251
Component Temp:	92 *°F* / 33.3 *°C*	**Stream Pressure/Temp:**	*psig* / *°F*
Stream Description:	*Wash Oil*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:57	Background	0	*ppmv*	8-sec Dwell	10	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	243 *ppm*
13:32	Initial Bag Vacuum	0.11	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	100.8	*°F*	Leak @	Stem

Bag Concentrations (ppmv) (had to vent bag)

Time	13:33	13:35	13:37	13:39	13:41	13:43	13:45	13:47	13:55	13:58				
ppmv	9.2	10.6	11	11.3	11.7	11.6	12.4	12.5	13.6	13.7				

Sorbent Tube Sample Collection Parameters

C029A

Time									
13:47	Volume Start	959.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:00	Volume Stop	972.5	*Liters*	Total Vol	12.6 *Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.900	*L/min*

C029B

13:47	Volume Start	887.4	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:00	Volume Stop	900.1	*Liters*	Total Vol	12.7 *Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.908	*L/min*
	Total ST Vol$_{STP}$	23.51	*Liters*	DGM Vol$_{STP}$	69.68 *Liters*	Total Run Vol$_{STP}$	93.18	*Liters*	

Bagging Parameters

Time									
13:51	Vacuum check	0.08	*inches H2O*			DGM$_P$	1.7 *inches H2O vacuum*	754.0	*mmHg*
13:50	DGM$_{10L}$ Time	01:44.5	*min:sec.frac*	DGM Time	1.733	DGM Flow	5.77	DGM Flow$_{STP}$ 5.36	*liters/minute*
13:52	Bag Temp.	110.8	*°F*	43.8	*°C*	Sample$_T$	106 *°F*	41.1	*°C*

Post-Sample Data

14:07	Post Test M21	Background	0 *ppmv*	8-sec Dwell	60 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	228 *ppm* @ Stem

Condensate accumulation: starting time 13:38 *hour:min* — Final time N/A *hour:min* — 0:00 *hours:min*
Organic condensate collected: not measurable *ml*
Density of organic condensate: N/A *g/ml*

Average THC emissions =	3.36E-06 kg/hr
Percent difference THC ER =	2%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.38E-08
C5 as Pentane	2.38E-08
n-Hexane	2.48E-08
C6 as Hexane	2.48E-08
n-Heptane	2.59E-08
C7 as Heptane	2.59E-08
n-Octane	2.52E-08
C8 as Octane	3.98E-07
n-Nonane	2.54E-08
C9 as Nonane	4.34E-07
n-Decane	3.49E-08
C10 as Decane	5.20E-07
n-Undecane	3.46E-08
C11 as Undecane	2.80E-07
n-Dodecane	2.54E-08
C12 as Dodecane	2.16E-07
n-Tridecane	5.14E-08
C13 as Tridecane	5.67E-07
n-Tetradecane	3.59E-08
C14 as tetradecane	2.54E-08
n-Pentadecane	2.55E-08
C15 as Pentadecane	3.43E-08
n-Hexadecane	2.54E-08
C16 as Hexadecane	2.54E-08
n-Heptadecane	2.51E-08
C17 as Heptadecane	4.39E-08
n-Octadecane	2.54E-08
C18 as Octodecane	2.54E-08
n-Nonadecane	2.54E-08
C19 as Nonadecane	2.54E-08
n-Eicosane	2.54E-08
C20 as Eicosane	2.54E-08
n-Heneicosane	2.56E-08
C21 as Heneicosane	2.56E-08
n-Docosane	2.53E-08
C22 as Docosane	2.53E-08
n-Tricosane	2.55E-08
C23 as Tricosane	2.55E-08
n-Tetracosane	2.55E-08
C24 as Tetracosane	2.55E-08
Total Hydrocarbon	3.36E-06

THC: 1.78E-04 lbs/day 3.24E-05 tons/yr

ANALYTICAL RESULTS C029A Component	C029A µg/m³	Flag	ND Adj µg/m³	BACKGROUND C030A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	74.30159	ND	37	146.28	ND	0	148	ND	0	37	0.04	3	16	1.60E-08	1.60E-08
C5 as Pentane	74.30159	ND	37	146.28	ND	0	148	ND	0	37	0.04	3	16	1.60E-08	1.60E-08
n-Hexane	77.19047	ND	39	151.97	ND	0	212	ND	0	39	0.04	4	17	1.66E-08	1.66E-08
C6 as Hexane	77.19047	ND	39	151.97	ND	0	212	ND	0	39	0.04	4	17	1.66E-08	1.66E-08
n-Heptane	80.66666	ND	40	158.81	ND	0	176	ND	0	40	0.04	4	17	1.73E-08	1.73E-08
C7 as Heptane	80.66666	ND	40	158.81	ND	0	176	ND	0	40	0.04	4	17	1.73E-08	1.73E-08
n-Octane	78.53968	ND	39	154.62	ND	0	152	ND	0	39	0.04	4	17	1.69E-08	1.69E-08
C8 as Octane	925.3662		925	154.62	ND	0	152	ND	0	925	0.93	86	398	3.98E-07	3.98E-07
n-Nonane	79.12698	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
C9 as Nonane	960.8735		961	155.78	ND	0	153	ND	0	961	0.96	90	413	4.13E-07	4.13E-07
n-Decane	82.99921	J	83	157.19	ND	0	155	ND	0	83	0.08	8	36	3.57E-08	3.57E-08
C10 as Decane	1205.541		1,206	157.19	ND	0	155	ND	0	1,206	1.21	112	518	5.18E-07	5.18E-07
n-Undecane	82.0238	J	82	156.78	ND	0	154	ND	0	82	0.08	8	35	3.53E-08	3.53E-08
C11 as Undecane	627.6671	J	628	156.78	ND	0	154	ND	0	628	0.63	58	270	2.70E-07	2.70E-07
n-Dodecane	79.09524	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
C12 as Dodecane	594.3662	J	594	155.72	ND	0	153	ND	0	594	0.59	55	256	2.56E-07	2.56E-07
n-Tridecane	160.3091	J	160	156.09	ND	0	154	ND	0	160	0.16	15	69	6.89E-08	6.89E-08
C13 as Tridecane	1710.104		1,710	156.09	ND	0	154	ND	0	1,710	1.71	159	735	7.35E-07	7.35E-07
n-Tetradecane	88.20148	J	88	155.94	ND	0	154	ND	0	88	0.09	8	38	3.79E-08	3.79E-08
C14 as tetradecane	79.20635	ND	40	155.94	ND	0	154	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
n-Pentadecane	79.60317	ND	40	156.72	ND	0	154	ND	0	40	0.04	4	17	1.71E-08	1.71E-08
C15 as Pentadecane	80.4333	J	80	156.72	ND	0	154	ND	0	80	0.08	7	35	3.46E-08	3.46E-08
n-Hexadecane	79.1746	ND	40	155.87	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
C16 as Hexadecane	79.1746	ND	40	155.87	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
n-Heptadecane	78.25397	ND	39	154.06	ND	0	152	ND	0	39	0.04	4	17	1.68E-08	1.68E-08
C17 as Heptadecane	126.3926	J	126	154.06	ND	0	152	ND	0	126	0.13	12	54	5.44E-08	5.44E-08
n-Octadecane	79.12698	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
C18 as Octodecane	79.12698	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
n-Nonadecane	79.28571	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
C19 as Nonadecane	79.28571	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
n-Eicosane	79.09524	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
C20 as Eicosane	79.09524	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	17	1.70E-08	1.70E-08
n-Heneicosane	79.84127	ND	40	157.19	ND	0	155	ND	0	40	0.04	4	17	1.72E-08	1.72E-08
C21 as Heneicosane	79.84127	ND	40	157.19	ND	0	155	ND	0	40	0.04	4	17	1.72E-08	1.72E-08
n-Docosane	78.93651	ND	39	155.41	ND	0	153	ND	0	39	0.04	4	17	1.70E-08	1.70E-08
C22 as Docosane	78.93651	ND	39	155.41	ND	0	153	ND	0	39	0.04	4	17	1.70E-08	1.70E-08
n-Tricosane	79.36508	ND	40	156.25	ND	0	154	ND	0	40	0.04	4	17	1.71E-08	1.71E-08
C23 as Tricosane	79.36508	ND	40	156.25	ND	0	154	ND	0	40	0.04	4	17	1.71E-08	1.71E-08
n-Tetracosane	79.47619	ND	40	156.47	ND	0	154	ND	0	40	0.04	4	17	1.71E-08	1.71E-08
C24 as Tetracosane	79.47619	ND	40	156.47	ND	0	154	ND	0	40	0.04	4	17	1.71E-08	1.71E-08
Total Hydrocarbon			7,748			0			0		7.75	722	3,332	3.33E-06	3.33E-06

ANALYTICAL RESULTS C029B Component	C029B µg/m³	Flag	ND Adj µg/m³	BACKGROUND C030A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	147.4331	ND	74	146	ND	0	148	ND	0	74	0.07	7	32	3.17E-08	3.17E-08
C5 as Pentane	147.4331	ND	74	146	ND	0	148	ND	0	74	0.07	7	32	3.17E-08	3.17E-08
n-Hexane	153.1654	ND	77	152	ND	0	212	ND	0	77	0.08	7	33	3.29E-08	3.29E-08
C6 as Hexane	153.1654	ND	77	152	ND	0	212	ND	0	77	0.08	7	33	3.29E-08	3.29E-08
n-Heptane	160.063	ND	80	159	ND	0	176	ND	0	80	0.08	7	34	3.44E-08	3.44E-08
C7 as Heptane	160.063	ND	80	159	ND	0	176	ND	0	80	0.08	7	34	3.44E-08	3.44E-08
n-Octane	155.8425	ND	78	155	ND	0	152	ND	0	78	0.08	7	34	3.35E-08	3.35E-08
C8 as Octane	924.4508	J	924	155	ND	0	152	ND	0	924	0.92	86	398	3.98E-07	3.98E-07
n-Nonane	157.0079	ND	79	156	ND	0	153	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
C9 as Nonane	1056.824	J	1,057	156	ND	0	153	ND	0	1,057	1.06	98	455	4.55E-07	4.55E-07
n-Decane	158.4252	ND	79	157	ND	0	155	ND	0	79	0.08	7	34	3.41E-08	3.41E-08
C10 as Decane	1212.648	J	1,213	157	ND	0	155	ND	0	1,213	1.21	113	522	5.22E-07	5.22E-07
n-Undecane	158.0158	ND	79	157	ND	0	154	ND	0	79	0.08	7	34	3.40E-08	3.40E-08
C11 as Undecane	675.3054	J	675	157	ND	0	154	ND	0	675	0.68	63	290	2.90E-07	2.90E-07
n-Dodecane	156.9449	ND	78	156	ND	0	153	ND	0	78	0.08	7	34	3.37E-08	3.37E-08
C12 as Dodecane	412.0578	J	412	156	ND	0	153	ND	0	412	0.41	38	177	1.77E-07	1.77E-07
n-Tridecane	157.3228	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
C13 as Tridecane	927.4168	J	927	156	ND	0	154	ND	0	927	0.93	86	399	3.99E-07	3.99E-07
n-Tetradecane	157.1654	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
C14 as tetradecane	157.1654	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
n-Pentadecane	157.9528	ND	79	157	ND	0	154	ND	0	79	0.08	7	34	3.40E-08	3.40E-08
C15 as Pentadecane	157.9528	ND	79	157	ND	0	154	ND	0	79	0.08	7	34	3.40E-08	3.40E-08
n-Hexadecane	157.1024	ND	79	156	ND	0	153	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
C16 as Hexadecane	157.1024	ND	79	156	ND	0	153	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
n-Heptadecane	155.2756	ND	78	154	ND	0	152	ND	0	78	0.08	7	33	3.34E-08	3.34E-08
C17 as Heptadecane	155.2756	ND	78	154	ND	0	152	ND	0	78	0.08	7	33	3.34E-08	3.34E-08
n-Octadecane	157.0079	ND	79	156	ND	0	153	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
C18 as Octodecane	157.0079	ND	79	156	ND	0	153	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
n-Nonadecane	157.3228	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
C19 as Nonadecane	157.3228	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.38E-08	3.38E-08
n-Eicosane	156.9449	ND	78	156	ND	0	153	ND	0	78	0.08	7	34	3.37E-08	3.37E-08
C20 as Eicosane	156.9449	ND	78	156	ND	0	153	ND	0	78	0.08	7	34	3.37E-08	3.37E-08
n-Heneicosane	158.4252	ND	79	157	ND	0	155	ND	0	79	0.08	7	34	3.41E-08	3.41E-08
C21 as Heneicosane	158.4252	ND	79	157	ND	0	155	ND	0	79	0.08	7	34	3.41E-08	3.41E-08
n-Docosane	156.6299	ND	78	155	ND	0	153	ND	0	78	0.08	7	34	3.37E-08	3.37E-08
C22 as Docosane	156.6299	ND	78	155	ND	0	153	ND	0	78	0.08	7	34	3.37E-08	3.37E-08
n-Tricosane	157.4803	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.39E-08	3.39E-08
C23 as Tricosane	157.4803	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.39E-08	3.39E-08
n-Tetracosane	157.7008	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.39E-08	3.39E-08
C24 as Tetracosane	157.7008	ND	79	156	ND	0	154	ND	0	79	0.08	7	34	3.39E-08	3.39E-08
Total Hydrocarbon			7,870			0			0		7.87	733	3,385	3.38E-06	3.38E-06

Bagging Data Form — Vacuum Method

Sample Id	C031				
Equipment type:	Connector	**Component ID:**	21025.3		
Equipment Subtype:	Threaded	**Unit:**	Refinery C		
Line Size:	3/4 *inches*	**Date:**	31-May-18		
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR		
Barometric pressure	29.93 *inHg*	760.2 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	64 °F	17.8 °C	**TVA ID**	37887	
Component Temp:	87 °F	30.6 °C	**Stream Pressure/Temp:**	800 *psig*	°F
Stream Description:	*Charge Oil Fed from SDA Rose PCC BKR IIB at P-102*				

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
9:01	Background	0 *ppmv*	8-sec Dwell	0 *ppmv*	Total Dwell	5:00 *min:sec*	Final M21	11 *ppm*
9:46	Initial Bag Vacuum	0.015 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	71.8 °F	Leak @	Connector

Bag Concentrations (ppmv)

Time	9:48	9:50	9:52	9:54	9:56	9:58	10:07	10:09						
ppmv	1.7	2.6	2.7	3.6	3.4	3.5	3.5	3.4						

Sorbent Tube Sample Collection Parameters

C031A

Time						
9:58	Volume Start	974.8 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:11	Volume Stop	987.3 *Liters*	Total Vol	12.5 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.962 *L/min*	Sorbent Flow$_{STP}$	0.976 *L/min*

C031B

9:58	Volume Start	902.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:11	Volume Stop	915.2 *Liters*	Total Vol	12.6 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.969 *L/min*	Sorbent Flow$_{STP}$	0.984 *L/min*
	Total ST Vol$_{STP}$	25.47 *Liters*	DGM Vol$_{STP}$	81.61 *Liters*	Total Run Vol$_{STP}$	107.09 *Liters*

Bagging Parameters

Time							
10:02	Vacuum check	0.02 *inches H2O*			DGM$_P$	1.9 *inches H2O vacuum*	756.7 *mmHg*
10:01	DGM$_{10L}$ Time	01:36.7 *min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM Flow$_{STP}$ 6.28 *liters/minute*
10:03	Bag Temp.	81.9 °F	27.7 °C		Sample$_T$	60 °F	15.6 °C

Post-Sample Data

10:20	Post Test M21	Background 0 *ppmv*	8-sec Dwell	1 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	3 *ppm* @ Connector

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	1.51E-06 kg/hr
Percent difference THC ER =	46%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.76E-08
C5 as Pentane	2.76E-08
n-Hexane	2.87E-08
C6 as Hexane	2.87E-08
n-Heptane	3.00E-08
C7 as Heptane	3.00E-08
n-Octane	2.92E-08
C8 as Octane	2.92E-08
n-Nonane	2.94E-08
C9 as Nonane	2.94E-08
n-Decane	2.97E-08
C10 as Decane	3.65E-07
n-Undecane	2.96E-08
C11 as Undecane	2.96E-08
n-Dodecane	2.94E-08
C12 as Dodecane	2.94E-08
n-Tridecane	2.95E-08
C13 as Tridecane	2.95E-08
n-Tetradecane	2.94E-08
C14 as tetradecane	2.94E-08
n-Pentadecane	2.96E-08
C15 as Pentadecane	2.96E-08
n-Hexadecane	2.94E-08
C16 as Hexadecane	2.94E-08
n-Heptadecane	2.91E-08
C17 as Heptadecane	2.91E-08
n-Octadecane	2.94E-08
C18 as Octodecane	2.94E-08
n-Nonadecane	2.95E-08
C19 as Nonadecane	2.95E-08
n-Eicosane	2.94E-08
C20 as Eicosane	2.94E-08
n-Heneicosane	2.97E-08
C21 as Heneicosane	2.97E-08
n-Docosane	2.93E-08
C22 as Docosane	2.93E-08
n-Tricosane	2.95E-08
C23 as Tricosane	2.95E-08
n-Tetracosane	2.95E-08
C24 as Tetracosane	2.95E-08
Total Hydrocarbon	1.51E-06

THC:	**7.98E-05**	**lbs/day**	**1.46E-05 tons/yr**	

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C031A	C031A		ND Adj	C032A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.896	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	19	1.85E-08	1.85E-08
C5 as Pentane	74.896	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	19	1.85E-08	1.85E-08
n-Hexane	77.808	ND	39	150.79	ND	0	212	ND	0	39	0.04	4	19	1.92E-08	1.92E-08
C6 as Hexane	77.808	ND	39	150.79	ND	0	212	ND	0	39	0.04	4	19	1.92E-08	1.92E-08
n-Heptane	81.312	ND	41	157.58	ND	0	176	ND	0	41	0.04	4	20	2.01E-08	2.01E-08
C7 as Heptane	81.312	ND	41	157.58	ND	0	176	ND	0	41	0.04	4	20	2.01E-08	2.01E-08
n-Octane	79.168	ND	40	153.43	ND	0	152	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
C8 as Octane	79.168	ND	40	153.43	ND	0	152	ND	0	40	0.04	4	20	1.96E-08	1.96E-08
n-Nonane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C9 as Nonane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Decane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C10 as Decane	792.9962	J	793	155.97	ND	0	155	ND	0	793	0.79	85	392	3.92E-07	3.92E-07
n-Undecane	80.272	ND	40	155.57	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
C11 as Undecane	80.272	ND	40	155.57	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
n-Dodecane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C12 as Dodecane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Tridecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
C13 as Tridecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
n-Tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C14 as tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
C15 as Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
n-Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C16 as Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	19	1.95E-08	1.95E-08
C17 as Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	19	1.95E-08	1.95E-08
n-Octadecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C18 as Octodecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
C19 as Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
n-Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C20 as Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C21 as Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
C22 as Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	4	20	1.97E-08	1.97E-08
n-Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
C23 as Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
n-Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
C24 as Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	20	1.98E-08	1.98E-08
Total Hydrocarbon			2,344			0			0		2.34	251	1,159	1.16E-06	1.16E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C031B	C031B		ND Adj	C032A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.6032	ND	74	145	ND	0	148	ND	0	74	0.07	8	37	3.67E-08	3.67E-08
C5 as Pentane	148.6032	ND	74	145	ND	0	148	ND	0	74	0.07	8	37	3.67E-08	3.67E-08
n-Hexane	154.3809	ND	77	151	ND	0	212	ND	0	77	0.08	8	38	3.82E-08	3.82E-08
C6 as Hexane	154.3809	ND	77	151	ND	0	212	ND	0	77	0.08	8	38	3.82E-08	3.82E-08
n-Heptane	161.3333	ND	81	158	ND	0	176	ND	0	81	0.08	9	40	3.99E-08	3.99E-08
C7 as Heptane	161.3333	ND	81	158	ND	0	176	ND	0	81	0.08	9	40	3.99E-08	3.99E-08
n-Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C8 as Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Nonane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C9 as Nonane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Decane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	9	39	3.95E-08	3.95E-08
C10 as Decane	683.4869	J	683	156	ND	0	155	ND	0	683	0.68	73	338	3.38E-07	3.38E-07
n-Undecane	159.2698	ND	80	156	ND	0	154	ND	0	80	0.08	9	39	3.94E-08	3.94E-08
C11 as Undecane	159.2698	ND	80	156	ND	0	154	ND	0	80	0.08	9	39	3.94E-08	3.94E-08
n-Dodecane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C12 as Dodecane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Tridecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
C13 as Tridecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
n-Tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C14 as tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	9	39	3.93E-08	3.93E-08
C15 as Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	9	39	3.93E-08	3.93E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	8	39	3.87E-08	3.87E-08
C17 as Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	8	39	3.87E-08	3.87E-08
n-Octadecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C18 as Octodecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
C19 as Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
n-Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C20 as Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	9	39	3.95E-08	3.95E-08
C21 as Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	9	39	3.95E-08	3.95E-08
n-Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
C22 as Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
n-Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
C23 as Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
n-Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
C24 as Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	9	39	3.93E-08	3.93E-08
Total Hydrocarbon			3,762			0			0		3.76	403	1,859	1.86E-06	1.86E-06

Bagging Data Form — Vacuum Method

Sample Id: C033

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	20772		
Equipment Subtype:	Gate			**Unit:**	Refinery C		
Line Size:	3/4	inches		**Date:**	20-Jun-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	30.02	inHg	762.5 mmHg	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	66.7	°F	19.3 °C	**TVA ID**	37887		
Component Temp:	160	°F	71.1 °C	**Stream Pressure/Temp:**	45	psig	°F
Stream Description:	DAO						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:05	Background	-2	ppmv	8-sec Dwell	0	ppmv	Total Dwell	5:00	min:sec	Final M21	1 ppm
9:38	Initial Bag Vacuum	0.01	inches H2O	DGM Vac.	1.9	inches H2O	Bag Temp	83.3	°F	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:42	9:46	9:48	9:50	9:52	9:54	9:56	10:04	10:07					
ppmv	3.1	15.7	11.1	6.2	5.6	5.4	6.1	6	6.1					

Sorbent Tube Sample Collection Parameters

C033A

Time									
9:56	Volume Start	990.4	Liters		Design Sample Flow Rate = 1 liter/min				
10:09	Volume Stop	1,002.0	Liters	Total Vol	11.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.892 L/min	Sorbent Flow$_{STP}$	0.902	L/min

C033B

9:56	Volume Start	917.8	Liters		Design Sample Flow Rate = 1 liter/min				
10:09	Volume Stop	930.6	Liters	Total Vol	12.8	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.985 L/min	Sorbent Flow$_{STP}$	0.995	L/min
	Total ST Vol$_{STP}$	24.66	Liters	DGM Vol$_{STP}$	82.10	Liters	Total Run Vol$_{STP}$	106.76	Liters

Bagging Parameters

Time									
10:00	Vacuum check	0.01	inches H2O			DGM$_P$	1.8 inches H2O vacuum	759.1	mmHg
10:00	DGM$_{10L}$ Time	01:35.5	min:sec.frac	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$ 6.32	liters/minute
10:01	Bag Temp.	80.4	°F	26.9	°C	Sample$_T$	64 °F	17.8	°C

Post-Sample Data

10:19	Post Test M21	Background	0	ppmv	8-sec Dwell	0 ppmv	Total Dwell	4:00 min:sec	Final M21	1 ppm @ Packing
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions = 1.35E-06 kg/hr
Percent difference THC ER = 82%

Acceptable? No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.84E-08
C5 as Pentane	2.84E-08
n-Hexane	3.64E-08
C6 as Hexane	3.64E-08
n-Heptane	3.20E-08
C7 as Heptane	3.20E-08
n-Octane	2.90E-08
C8 as Octane	2.90E-08
n-Nonane	2.91E-08
C9 as Nonane	2.91E-08
n-Decane	2.93E-08
C10 as Decane	1.90E-07
n-Undecane	2.93E-08
C11 as Undecane	2.93E-08
n-Dodecane	2.91E-08
C12 as Dodecane	2.91E-08
n-Tridecane	2.92E-08
C13 as Tridecane	2.92E-08
n-Tetradecane	2.91E-08
C14 as tetradecane	2.91E-08
n-Pentadecane	2.92E-08
C15 as Pentadecane	2.92E-08
n-Hexadecane	2.91E-08
C16 as Hexadecane	2.91E-08
n-Heptadecane	2.89E-08
C17 as Heptadecane	2.89E-08
n-Octadecane	2.91E-08
C18 as Octodecane	2.91E-08
n-Nonadecane	2.92E-08
C19 as Nonadecane	2.92E-08
n-Eicosane	2.91E-08
C20 as Eicosane	2.91E-08
n-Heneicosane	2.93E-08
C21 as Heneicosane	2.93E-08
n-Docosane	2.91E-08
C22 as Docosane	2.91E-08
n-Tricosane	2.92E-08
C23 as Tricosane	2.92E-08
n-Tetracosane	2.92E-08
C24 as Tetracosane	2.92E-08
Total Hydrocarbon	1.35E-06

THC: 7.12E-05 lbs/day 1.30E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C033A	C033A		ND Adj	C034A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	80.70689	ND	40	150.1	ND	0	148	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C5 as Pentane	80.70689	ND	40	150.1	ND	0	148	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Hexane	80.70689	ND	40	215.09	ND	0	212	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C6 as Hexane	80.70689	ND	40	215.09	ND	0	212	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Heptane	80.70689	ND	40	178.69	ND	0	176	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C7 as Heptane	80.70689	ND	40	178.69	ND	0	176	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Octane	80.70689	ND	40	154.62	ND	0	152	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C8 as Octane	80.70689	ND	40	154.62	ND	0	152	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Nonane	80.70689	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C9 as Nonane	80.70689	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Decane	80.70689	ND	40	157.19	ND	0	155	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C10 as Decane	80.70689	ND	40	157.19	ND	0	155	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Undecane	80.70689	ND	40	156.78	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C11 as Undecane	80.70689	ND	40	156.78	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Dodecane	80.70689	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C12 as Dodecane	80.70689	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Tridecane	80.70689	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C13 as Tridecane	80.70689	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Tetradecane	80.70689	ND	40	155.94	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C14 as tetradecane	80.70689	ND	40	155.94	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Pentadecane	80.70689	ND	40	156.72	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C15 as Pentadecane	80.70689	ND	40	156.72	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Hexadecane	80.70689	ND	40	155.87	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C16 as Hexadecane	80.70689	ND	40	155.87	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Heptadecane	80.70689	ND	40	154.06	ND	0	152	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C17 as Heptadecane	80.70689	ND	40	154.06	ND	0	152	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Octadecane	80.70689	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C18 as Octodecane	80.70689	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Nonadecane	80.70689	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C19 as Nonadecane	80.70689	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Eicosane	80.70689	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C20 as Eicosane	80.70689	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Heneicosane	80.70689	ND	40	157.19	ND	0	155	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C21 as Heneicosane	80.70689	ND	40	157.19	ND	0	155	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Docosane	80.70689	ND	40	155.41	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C22 as Docosane	80.70689	ND	40	155.41	ND	0	153	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Tricosane	80.70689	ND	40	156.25	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C23 as Tricosane	80.70689	ND	40	156.25	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
n-Tetracosane	80.70689	ND	40	156.47	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
C24 as Tetracosane	80.70689	ND	40	156.47	ND	0	154	ND	0	40	0.04	4	20	1.99E-08	1.99E-08
Total Hydrocarbon			1,614			0			0		1.61	172	795	7.95E-07	7.95E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C033B	C033B		ND Adj	C034A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	150	ND	0	148	ND	0	75	0.08	8	37	3.70E-08	3.70E-08
C5 as Pentane	150.1	ND	75	150	ND	0	148	ND	0	75	0.08	8	37	3.70E-08	3.70E-08
n-Hexane	215.0875	ND	108	215	ND	0	212	ND	0	108	0.11	11	53	5.30E-08	5.30E-08
C6 as Hexane	215.0875	ND	108	215	ND	0	212	ND	0	108	0.11	11	53	5.30E-08	5.30E-08
n-Heptane	178.6875	ND	89	179	ND	0	176	ND	0	89	0.09	10	44	4.40E-08	4.40E-08
C7 as Heptane	178.6875	ND	89	179	ND	0	176	ND	0	89	0.09	10	44	4.40E-08	4.40E-08
n-Octane	154.625	ND	77	155	ND	0	152	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C8 as Octane	154.625	ND	77	155	ND	0	152	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
n-Nonane	155.7812	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C9 as Nonane	155.7812	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Decane	157.1875	ND	79	157	ND	0	155	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C10 as Decane	731.4329	J	731	157	ND	0	155	ND	0	731	0.73	78	360	3.60E-07	3.60E-07
n-Undecane	156.7812	ND	78	157	ND	0	154	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C11 as Undecane	156.7812	ND	78	157	ND	0	154	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
n-Dodecane	155.7187	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C12 as Dodecane	155.7187	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Tridecane	156.0937	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
C13 as Tridecane	156.0937	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
n-Tetradecane	155.9375	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C14 as tetradecane	155.9375	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Pentadecane	156.7187	ND	78	157	ND	0	154	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C15 as Pentadecane	156.7187	ND	78	157	ND	0	154	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
n-Hexadecane	155.875	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C16 as Hexadecane	155.875	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Heptadecane	154.0625	ND	77	154	ND	0	152	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C17 as Heptadecane	154.0625	ND	77	154	ND	0	152	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Octadecane	155.7812	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C18 as Octodecane	155.7812	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Nonadecane	156.0937	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
C19 as Nonadecane	156.0937	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
n-Eicosane	155.7187	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C20 as Eicosane	155.7187	ND	78	156	ND	0	153	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Heneicosane	157.1875	ND	79	157	ND	0	155	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C21 as Heneicosane	157.1875	ND	79	157	ND	0	155	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Docosane	155.4062	ND	78	155	ND	0	153	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C22 as Docosane	155.4062	ND	78	155	ND	0	153	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Tricosane	156.25	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
C23 as Tricosane	156.25	ND	78	156	ND	0	154	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
n-Tetracosane	156.4687	ND	78	156	ND	0	154	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
C24 as Tetracosane	156.4687	ND	78	156	ND	0	154	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
Total Hydrocarbon			3,848			0			0		3.85	411	1,896	1.90E-06	1.90E-06

Bagging Data Form — Vacuum Method

Sample Id C035

WSPA Western States Petroleum Association

Equipment type:	PRD		**Component ID:**	20171		
Equipment Subtype:	Side Flange		**Unit:**	Refinery C		
Line Size:	1 *inches*		**Date:**	20-Jun-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	30.04 *inHg*	763.0 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	75 *°F*	23.9 *°C*	**TVA ID**	36502		
Component Temp:	82 *°F*	27.8 *°C*	**Stream Pressure/Temp:**	280 *psig*		*°F*
Stream Description:	*MEA*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
12:03	Background	-4 *ppmv*	8-sec Dwell	1 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	6 *ppm*
12:45	Initial Bag Vacuum	0.05 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	87.4 *°F*	Leak @	flange-side

Bag Concentrations (ppmv)

Time	12:48	12:50	12:52	12:54	12:56	12:58	13:00	13:02	13:08	13:12				
ppmv	2	10.2	11.3	8.2	4.7	2.4	6	6.9	17	11.6				

Sorbent Tube Sample Collection Parameters

C035A

Time						
13:02	Volume Start	1,002.0 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:15	Volume Stop	1,015.0 *Liters*	Total Vol	13.0 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	1.000 *L/min*	$Sorbent\ Flow_{STP}$	0.956 *L/min*

C035B

13:02	Volume Start	930.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:15	Volume Stop	943.4 *Liters*	Total Vol	12.8 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	0.985 *L/min*	$Sorbent\ Flow_{STP}$	0.942 *L/min*
	$Total\ ST\ Vol_{STP}$	24.67 *Liters*	$DGM\ Vol_{STP}$	77.70 *Liters*	$Total\ Run\ Vol_{STP}$	102.37 *Liters*

Bagging Parameters

Time							
13:07	Vacuum check	0.05 *inches H2O*			DGM_P	1.8 *inches H2O vacuum*	759.7 *mmHg*
13:07	DGM_{10L} Time	01:36.0 *min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	$DGM\ Flow_{STP}$ 5.98 *liters/minute*
13:08	Bag Temp.	95.4 *°F*	35.2 *°C*		$Sample_T$	94 *°F*	34.4 *°C*

Post-Sample Data

13:24	Post Test M21	Background 0 *ppmv*	8-sec Dwell	1 *ppmv*	Total Dwell	3:30 *min:sec*	Final M21	8 *ppm*
							@	flange-side
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A *ml*						
Density of organic condensate		N/A *g/ml*						

Average THC emissions =	1.26E-06 kg/hr
Percent difference THC ER =	61%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.62E-08
C5 as Pentane	2.62E-08
n-Hexane	3.42E-08
C6 as Hexane	3.42E-08
n-Heptane	3.03E-08
C7 as Heptane	3.03E-08
n-Octane	2.73E-08
C8 as Octane	2.73E-08
n-Nonane	2.75E-08
C9 as Nonane	4.23E-08
n-Decane	2.77E-08
C10 as Decane	1.59E-07
n-Undecane	2.76E-08
C11 as Undecane	2.76E-08
n-Dodecane	2.74E-08
C12 as Dodecane	2.74E-08
n-Tridecane	2.75E-08
C13 as Tridecane	2.75E-08
n-Tetradecane	2.75E-08
C14 as tetradecane	2.75E-08
n-Pentadecane	2.76E-08
C15 as Pentadecane	2.76E-08
n-Hexadecane	2.75E-08
C16 as Hexadecane	2.75E-08
n-Heptadecane	2.72E-08
C17 as Heptadecane	2.72E-08
n-Octadecane	2.75E-08
C18 as Octodecane	2.75E-08
n-Nonadecane	2.75E-08
C19 as Nonadecane	2.75E-08
n-Eicosane	2.74E-08
C20 as Eicosane	2.74E-08
n-Heneicosane	2.77E-08
C21 as Heneicosane	2.77E-08
n-Docosane	2.74E-08
C22 as Docosane	2.74E-08
n-Tricosane	2.75E-08
C23 as Tricosane	2.75E-08
n-Tetracosane	2.76E-08
C24 as Tetracosane	2.76E-08
Total Hydrocarbon	1.26E-06

THC: 6.68E-05 lbs/day 1.22E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C035A	C035A		ND Adj	C036A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	72.01538	ND	36	151.28	ND	0	148	ND	0	36	0.04	4	17	1.70E-08	1.70E-08
C5 as Pentane	72.01538	ND	36	151.28	ND	0	148	ND	0	36	0.04	4	17	1.70E-08	1.70E-08
n-Hexane	74.81538	ND	37	216.78	ND	0	212	ND	0	37	0.04	4	18	1.77E-08	1.77E-08
C6 as Hexane	74.81538	ND	37	216.78	ND	0	212	ND	0	37	0.04	4	18	1.77E-08	1.77E-08
n-Heptane	78.18462	ND	39	180.09	ND	0	176	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
C7 as Heptane	78.18462	ND	39	180.09	ND	0	176	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
n-Octane	76.12308	ND	38	155.84	ND	0	152	ND	0	38	0.04	4	18	1.80E-08	1.80E-08
C8 as Octane	76.12308	ND	38	155.84	ND	0	152	ND	0	38	0.04	4	18	1.80E-08	1.80E-08
n-Nonane	76.69231	ND	38	157.01	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
C9 as Nonane	101.2192	J	101	157.01	ND	0	153	ND	0	101	0.10	10	48	4.78E-08	4.78E-08
n-Decane	77.38462	ND	39	158.43	ND	0	155	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
C10 as Decane	298.4287	J	298	158.43	ND	0	155	ND	0	298	0.30	31	141	1.41E-07	1.41E-07
n-Undecane	77.18462	ND	39	158.02	ND	0	154	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
C11 as Undecane	77.18462	ND	39	158.02	ND	0	154	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
n-Dodecane	76.66154	ND	38	156.94	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
C12 as Dodecane	76.66154	ND	38	156.94	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
n-Tridecane	76.84615	ND	38	157.32	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	1.82E-08
C13 as Tridecane	76.84615	ND	38	157.32	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	1.82E-08
n-Tetradecane	76.76923	ND	38	157.17	ND	0	154	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
C14 as tetradecane	76.76923	ND	38	157.17	ND	0	154	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
n-Pentadecane	77.15385	ND	39	157.95	ND	0	154	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
C15 as Pentadecane	77.15385	ND	39	157.95	ND	0	154	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
n-Hexadecane	76.73846	ND	38	157.1	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
C16 as Hexadecane	76.73846	ND	38	157.1	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
n-Heptadecane	75.84615	ND	38	155.28	ND	0	152	ND	0	38	0.04	4	18	1.79E-08	1.79E-08
C17 as Heptadecane	75.84615	ND	38	155.28	ND	0	152	ND	0	38	0.04	4	18	1.79E-08	1.79E-08
n-Octadecane	76.69231	ND	38	157.01	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
C18 as Octodecane	76.69231	ND	38	157.01	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
n-Nonadecane	76.84615	ND	38	157.32	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	1.82E-08
C19 as Nonadecane	76.84615	ND	38	157.32	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	1.82E-08
n-Eicosane	76.66154	ND	38	156.94	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
C20 as Eicosane	76.66154	ND	38	156.94	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
n-Heneicosane	77.38462	ND	39	158.43	ND	0	155	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
C21 as Heneicosane	77.38462	ND	39	158.43	ND	0	155	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
n-Docosane	76.50769	ND	38	156.63	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
C22 as Docosane	76.50769	ND	38	156.63	ND	0	153	ND	0	38	0.04	4	18	1.81E-08	1.81E-08
n-Tricosane	76.92308	ND	38	157.48	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	1.82E-08
C23 as Tricosane	76.92308	ND	38	157.48	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	1.82E-08
n-Tetracosane	77.03077	ND	39	157.7	ND	0	154	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
C24 as Tetracosane	77.03077	ND	39	157.7	ND	0	154	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
Total Hydrocarbon			1,853			0			0		1.85	190	876	8.76E-07	8.76E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C035B	C035B		ND Adj	C036A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	151	ND	0	148	ND	0	75	0.08	8	35	3.55E-08	3.55E-08
C5 as Pentane	150.1	ND	75	151	ND	0	148	ND	0	75	0.08	8	35	3.55E-08	3.55E-08
n-Hexane	215.0875	ND	108	217	ND	0	212	ND	0	108	0.11	11	51	5.08E-08	5.08E-08
C6 as Hexane	215.0875	ND	108	217	ND	0	212	ND	0	108	0.11	11	51	5.08E-08	5.08E-08
n-Heptane	178.6875	ND	89	180	ND	0	176	ND	0	89	0.09	9	42	4.22E-08	4.22E-08
C7 as Heptane	178.6875	ND	89	180	ND	0	176	ND	0	89	0.09	9	42	4.22E-08	4.22E-08
n-Octane	154.625	ND	77	156	ND	0	152	ND	0	77	0.08	8	37	3.65E-08	3.65E-08
C8 as Octane	154.625	ND	77	156	ND	0	152	ND	0	77	0.08	8	37	3.65E-08	3.65E-08
n-Nonane	155.7812	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C9 as Nonane	155.7812	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Decane	157.1875	ND	79	158	ND	0	155	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
C10 as Decane	376.6689	J	377	158	ND	0	155	ND	0	377	0.38	39	178	1.78E-07	1.78E-07
n-Undecane	156.7812	ND	78	158	ND	0	154	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
C11 as Undecane	156.7812	ND	78	158	ND	0	154	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
n-Dodecane	155.7187	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C12 as Dodecane	155.7187	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Tridecane	156.0937	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
C13 as Tridecane	156.0937	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
n-Tetradecane	155.9375	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C14 as tetradecane	155.9375	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Pentadecane	156.7187	ND	78	158	ND	0	154	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
C15 as Pentadecane	156.7187	ND	78	158	ND	0	154	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
n-Hexadecane	155.875	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C16 as Hexadecane	155.875	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Heptadecane	154.0625	ND	77	155	ND	0	152	ND	0	77	0.08	8	36	3.64E-08	3.64E-08
C17 as Heptadecane	154.0625	ND	77	155	ND	0	152	ND	0	77	0.08	8	36	3.64E-08	3.64E-08
n-Octadecane	155.7812	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C18 as Octodecane	155.7812	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Nonadecane	156.0937	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
C19 as Nonadecane	156.0937	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
n-Eicosane	155.7187	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C20 as Eicosane	155.7187	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Heneicosane	157.1875	ND	79	158	ND	0	155	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
C21 as Heneicosane	157.1875	ND	79	158	ND	0	155	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
n-Docosane	155.4062	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.67E-08	3.67E-08
C22 as Docosane	155.4062	ND	78	157	ND	0	153	ND	0	78	0.08	8	37	3.67E-08	3.67E-08
n-Tricosane	156.25	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
C23 as Tricosane	156.25	ND	78	157	ND	0	154	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
n-Tetracosane	156.4687	ND	78	158	ND	0	154	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
C24 as Tetracosane	156.4687	ND	78	158	ND	0	154	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
Total Hydrocarbon			3,494			0			0		3.49	358	1,651	1.65E-06	1.65E-06

Bagging Data Form — Vacuum Method

Sample Id: C037

Equipment type:	Pump (Sample Pump)			**Component ID:**	20067 - P
Equipment Subtype:	Seal			**Unit:**	Refinery C
Line Size:	1 inches			**Date:**	21-Jun-18
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR
Barometric pressure	29.84 inHg	757.9 mmHg		**Sample Pump A**	LP52979
				Sample Pump B	LP52975
Ambient Temp:	56.6 °F	13.7 °C		**TVA ID**	37887
Component Temp:	53.1 °F	11.7 °C		**Stream Pressure/Temp:**	psig °F
Stream Description:	Diesel				

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
8:51	Background	2 ppmv	8-sec Dwell	12 ppmv	Total Dwell	3:00 min:sec	Final M21	21 ppm
9:39	Initial Bag Vacuum	0.04 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	64 °F	Leak @	bottom side of pump seal

Bag Concentrations (ppmv) (had to vent bag)

Time	9:42	9:44	9:46	9:48	9:50	9:52	9:54	9:58						
ppmv	1.8	2.5	2.7	2.6	3.1	3.4	3.6	4.5						

Sorbent Tube Sample Collection Parameters

C037A

Time						
9:54	Volume Start	0.0 Liters		Design Sample Flow Rate = 1 liter/min		
10:07	Volume Stop	12.5 Liters	Total Vol	12.5 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.962 L/min	Sorbent Flow$_{STP}$	0.983 L/min

C037B

9:54	Volume Start	0.0 Liters		Design Sample Flow Rate = 1 liter/min		
10:07	Volume Stop	12.6 Liters	Total Vol	12.6 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.969 L/min	Sorbent Flow$_{STP}$	0.991 L/min
	Total ST Vol$_{STP}$	25.65 Liters	DGM Vol$_{STP}$	87.60 Liters	Total Run Vol$_{STP}$	113.25 Liters

Bagging Parameters

Time							
9:56	Vacuum check	0.05 inches H2O			DGM$_P$	1.8 inches H2O vacuum	754.6 mmHg
9:58	DGM$_{10L}$ Time	01:31.0 min:sec.frac	DGM Time	1.517	DGM Flow	6.59	DGM Flow$_{STP}$ 6.74 liters/minute
9:56	Bag Temp.	64.9 °F	18.3 °C		Sample$_T$	55 °F	12.8 °C

Post-Sample Data

10:32 Post Test M21	Background	5 ppmv	8-sec Dwell	30 ppmv	Total Dwell 2:00 min:sec	Final M21 44 ppm @ bottom side of pump seal
Condensate accumulation: starting time		N/A hour:min	Final time	N/A hour:min	0:00 hours:min	
Organic condensate collected		N/A ml				
Density of organic condensate		N/A g/ml				

Average THC emissions =	1.37E-06	kg/hr
Percent difference THC ER =	48%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.97E-08
C5 as Pentane	2.97E-08
n-Hexane	3.87E-08
C6 as Hexane	3.87E-08
n-Heptane	3.43E-08
C7 as Heptane	3.43E-08
n-Octane	3.09E-08
C8 as Octane	6.14E-08
n-Nonane	3.11E-08
C9 as Nonane	7.19E-08
n-Decane	3.14E-08
C10 as Decane	5.08E-08
n-Undecane	3.13E-08
C11 as Undecane	4.70E-08
n-Dodecane	3.11E-08
C12 as Dodecane	3.11E-08
n-Tridecane	3.12E-08
C13 as Tridecane	3.12E-08
n-Tetradecane	3.11E-08
C14 as tetradecane	3.11E-08
n-Pentadecane	3.13E-08
C15 as Pentadecane	3.13E-08
n-Hexadecane	3.11E-08
C16 as Hexadecane	3.11E-08
n-Heptadecane	3.08E-08
C17 as Heptadecane	3.08E-08
n-Octadecane	3.11E-08
C18 as Octodecane	3.11E-08
n-Nonadecane	3.12E-08
C19 as Nonadecane	3.12E-08
n-Eicosane	3.11E-08
C20 as Eicosane	3.11E-08
n-Heneicosane	3.14E-08
C21 as Heneicosane	3.14E-08
n-Docosane	3.10E-08
C22 as Docosane	3.10E-08
n-Tricosane	3.12E-08
C23 as Tricosane	3.12E-08
n-Tetracosane	3.12E-08
C24 as Tetracosane	3.12E-08
Total Hydrocarbon	1.37E-06

THC:	7.25E-05	lbs/day	1.32E-05	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C037A	C037A		ND Adj	C038A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.896	ND	37	148.94	ND	0	148	ND	0	37	0.04	4	20	1.96E-08	1.96E-08
C5 as Pentane	74.896	ND	37	148.94	ND	0	148	ND	0	37	0.04	4	20	1.96E-08	1.96E-08
n-Hexane	77.808	ND	39	213.42	ND	0	212	ND	0	39	0.04	4	20	2.03E-08	2.03E-08
C6 as Hexane	77.808	ND	39	213.42	ND	0	212	ND	0	39	0.04	4	20	2.03E-08	2.03E-08
n-Heptane	81.312	ND	41	177.3	ND	0	176	ND	0	41	0.04	5	21	2.12E-08	2.12E-08
C7 as Heptane	81.312	ND	41	177.3	ND	0	176	ND	0	41	0.04	5	21	2.12E-08	2.12E-08
n-Octane	79.168	ND	40	153.43	ND	0	152	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
C8 as Octane	156.567	J	157	153.43	ND	0	152	ND	0	157	0.16	18	82	8.18E-08	8.18E-08
n-Nonane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
C9 as Nonane	195.8624	J	196	154.57	ND	0	153	ND	0	196	0.20	22	102	1.02E-07	1.02E-07
n-Decane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	5	21	2.10E-08	2.10E-08
C10 as Decane	114.5325	J	115	155.97	ND	0	155	ND	0	115	0.11	13	60	5.99E-08	5.99E-08
n-Undecane	80.272	ND	40	155.57	ND	0	154	ND	0	40	0.04	5	21	2.10E-08	2.10E-08
C11 as Undecane	100.1352	J	100	155.57	ND	0	154	ND	0	100	0.10	11	52	5.23E-08	5.23E-08
n-Dodecane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
C12 as Dodecane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
n-Tridecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
C13 as Tridecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
n-Tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
C14 as tetradecane	79.84	ND	40	154.73	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
n-Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	5	21	2.10E-08	2.10E-08
C15 as Pentadecane	80.24	ND	40	155.5	ND	0	154	ND	0	40	0.04	5	21	2.10E-08	2.10E-08
n-Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
C16 as Hexadecane	79.808	ND	40	154.67	ND	0	153	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
n-Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	21	2.06E-08	2.06E-08
C17 as Heptadecane	78.88	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	21	2.06E-08	2.06E-08
n-Octadecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
C18 as Octodecane	79.76	ND	40	154.57	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
n-Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
C19 as Nonadecane	79.92	ND	40	154.88	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
n-Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
C20 as Eicosane	79.728	ND	40	154.51	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
n-Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	5	21	2.10E-08	2.10E-08
C21 as Heneicosane	80.48	ND	40	155.97	ND	0	155	ND	0	40	0.04	5	21	2.10E-08	2.10E-08
n-Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
C22 as Docosane	79.568	ND	40	154.2	ND	0	153	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
n-Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
C23 as Tricosane	80	ND	40	155.04	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
n-Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
C24 as Tetracosane	80.112	ND	40	155.26	ND	0	154	ND	0	40	0.04	5	21	2.09E-08	2.09E-08
Total Hydrocarbon			1,999			0			0		2.00	226	1,045	1.04E-06	1.04E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
C037B	C037B		ND Adj	C038A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	149	ND	0	148	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
C5 as Pentane	152.4825	ND	76	149	ND	0	148	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
n-Hexane	218.5016	ND	109	213	ND	0	212	ND	0	109	0.11	12	57	5.71E-08	5.71E-08
C6 as Hexane	218.5016	ND	109	213	ND	0	212	ND	0	109	0.11	12	57	5.71E-08	5.71E-08
n-Heptane	181.5238	ND	91	177	ND	0	176	ND	0	91	0.09	10	47	4.74E-08	4.74E-08
C7 as Heptane	181.5238	ND	91	177	ND	0	176	ND	0	91	0.09	10	47	4.74E-08	4.74E-08
n-Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C8 as Octane	157.0794	ND	79	153	ND	0	152	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Nonane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C9 as Nonane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Decane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	9	42	4.17E-08	4.17E-08
C10 as Decane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	9	42	4.17E-08	4.17E-08
n-Undecane	159.2698	ND	80	156	ND	0	154	ND	0	80	0.08	9	42	4.16E-08	4.16E-08
C11 as Undecane	159.2698	ND	80	156	ND	0	154	ND	0	80	0.08	9	42	4.16E-08	4.16E-08
n-Dodecane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C12 as Dodecane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Tridecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C13 as Tridecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C14 as tetradecane	158.4127	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	9	42	4.16E-08	4.16E-08
C15 as Pentadecane	159.2063	ND	80	156	ND	0	154	ND	0	80	0.08	9	42	4.16E-08	4.16E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
C17 as Heptadecane	156.5079	ND	78	153	ND	0	152	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
n-Octadecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C18 as Octodecane	158.254	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C19 as Nonadecane	158.5714	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C20 as Eicosane	158.1905	ND	79	155	ND	0	153	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	9	42	4.17E-08	4.17E-08
C21 as Heneicosane	159.6825	ND	80	156	ND	0	155	ND	0	80	0.08	9	42	4.17E-08	4.17E-08
n-Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C22 as Docosane	157.873	ND	79	154	ND	0	153	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.15E-08	4.15E-08
C23 as Tricosane	158.7302	ND	79	155	ND	0	154	ND	0	79	0.08	9	41	4.15E-08	4.15E-08
n-Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	9	42	4.15E-08	4.15E-08
C24 as Tetracosane	158.9524	ND	79	155	ND	0	154	ND	0	79	0.08	9	42	4.15E-08	4.15E-08
Total Hydrocarbon			3,246			0			0		3.25	368	1,697	1.70E-06	1.70E-06

Bagging Data Form — Vacuum Method

Sample Id: C040

WSPA Western States Petroleum Association

Equipment type:	Sample Pump		**Component ID:**	20370
Equipment Subtype:	Seal		**Unit:**	Refinery C
Line Size:	1 *inches*		**Date:**	21-Jun-18
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR
Barometric pressure	29.88 *inHg*	759.0 *mmHg*	**Sample Pump A**	LP52979
			Sample Pump B	LP52975
Ambient Temp:	74 °F	23.3 °C	**TVA ID**	36502
Component Temp:	76 °F	24.4 °C	**Stream Pressure/Temp:**	*psig* °F
Stream Description:	*Tetramer*			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
12:13	Background	-2 *ppmv*	8-sec Dwell	61 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	114 *ppm*
12:50	Initial Bag Vacuum	0.035 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	72.7 °F	Leak @	Seal

Bag Concentrations (ppmv) (had to vent bad to bring vacuum reading on scale)

Time	12:53	12:55	12:57	12:59	13:01	13:03	13:05	13:09	13:11	13:13	13:22			
ppmv	3.6	4.7	6.5	7.6	7.1	7.7	8.7	9.6	10.7	10.7	12.2			

Sorbent Tube Sample Collection Parameters

C040A

Time						
13:15	Volume Start	12.5 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:28	Volume Stop	25.4 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	$\text{Sorbent Flow}_{STP}$	0.936 *L/min*

C040B

13:15	Volume Start	12.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:28	Volume Stop	25.5 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	$\text{Sorbent Flow}_{STP}$	0.936 *L/min*

$\text{Total ST Vol}_{STP}$ 24.33 *Liters* — DGM Vol_{STP} 72.82 *Liters* — $\text{Total Run Vol}_{STP}$ 97.15 *Liters*

Bagging Parameters

Time								
13:20	Vacuum check	0.035 *inches H2O*			DGM_P	1.7 *inches H2O vacuum*	755.8	*mmHg*
13:18	DGM_{10L} Time	01:41.4 *min:sec.frac*	DGM Time	1.683	DGM Flow	5.94	DGM Flow_{STP} 5.60	*liters/minute*
13:21	Bag Temp.	93.4 °F	34.1	°C	Sample_T	99 °F	37.2	°C

Post-Sample Data

13:57	Post Test M21	Background 1 *ppmv*	8-sec Dwell	[illegible] *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	128 *ppm* @ Seal

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	4.92E-06 kg/hr
Percent difference THC ER =	105%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.48E-08
C5 as Pentane	2.48E-08
n-Hexane	3.24E-08
C6 as Hexane	3.24E-08
n-Heptane	2.87E-08
C7 as Heptane	2.87E-08
n-Octane	2.58E-08
C8 as Octane	5.00E-08
n-Nonane	4.74E-08
C9 as Nonane	8.77E-07
n-Decane	4.53E-08
C10 as Decane	2.04E-06
n-Undecane	2.01E-07
C11 as Undecane	7.89E-07
n-Dodecane	2.60E-08
C12 as Dodecane	2.60E-08
n-Tridecane	2.60E-08
C13 as Tridecane	2.60E-08
n-Tetradecane	2.60E-08
C14 as tetradecane	2.60E-08
n-Pentadecane	2.61E-08
C15 as Pentadecane	2.61E-08
n-Hexadecane	2.60E-08
C16 as Hexadecane	2.60E-08
n-Heptadecane	2.57E-08
C17 as Heptadecane	2.57E-08
n-Octadecane	2.60E-08
C18 as Octodecane	2.60E-08
n-Nonadecane	2.60E-08
C19 as Nonadecane	2.60E-08
n-Eicosane	2.60E-08
C20 as Eicosane	2.60E-08
n-Heneicosane	2.62E-08
C21 as Heneicosane	2.62E-08
n-Docosane	2.59E-08
C22 as Docosane	2.59E-08
n-Tricosane	2.61E-08
C23 as Tricosane	2.61E-08
n-Tetracosane	2.61E-08
C24 as Tetracosane	2.61E-08
Total Hydrocarbon	4.92E-06

THC:	2.60E-04	lbs/day	4.75E-05 tons/yr

C040A Component	ANALYTICAL RESULTS C040A µg/m³	Flag	ND Adj µg/m³	BACKGROUND C041A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	72.57365	ND	36	145.55	ND	0	148	ND	0	36	0.04	4	16	1.63E-08	1.63E-08
C5 as Pentane	72.57365	ND	36	145.55	ND	0	148	ND	0	36	0.04	4	16	1.63E-08	1.63E-08
n-Hexane	75.39535	ND	38	208.57	ND	0	212	ND	0	38	0.04	4	17	1.69E-08	1.69E-08
C6 as Hexane	75.39535	ND	38	208.57	ND	0	212	ND	0	38	0.04	4	17	1.69E-08	1.69E-08
n-Heptane	78.7907	ND	39	173.27	ND	0	176	ND	0	39	0.04	4	18	1.77E-08	1.77E-08
C7 as Heptane	78.7907	ND	39	173.27	ND	0	176	ND	0	39	0.04	4	18	1.77E-08	1.77E-08
n-Octane	76.71318	ND	38	149.94	ND	0	152	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
C8 as Octane	146.5272	J	147	149.94	ND	0	152	ND	0	147	0.15	14	66	6.57E-08	6.57E-08
n-Nonane	134.2456	J	134	151.06	ND	0	153	ND	0	134	0.13	13	60	6.02E-08	6.02E-08
C9 as Nonane	2122.152		2,122	151.06	ND	0	153	ND	0	2,122	2.12	206	952	9.52E-07	9.52E-07
n-Decane	123.8633	J	124	152.42	ND	0	155	ND	0	124	0.12	12	56	5.55E-08	5.55E-08
C10 as Decane	9018.454		9,018	152.42	ND	0	155	ND	0	9,018	9.02	876	4044	4.04E-06	4.04E-06
n-Undecane	466.2478	J	466	152.03	ND	0	154	ND	0	466	0.47	45	209	2.09E-07	2.09E-07
C11 as Undecane	3440.067		3,440	152.03	ND	0	154	ND	0	3,440	3.44	334	1542	1.54E-06	1.54E-06
n-Dodecane	77.25582	ND	39	151	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
C12 as Dodecane	77.25582	ND	39	151	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Tridecane	77.44186	ND	39	151.36	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
C13 as Tridecane	77.44186	ND	39	151.36	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
n-Tetradecane	77.36434	ND	39	151.21	ND	0	154	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
C14 as tetradecane	77.36434	ND	39	151.21	ND	0	154	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Pentadecane	77.75194	ND	39	151.97	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
C15 as Pentadecane	77.75194	ND	39	151.97	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
n-Hexadecane	77.33334	ND	39	151.15	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
C16 as Hexadecane	77.33334	ND	39	151.15	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Heptadecane	76.43411	ND	38	149.39	ND	0	152	ND	0	38	0.04	4	17	1.71E-08	1.71E-08
C17 as Heptadecane	76.43411	ND	38	149.39	ND	0	152	ND	0	38	0.04	4	17	1.71E-08	1.71E-08
n-Octadecane	77.28682	ND	39	151.06	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
C18 as Octodecane	77.28682	ND	39	151.06	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Nonadecane	77.44186	ND	39	151.36	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
C19 as Nonadecane	77.44186	ND	39	151.36	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
n-Eicosane	77.25582	ND	39	151	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
C20 as Eicosane	77.25582	ND	39	151	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Heneicosane	77.9845	ND	39	152.42	ND	0	155	ND	0	39	0.04	4	17	1.75E-08	1.75E-08
C21 as Heneicosane	77.9845	ND	39	152.42	ND	0	155	ND	0	39	0.04	4	17	1.75E-08	1.75E-08
n-Docosane	77.10078	ND	39	150.7	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
C22 as Docosane	77.10078	ND	39	150.7	ND	0	153	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Tricosane	77.51938	ND	39	151.52	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
C23 as Tricosane	77.51938	ND	39	151.52	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
n-Tetracosane	77.62791	ND	39	151.73	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
C24 as Tetracosane	77.62791	ND	39	151.73	ND	0	154	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
Total Hydrocarbon			16,722			0			0		16.72	1625	7,498	7.50E-06	7.50E-06

C040B Component	ANALYTICAL RESULTS C040B µg/m³	Flag	ND Adj µg/m³	BACKGROUND C041A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	148.9364	ND	74	146	ND	0	148	ND	0	74	0.07	7	33	3.34E-08	3.34E-08
C5 as Pentane	148.9364	ND	74	146	ND	0	148	ND	0	74	0.07	7	33	3.34E-08	3.34E-08
n-Hexane	213.4202	ND	107	209	ND	0	212	ND	0	107	0.11	10	48	4.78E-08	4.78E-08
C6 as Hexane	213.4202	ND	107	209	ND	0	212	ND	0	107	0.11	10	48	4.78E-08	4.78E-08
n-Heptane	177.3023	ND	89	173	ND	0	176	ND	0	89	0.09	9	40	3.97E-08	3.97E-08
C7 as Heptane	177.3023	ND	89	173	ND	0	176	ND	0	89	0.09	9	40	3.97E-08	3.97E-08
n-Octane	153.4264	ND	77	150	ND	0	152	ND	0	77	0.08	7	34	3.44E-08	3.44E-08
C8 as Octane	153.4264	ND	77	150	ND	0	152	ND	0	77	0.08	7	34	3.44E-08	3.44E-08
n-Nonane	154.5736	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
C9 as Nonane	1787.642		1,788	151	ND	0	153	ND	0	1,788	1.79	174	802	8.02E-07	8.02E-07
n-Decane	155.969	ND	78	152	ND	0	155	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
C10 as Decane	155.969	ND	78	152	ND	0	155	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
n-Undecane	428.3504	J	428	152	ND	0	154	ND	0	428	0.43	42	192	1.92E-07	1.92E-07
C11 as Undecane	155.5659	ND	78	152	ND	0	154	ND	0	78	0.08	8	35	3.49E-08	3.49E-08
n-Dodecane	154.5116	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.46E-08	3.46E-08
C12 as Dodecane	154.5116	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.46E-08	3.46E-08
n-Tridecane	154.8837	ND	77	151	ND	0	154	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
C13 as Tridecane	154.8837	ND	77	151	ND	0	154	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
n-Tetradecane	154.7287	ND	77	151	ND	0	154	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
C14 as tetradecane	154.7287	ND	77	151	ND	0	154	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
n-Pentadecane	155.5039	ND	78	152	ND	0	154	ND	0	78	0.08	8	35	3.49E-08	3.49E-08
C15 as Pentadecane	155.5039	ND	78	152	ND	0	154	ND	0	78	0.08	8	35	3.49E-08	3.49E-08
n-Hexadecane	154.6667	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
C16 as Hexadecane	154.6667	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
n-Heptadecane	152.8682	ND	76	149	ND	0	152	ND	0	76	0.08	7	34	3.43E-08	3.43E-08
C17 as Heptadecane	152.8682	ND	76	149	ND	0	152	ND	0	76	0.08	7	34	3.43E-08	3.43E-08
n-Octadecane	154.5736	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
C18 as Octodecane	154.5736	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
n-Nonadecane	154.8837	ND	77	151	ND	0	154	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
C19 as Nonadecane	154.8837	ND	77	151	ND	0	154	ND	0	77	0.08	8	35	3.47E-08	3.47E-08
n-Eicosane	154.5116	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.46E-08	3.46E-08
C20 as Eicosane	154.5116	ND	77	151	ND	0	153	ND	0	77	0.08	8	35	3.46E-08	3.46E-08
n-Heneicosane	155.969	ND	78	152	ND	0	155	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
C21 as Heneicosane	155.969	ND	78	152	ND	0	155	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
n-Docosane	154.2016	ND	77	151	ND	0	153	ND	0	77	0.08	7	35	3.46E-08	3.46E-08
C22 as Docosane	154.2016	ND	77	151	ND	0	153	ND	0	77	0.08	7	35	3.46E-08	3.46E-08
n-Tricosane	155.0388	ND	78	152	ND	0	154	ND	0	78	0.08	8	35	3.48E-08	3.48E-08
C23 as Tricosane	155.0388	ND	78	152	ND	0	154	ND	0	78	0.08	8	35	3.48E-08	3.48E-08
n-Tetracosane	155.2558	ND	78	152	ND	0	154	ND	0	78	0.08	8	35	3.48E-08	3.48E-08
C24 as Tetracosane	155.2558	ND	78	152	ND	0	154	ND	0	78	0.08	8	35	3.48E-08	3.48E-08
Total Hydrocarbon			5,232			0			0		5.23	508	2,346	2.35E-06	2.35E-06

Bagging Data Form	**Vacuum Method**		**Sample Id**	**C043**		
Equipment type:	Connector		**Component ID:**	**20305.6**		
Equipment Subtype:	Plug		**Unit:**	Refinery C		
Line Size:	1 *inches*		**Date:**	22-Jun-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	29.95 *inHg*	760.7 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	74.4 *°F*	23.6 *°C*	**TVA ID**	37887		
Component Temp:	85 *°F*	29.4 *°C*	**Stream Pressure/Temp:**	140 *psig*	90.00	*°F*
Stream Description:	*Tar*					

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:13	Background	-5	*ppmv*	8-sec Dwell	35	*ppmv*	Total Dwell	1:00	*min:sec*	Final M21	41 *ppm*
10:54	Initial Bag Vacuum	0.08	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	94.3	*°F*	Leak @	Plug

Bag Concentrations (ppmv) (had to vent bad to bring vacuum reading on scale)

Time	10:55	10:57	10:59	11:01	11:03	11:05	11:07	11:09	11:17	11:21				
ppmv	-2.1	-1.1	-0.6	-0.4	0	0.2	0.2	0.3	0.2	0.1				

Sorbent Tube Sample Collection Parameters

C043A

Time									
11:09	Volume Start	29.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:22	Volume Stop	41.7	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.900	*L/min*

C043B

Time									
11:09	Volume Start	27.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:22	Volume Stop	40.1	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent $Flow_{STP}$	0.893	*L/min*
	Total ST Vol_{STP}	23.30	*Liters*	DGM Vol_{STP}	77.03	*Liters*	Total Run Vol_{STP}	100.33	*Liters*

Bagging Parameters

Time									
11:14	Vacuum check	0.07	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	757.4 *mmHg*
11:13	DGM_{10L} Time	01:34.4	*min:sec.frac*	DGM Time	1.567	DGM Flow	6.38	DGM $Flow_{STP}$	5.93 *liters/minute*
11:15	Bag Temp.	110.3	*°F*	43.5	*°C*	$Sample_T$	109	*°F*	42.8 *°C*

Post-Sample Data

11:28	Post Test M21	Background	-2 *ppmv*	8-sec Dwell	10 *ppmv*	Total Dwell	1:00	*min:sec*	Final M21	21 *ppm* @ Plug
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00	*hours:min*		
Organic condensate collected			N/A *ml*							
Density of organic condensate			N/A *g/ml*							

Average THC emissions =	1.19E-06 kg/hr
Percent difference THC ER =	62%
Acceptable?	No

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.64E-08
C5 as Pentane	2.64E-08
n-Hexane	3.44E-08
C6 as Hexane	3.44E-08
n-Heptane	3.05E-08
C7 as Heptane	3.05E-08
n-Octane	2.74E-08
C8 as Octane	2.74E-08
n-Nonane	2.76E-08
C9 as Nonane	9.70E-08
n-Decane	2.79E-08
C10 as Decane	2.79E-08
n-Undecane	2.78E-08
C11 as Undecane	2.78E-08
n-Dodecane	2.76E-08
C12 as Dodecane	2.76E-08
n-Tridecane	2.77E-08
C13 as Tridecane	2.77E-08
n-Tetradecane	2.77E-08
C14 as tetradecane	2.77E-08
n-Pentadecane	2.78E-08
C15 as Pentadecane	2.78E-08
n-Hexadecane	2.76E-08
C16 as Hexadecane	2.76E-08
n-Heptadecane	2.73E-08
C17 as Heptadecane	2.73E-08
n-Octadecane	2.76E-08
C18 as Octodecane	2.76E-08
n-Nonadecane	2.77E-08
C19 as Nonadecane	2.77E-08
n-Eicosane	2.76E-08
C20 as Eicosane	2.76E-08
n-Heneicosane	2.79E-08
C21 as Heneicosane	2.79E-08
n-Docosane	2.76E-08
C22 as Docosane	2.76E-08
n-Tricosane	2.77E-08
C23 as Tricosane	2.77E-08
n-Tetracosane	2.77E-08
C24 as Tetracosane	2.77E-08
Total Hydrocarbon	1.19E-06

THC:	**6.31E-05**	**lbs/day**	**1.15E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C043A	C043A		ND Adj	C044A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	148.94	ND	0	148	ND	0	37	0.04	4	17	1.72E-08	1.72E-08
C5 as Pentane	74.30159	ND	37	148.94	ND	0	148	ND	0	37	0.04	4	17	1.72E-08	1.72E-08
n-Hexane	77.19047	ND	39	213.42	ND	0	212	ND	0	39	0.04	4	18	1.79E-08	1.79E-08
C6 as Hexane	77.19047	ND	39	213.42	ND	0	212	ND	0	39	0.04	4	18	1.79E-08	1.79E-08
n-Heptane	80.66666	ND	40	177.3	ND	0	176	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C7 as Heptane	80.66666	ND	40	177.3	ND	0	176	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
n-Octane	78.53968	ND	39	153.43	ND	0	152	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
C8 as Octane	78.53968	ND	39	153.43	ND	0	152	ND	0	39	0.04	4	18	1.82E-08	1.82E-08
n-Nonane	79.12698	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
C9 as Nonane	232.9914	J	233	154.57	ND	0	153	ND	0	233	0.23	23	108	1.08E-07	1.08E-07
n-Decane	79.84127	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	18	1.85E-08	1.85E-08
C10 as Decane	79.84127	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	18	1.85E-08	1.85E-08
n-Undecane	79.63492	ND	40	155.57	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
C11 as Undecane	79.63492	ND	40	155.57	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
n-Dodecane	79.09524	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
C12 as Dodecane	79.09524	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
n-Tridecane	79.28571	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
C13 as Tridecane	79.28571	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
n-Tetradecane	79.20635	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
C14 as tetradecane	79.20635	ND	40	154.73	ND	0	154	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
n-Pentadecane	79.60317	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
C15 as Pentadecane	79.60317	ND	40	155.5	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
n-Hexadecane	79.1746	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
C16 as Hexadecane	79.1746	ND	40	154.67	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
n-Heptadecane	78.25397	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	18	1.81E-08	1.81E-08
C17 as Heptadecane	78.25397	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	18	1.81E-08	1.81E-08
n-Octadecane	79.12698	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
C18 as Octodecane	79.12698	ND	40	154.57	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
n-Nonadecane	79.28571	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
C19 as Nonadecane	79.28571	ND	40	154.88	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
n-Eicosane	79.09524	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
C20 as Eicosane	79.09524	ND	40	154.51	ND	0	153	ND	0	40	0.04	4	18	1.83E-08	1.83E-08
n-Heneicosane	79.84127	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	18	1.85E-08	1.85E-08
C21 as Heneicosane	79.84127	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	18	1.85E-08	1.85E-08
n-Docosane	78.93651	ND	39	154.2	ND	0	153	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
C22 as Docosane	78.93651	ND	39	154.2	ND	0	153	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
n-Tricosane	79.36508	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
C23 as Tricosane	79.36508	ND	40	155.04	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
n-Tetracosane	79.47619	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
C24 as Tetracosane	79.47619	ND	40	155.26	ND	0	154	ND	0	40	0.04	4	18	1.84E-08	1.84E-08
Total Hydrocarbon			1,772			0			0		1.77	178	821	8.21E-07	8.21E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C043B	C043B		ND Adj	C044A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	153.7024	ND	77	149	ND	0	148	ND	0	77	0.08	8	36	3.56E-08	3.56E-08
C5 as Pentane	153.7024	ND	77	149	ND	0	148	ND	0	77	0.08	8	36	3.56E-08	3.56E-08
n-Hexane	220.2496	ND	110	213	ND	0	212	ND	0	110	0.11	11	51	5.10E-08	5.10E-08
C6 as Hexane	220.2496	ND	110	213	ND	0	212	ND	0	110	0.11	11	51	5.10E-08	5.10E-08
n-Heptane	182.976	ND	91	177	ND	0	176	ND	0	91	0.09	9	42	4.24E-08	4.24E-08
C7 as Heptane	182.976	ND	91	177	ND	0	176	ND	0	91	0.09	9	42	4.24E-08	4.24E-08
n-Octane	158.336	ND	79	153	ND	0	152	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
C8 as Octane	158.336	ND	79	153	ND	0	152	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
n-Nonane	159.52	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.69E-08	3.69E-08
C9 as Nonane	185.8961	J	186	155	ND	0	153	ND	0	186	0.19	19	86	8.61E-08	8.61E-08
n-Decane	160.96	ND	80	156	ND	0	155	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
C10 as Decane	160.96	ND	80	156	ND	0	155	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
n-Undecane	160.544	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
C11 as Undecane	160.544	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
n-Dodecane	159.456	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.69E-08	3.69E-08
C12 as Dodecane	159.456	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.69E-08	3.69E-08
n-Tridecane	159.84	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
C13 as Tridecane	159.84	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
n-Tetradecane	159.68	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
C14 as tetradecane	159.68	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
n-Pentadecane	160.48	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
C15 as Pentadecane	160.48	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
n-Hexadecane	159.616	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
C16 as Hexadecane	159.616	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
n-Heptadecane	157.76	ND	79	153	ND	0	152	ND	0	79	0.08	8	37	3.65E-08	3.65E-08
C17 as Heptadecane	157.76	ND	79	153	ND	0	152	ND	0	79	0.08	8	37	3.65E-08	3.65E-08
n-Octadecane	159.52	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.69E-08	3.69E-08
C18 as Octodecane	159.52	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.69E-08	3.69E-08
n-Nonadecane	159.84	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
C19 as Nonadecane	159.84	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
n-Eicosane	159.456	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.69E-08	3.69E-08
C20 as Eicosane	159.456	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.69E-08	3.69E-08
n-Heneicosane	160.96	ND	80	156	ND	0	155	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
C21 as Heneicosane	160.96	ND	80	156	ND	0	155	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
n-Docosane	159.136	ND	80	154	ND	0	153	ND	0	80	0.08	8	37	3.68E-08	3.68E-08
C22 as Docosane	159.136	ND	80	154	ND	0	153	ND	0	80	0.08	8	37	3.68E-08	3.68E-08
n-Tricosane	160	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
C23 as Tricosane	160	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
n-Tetracosane	160.224	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
C24 as Tetracosane	160.224	ND	80	155	ND	0	154	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
Total Hydrocarbon			3,378			0			0		3.38	339	1,564	1.56E-06	1.56E-06

Bagging Data Form — Vacuum Method

Sample Id C045

Equipment type:	Connector			**Component ID:**	20305.5		
Equipment Subtype:	Tube Fitting			**Unit:**	Refinery C		
Line Size:	1/2	inches		**Date:**	22-Jun-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.92	inHg	760.0 mmHg	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	85	°F	29.4 °C	**TVA ID**	37887		
Component Temp:	109	°F	42.8 °C	**Stream Pressure/Temp:**	140 psig	132.00	°F
Stream Description:	Tar						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
11:29	Background	2	ppmv	8-sec Dwell	10	ppmv	Total Dwell	2:00	min:sec	Final M21	41 ppm
12:04	Initial Bag Vacuum	0.11	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	106.5	°F	Leak @	bottom side of swage nut

Bag Concentrations (ppmv)

Time	12:06	12:08	12:10	12:12	12:14	12:16	12:18	12:20	12:22	12:26	12:31			
ppmv	17.6	19.5	18.6	19.5	20.7	21.3	21.7	21.6	22.2	22.4	21.3			

Sorbent Tube Sample Collection Parameters

C045A

Time								
12:20	Volume Start	41.7 Liters		Design Sample Flow Rate = 1 liter/min				
12:33	Volume Stop	54.7 Liters	Total Vol	13.0 Liters				
	Sample Run Time	13 Minutes		Sorbent Flow	1.000 L/min	Sorbent Flow$_{STP}$	0.937	L/min

C045B

Time								
12:20	Volume Start	40.1 Liters		Design Sample Flow Rate = 1 liter/min				
12:33	Volume Stop	52.9 Liters	Total Vol	12.8 Liters				
	Sample Run Time	13 Minutes		Sorbent Flow	0.985 L/min	Sorbent Flow$_{STP}$	0.923	L/min
	Total ST Vol$_{STP}$	24.19 Liters	DGM Vol$_{STP}$	73.12 Liters		Total Run Vol$_{STP}$	97.31	Liters

Bagging Parameters

Time								
12:21	Vacuum check	0.125 inches H2O			DGM$_P$	1.7 inches H2O vacuum	756.8	mmHg
12:25	DGM$_{TOL}$ Time	01:39.8 min:sec.frac	DGM Time	1.667	DGM Flow	6.00	DGM Flow$_{STP}$ 5.62	liters/minute
12:22	Bag Temp.	105.4 °F	40.8	°C	Sample$_T$	103 °F	39.4	°C

Post-Sample Data

12:41	Post Test M21	Background	3 ppmv	8-sec Dwell	70 ppmv	Total Dwell	1:00 min:sec	Final M21 112 ppm @ bottom side of swage nut
Condensate accumulation: starting time		N/A	hour:min	Final time	N/A hour:min		0:00 hours:min	
Organic condensate collected		N/A	ml					
Density of organic condensate		N/A	g/ml					

Average THC emissions =	1.21E-05 kg/hr
Percent difference THC ER =	51%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.49E-08
C5 as Pentane	2.49E-08
n-Hexane	3.26E-08
C6 as Hexane	3.26E-08
n-Heptane	2.88E-08
C7 as Heptane	2.88E-08
n-Octane	8.54E-08
C8 as Octane	9.56E-07
n-Nonane	2.77E-07
C9 as Nonane	2.27E-06
n-Decane	3.78E-07
C10 as Decane	1.54E-06
n-Undecane	5.07E-07
C11 as Undecane	1.37E-06
n-Dodecane	5.24E-07
C12 as Dodecane	1.90E-06
n-Tridecane	4.43E-07
C13 as Tridecane	8.46E-07
n-Tetradecane	1.75E-07
C14 as tetradecane	1.31E-07
n-Pentadecane	4.07E-08
C15 as Pentadecane	2.63E-08
n-Hexadecane	2.61E-08
C16 as Hexadecane	2.61E-08
n-Heptadecane	2.58E-08
C17 as Heptadecane	2.58E-08
n-Octadecane	2.61E-08
C18 as Octodecane	2.61E-08
n-Nonadecane	2.62E-08
C19 as Nonadecane	2.62E-08
n-Eicosane	2.61E-08
C20 as Eicosane	2.61E-08
n-Heneicosane	2.63E-08
C21 as Heneicosane	2.63E-08
n-Docosane	2.60E-08
C22 as Docosane	2.60E-08
n-Tricosane	2.62E-08
C23 as Tricosane	2.62E-08
n-Tetracosane	2.62E-08
C24 as Tetracosane	2.62E-08
Total Hydrocarbon	1.21E-05

THC:	6.41E-04	lbs/day	1.17E-04	tons/yr

C045A

Component	ANALYTICAL RESULTS C045A µg/m³	Flag	ND Adj µg/m³	BACKGROUND C046A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	72.01538	ND	36	148.94	ND	0	148	ND	0	36	0.04	4	16	1.62E-08	1.62E-08
C5 as Pentane	72.01538	ND	36	148.94	ND	0	148	ND	0	36	0.04	4	16	1.62E-08	1.62E-08
n-Hexane	74.81538	ND	37	213.42	ND	0	212	ND	0	37	0.04	4	17	1.68E-08	1.68E-08
C6 as Hexane	74.81538	ND	37	213.42	ND	0	212	ND	0	37	0.04	4	17	1.68E-08	1.68E-08
n-Heptane	78.18462	ND	39	177.3	ND	0	176	ND	0	39	0.04	4	18	1.76E-08	1.76E-08
C7 as Heptane	78.18462	ND	39	177.3	ND	0	176	ND	0	39	0.04	4	18	1.76E-08	1.76E-08
n-Octane	164.9024	J	165	153.43	ND	0	152	ND	0	165	0.16	16	74	7.41E-08	7.41E-08
C8 as Octane	1882.872		1,883	153.43	ND	0	152	ND	0	1,883	1.88	183	846	8.46E-07	8.46E-07
n-Nonane	549.3138	J	549	154.57	ND	0	153	ND	0	549	0.55	53	247	2.47E-07	2.47E-07
C9 as Nonane	4496.654		4,497	154.57	ND	0	153	ND	0	4,497	4.50	438	2020	2.02E-06	2.02E-06
n-Decane	745.2924	J	745	155.97	ND	0	155	ND	0	745	0.75	73	335	3.35E-07	3.35E-07
C10 as Decane	77.38462	ND	39	155.97	ND	0	155	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
n-Undecane	1021.182		1,021	155.57	ND	0	154	ND	0	1,021	1.02	99	459	4.59E-07	4.59E-07
C11 as Undecane	77.18462	ND	39	155.57	ND	0	154	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Dodecane	1059.293		1,059	154.51	ND	0	153	ND	0	1,059	1.06	103	476	4.76E-07	4.76E-07
C12 as Dodecane	5005.084		5,005	154.51	ND	0	153	ND	0	5,005	5.01	487	2248	2.25E-06	2.25E-06
n-Tridecane	1012.812		1,013	154.88	ND	0	154	ND	0	1,013	1.01	99	455	4.55E-07	4.55E-07
C13 as Tridecane	2267.676		2,268	154.88	ND	0	154	ND	0	2,268	2.27	221	1018	1.02E-06	1.02E-06
n-Tetradecane	355.0215	J	355	154.73	ND	0	154	ND	0	355	0.36	35	159	1.59E-07	1.59E-07
C14 as tetradecane	357.2215	J	357	154.73	ND	0	154	ND	0	357	0.36	35	160	1.60E-07	1.60E-07
n-Pentadecane	102.6959	J	103	155.5	ND	0	154	ND	0	103	0.10	10	46	4.61E-08	4.61E-08
C15 as Pentadecane	77.15385	ND	39	155.5	ND	0	154	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
n-Hexadecane	76.73846	ND	38	154.67	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
C16 as Hexadecane	76.73846	ND	38	154.67	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
n-Heptadecane	75.84615	ND	38	152.87	ND	0	152	ND	0	38	0.04	4	17	1.70E-08	1.70E-08
C17 as Heptadecane	75.84615	ND	38	152.87	ND	0	152	ND	0	38	0.04	4	17	1.70E-08	1.70E-08
n-Octadecane	76.69231	ND	38	154.57	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
C18 as Octodecane	76.69231	ND	38	154.57	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
n-Nonadecane	76.84615	ND	38	154.88	ND	0	154	ND	0	38	0.04	4	17	1.73E-08	1.73E-08
C19 as Nonadecane	76.84615	ND	38	154.88	ND	0	154	ND	0	38	0.04	4	17	1.73E-08	1.73E-08
n-Eicosane	76.66154	ND	38	154.51	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
C20 as Eicosane	76.66154	ND	38	154.51	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
n-Heneicosane	77.38462	ND	39	155.97	ND	0	155	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
C21 as Heneicosane	77.38462	ND	39	155.97	ND	0	155	ND	0	39	0.04	4	17	1.74E-08	1.74E-08
n-Docosane	76.50769	ND	38	154.2	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
C22 as Docosane	76.50769	ND	38	154.2	ND	0	153	ND	0	38	0.04	4	17	1.72E-08	1.72E-08
n-Tricosane	76.92308	ND	38	155.04	ND	0	154	ND	0	38	0.04	4	17	1.73E-08	1.73E-08
C23 as Tricosane	76.92308	ND	38	155.04	ND	0	154	ND	0	38	0.04	4	17	1.73E-08	1.73E-08
n-Tetracosane	77.03077	ND	39	155.26	ND	0	154	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
C24 as Tetracosane	77.03077	ND	39	155.26	ND	0	154	ND	0	39	0.04	4	17	1.73E-08	1.73E-08
Total Hydrocarbon			20,052			0			0		20.05	1951	9,006	9.01E-06	9.01E-06

C045B

Component	ANALYTICAL RESULTS C045B µg/m³	Flag	ND Adj µg/m³	BACKGROUND C046A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	150.1	ND	75	149	ND	0	148	ND	0	75	0.08	7	34	3.37E-08	3.37E-08
C5 as Pentane	150.1	ND	75	149	ND	0	148	ND	0	75	0.08	7	34	3.37E-08	3.37E-08
n-Hexane	215.0875	ND	108	213	ND	0	212	ND	0	108	0.11	10	48	4.83E-08	4.83E-08
C6 as Hexane	215.0875	ND	108	213	ND	0	212	ND	0	108	0.11	10	48	4.83E-08	4.83E-08
n-Heptane	178.6875	ND	89	177	ND	0	176	ND	0	89	0.09	9	40	4.01E-08	4.01E-08
C7 as Heptane	178.6875	ND	89	177	ND	0	176	ND	0	89	0.09	9	40	4.01E-08	4.01E-08
n-Octane	215.6086	J	216	153	ND	0	152	ND	0	216	0.22	21	97	9.68E-08	9.68E-08
C8 as Octane	2372.23		2,372	153	ND	0	152	ND	0	2,372	2.37	231	1065	1.07E-06	1.07E-06
n-Nonane	682.1529	J	682	155	ND	0	153	ND	0	682	0.68	66	306	3.06E-07	3.06E-07
C9 as Nonane	5611.229		5,611	155	ND	0	153	ND	0	5,611	5.61	546	2520	2.52E-06	2.52E-06
n-Decane	937.7382	J	938	156	ND	0	155	ND	0	938	0.94	91	421	4.21E-07	4.21E-07
C10 as Decane	6838.254		6,838	156	ND	0	155	ND	0	6,838	6.84	665	3071	3.07E-06	3.07E-06
n-Undecane	1235.181	J	1,235	156	ND	0	154	ND	0	1,235	1.24	120	555	5.55E-07	5.55E-07
C11 as Undecane	6067.553		6,068	156	ND	0	154	ND	0	6,068	6.07	590	2725	2.73E-06	2.73E-06
n-Dodecane	1274.957	J	1,275	155	ND	0	153	ND	0	1,275	1.27	124	573	5.73E-07	5.73E-07
C12 as Dodecane	3452.625		3,453	155	ND	0	153	ND	0	3,453	3.45	336	1551	1.55E-06	1.55E-06
n-Tridecane	960.7273	J	961	155	ND	0	154	ND	0	961	0.96	93	431	4.31E-07	4.31E-07
C13 as Tridecane	1500.341	J	1,500	155	ND	0	154	ND	0	1,500	1.50	146	674	6.74E-07	6.74E-07
n-Tetradecane	423.1012	J	423	155	ND	0	154	ND	0	423	0.42	41	190	1.90E-07	1.90E-07
C14 as tetradecane	228.1875	J	228	155	ND	0	154	ND	0	228	0.23	22	102	1.02E-07	1.02E-07
n-Pentadecane	156.7187	ND	78	156	ND	0	154	ND	0	78	0.08	8	35	3.52E-08	3.52E-08
C15 as Pentadecane	156.7187	ND	78	156	ND	0	154	ND	0	78	0.08	8	35	3.52E-08	3.52E-08
n-Hexadecane	155.875	ND	78	155	ND	0	153	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
C16 as Hexadecane	155.875	ND	78	155	ND	0	153	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
n-Heptadecane	154.0625	ND	77	153	ND	0	152	ND	0	77	0.08	7	35	3.46E-08	3.46E-08
C17 as Heptadecane	154.0625	ND	77	153	ND	0	152	ND	0	77	0.08	7	35	3.46E-08	3.46E-08
n-Octadecane	155.7812	ND	78	155	ND	0	153	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
C18 as Octodecane	155.7812	ND	78	155	ND	0	153	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
n-Nonadecane	156.0937	ND	78	155	ND	0	154	ND	0	78	0.08	8	35	3.51E-08	3.51E-08
C19 as Nonadecane	156.0937	ND	78	155	ND	0	154	ND	0	78	0.08	8	35	3.51E-08	3.51E-08
n-Eicosane	155.7187	ND	78	155	ND	0	153	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
C20 as Eicosane	155.7187	ND	78	155	ND	0	153	ND	0	78	0.08	8	35	3.50E-08	3.50E-08
n-Heneicosane	157.1875	ND	79	156	ND	0	155	ND	0	79	0.08	8	35	3.53E-08	3.53E-08
C21 as Heneicosane	157.1875	ND	79	156	ND	0	155	ND	0	79	0.08	8	35	3.53E-08	3.53E-08
n-Docosane	155.4062	ND	78	154	ND	0	153	ND	0	78	0.08	8	35	3.49E-08	3.49E-08
C22 as Docosane	155.4062	ND	78	154	ND	0	153	ND	0	78	0.08	8	35	3.49E-08	3.49E-08
n-Tricosane	156.25	ND	78	155	ND	0	154	ND	0	78	0.08	8	35	3.51E-08	3.51E-08
C23 as Tricosane	156.25	ND	78	155	ND	0	154	ND	0	78	0.08	8	35	3.51E-08	3.51E-08
n-Tetracosane	156.4687	ND	78	155	ND	0	154	ND	0	78	0.08	8	35	3.51E-08	3.51E-08
C24 as Tetracosane	156.4687	ND	78	155	ND	0	154	ND	0	78	0.08	8	35	3.51E-08	3.51E-08
Total Hydrocarbon			33,903			0			0		33.90	3299	15,227	1.52E-05	1.52E-05

Bagging Data Form — Vacuum Method

Sample Id: C047

Equipment type:	Agitator			**Component ID:**	**20178-P**		
Equipment Subtype:	Seal			**Unit:**	Refinery C		
Line Size:	24	*inches*		**Date:**	2-Jul-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.86	*inHg*	758.4 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	61.4	*°F*	16.3 *°C*	**TVA ID**	37887		
Component Temp:	59	*°F*	15.0 *°C*	**Stream Pressure/Temp:**		*psig*	*°F*
Stream Description:	*Diesel*						

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
9:03	Background	-2	*ppmv*	8-sec Dwell	10	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	15	*ppm*
9:41	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	65.3	*°F*	Leak @	Seal East Side	

Bag Concentrations (ppmv)

Time	9:46	9:48	9:50	9:52	9:58	10:02								
ppmv	-0.5	-0.6	-0.5	-1	0.1	0.5								

Sorbent Tube Sample Collection Parameters

C047A

Time										
9:52	Volume Start	57.3	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:05	Volume Stop	69.9	*Liters*	Total Vol	12.6	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969	*L/min*	Sorbent $Flow_{STP}$	0.985	*L/min*

C047B

9:52	Volume Start	54.9	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:05	Volume Stop	67.6	*Liters*	Total Vol	12.7	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977	*L/min*	Sorbent $Flow_{STP}$	0.993	*L/min*
	Total ST Vol_{STP}	25.71	*Liters*	DGM Vol_{STP}	87.10	*Liters*	Total Run Vol_{STP}	112.81	*Liters*	

Bagging Parameters

Time										
9:57	Vacuum check	0.01	*inches H2O*			DGM_P	2	*inches H2O vacuum*	754.7	*mmHg*
9:56	DGM_{10L} Time	01:31.0	*min:sec.frac*	DGM Time	1.517	DGM Flow	6.59	DGM $Flow_{STP}$	6.70	*liters/minute*
9:57	Bag Temp.	65.8	*°F*	18.8	*°C*	$Sample_T$	58	*°F*	14.4	*°C*

Post-Sample Data

10:13	Post Test M21	Background	-2	*ppmv*	8-sec Dwell	13	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	18 *ppm*
											@	Seal East Side

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	1.26E-06 kg/hr
Percent difference THC ER =	66%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.96E-08
C5 as Pentane	2.96E-08
n-Hexane	4.24E-08
C6 as Hexane	4.24E-08
n-Heptane	3.53E-08
C7 as Heptane	3.53E-08
n-Octane	3.05E-08
C8 as Octane	3.05E-08
n-Nonane	3.07E-08
C9 as Nonane	3.07E-08
n-Decane	3.10E-08
C10 as Decane	3.10E-08
n-Undecane	3.09E-08
C11 as Undecane	3.09E-08
n-Dodecane	3.07E-08
C12 as Dodecane	3.07E-08
n-Tridecane	3.08E-08
C13 as Tridecane	3.08E-08
n-Tetradecane	3.08E-08
C14 as tetradecane	3.08E-08
n-Pentadecane	3.09E-08
C15 as Pentadecane	3.09E-08
n-Hexadecane	3.08E-08
C16 as Hexadecane	3.08E-08
n-Heptadecane	3.04E-08
C17 as Heptadecane	3.04E-08
n-Octadecane	3.07E-08
C18 as Octodecane	3.07E-08
n-Nonadecane	3.08E-08
C19 as Nonadecane	3.08E-08
n-Eicosane	3.07E-08
C20 as Eicosane	3.07E-08
n-Heneicosane	3.10E-08
C21 as Heneicosane	3.10E-08
n-Docosane	3.07E-08
C22 as Docosane	3.07E-08
n-Tricosane	3.08E-08
C23 as Tricosane	3.08E-08
n-Tetracosane	3.09E-08
C24 as Tetracosane	3.09E-08
Total Hydrocarbon	1.26E-06

THC:	**6.67E-05**	**lbs/day**	**1.22E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C047A	C047A		ND Adj	C048A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	76.24127	ND	38	147.79	ND	0	148	ND	0	38	0.04	4	20	1.98E-08	1.98E-08
C5 as Pentane	76.24127	ND	38	147.79	ND	0	148	ND	0	38	0.04	4	20	1.98E-08	1.98E-08
n-Hexane	109.2508	ND	55	211.78	ND	0	212	ND	0	55	0.05	6	28	2.84E-08	2.84E-08
C6 as Hexane	109.2508	ND	55	211.78	ND	0	212	ND	0	55	0.05	6	28	2.84E-08	2.84E-08
n-Heptane	90.7619	ND	45	175.94	ND	0	176	ND	0	45	0.05	5	24	2.36E-08	2.36E-08
C7 as Heptane	90.7619	ND	45	175.94	ND	0	176	ND	0	45	0.05	5	24	2.36E-08	2.36E-08
n-Octane	78.53968	ND	39	152.25	ND	0	152	ND	0	39	0.04	4	20	2.04E-08	2.04E-08
C8 as Octane	78.53968	ND	39	152.25	ND	0	152	ND	0	39	0.04	4	20	2.04E-08	2.04E-08
n-Nonane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C9 as Nonane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Decane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
C10 as Decane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
n-Undecane	79.63492	ND	40	154.37	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
C11 as Undecane	79.63492	ND	40	154.37	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
n-Dodecane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C12 as Dodecane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Tridecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C13 as Tridecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Tetradecane	79.20635	ND	40	153.54	ND	0	154	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C14 as tetradecane	79.20635	ND	40	153.54	ND	0	154	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Pentadecane	79.60317	ND	40	154.31	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
C15 as Pentadecane	79.60317	ND	40	154.31	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
n-Hexadecane	79.1746	ND	40	153.48	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C16 as Hexadecane	79.1746	ND	40	153.48	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Heptadecane	78.25397	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	20	2.04E-08	2.04E-08
C17 as Heptadecane	78.25397	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	20	2.04E-08	2.04E-08
n-Octadecane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C18 as Octodecane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Nonadecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C19 as Nonadecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Eicosane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
C20 as Eicosane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	21	2.06E-08	2.06E-08
n-Heneicosane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
C21 as Heneicosane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	5	21	2.08E-08	2.08E-08
n-Docosane	78.93651	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	21	2.06E-08	2.06E-08
C22 as Docosane	78.93651	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	21	2.06E-08	2.06E-08
n-Tricosane	79.36508	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
C23 as Tricosane	79.36508	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
n-Tetracosane	79.47619	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
C24 as Tetracosane	79.47619	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
Total Hydrocarbon			1,623			0			0		1.62	183	845	8.45E-07	8.45E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C047B	C047B		ND Adj	C048A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.2819	ND	76	148	ND	0	148	ND	0	76	0.08	9	39	3.94E-08	3.94E-08
C5 as Pentane	151.2819	ND	76	148	ND	0	148	ND	0	76	0.08	9	39	3.94E-08	3.94E-08
n-Hexane	216.7811	ND	108	212	ND	0	212	ND	0	108	0.11	12	56	5.64E-08	5.64E-08
C6 as Hexane	216.7811	ND	108	212	ND	0	212	ND	0	108	0.11	12	56	5.64E-08	5.64E-08
n-Heptane	180.0945	ND	90	176	ND	0	176	ND	0	90	0.09	10	47	4.69E-08	4.69E-08
C7 as Heptane	180.0945	ND	90	176	ND	0	176	ND	0	90	0.09	10	47	4.69E-08	4.69E-08
n-Octane	155.8425	ND	78	152	ND	0	152	ND	0	78	0.08	9	41	4.06E-08	4.06E-08
C8 as Octane	155.8425	ND	78	152	ND	0	152	ND	0	78	0.08	9	41	4.06E-08	4.06E-08
n-Nonane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
C9 as Nonane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
n-Decane	158.4252	ND	79	155	ND	0	155	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
C10 as Decane	158.4252	ND	79	155	ND	0	155	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
n-Undecane	158.0158	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C11 as Undecane	158.0158	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Dodecane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
C12 as Dodecane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
n-Tridecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C13 as Tridecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Tetradecane	157.1654	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
C14 as tetradecane	157.1654	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
n-Pentadecane	157.9528	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C15 as Pentadecane	157.9528	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Hexadecane	157.1024	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
C16 as Hexadecane	157.1024	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
n-Heptadecane	155.2756	ND	78	152	ND	0	152	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
C17 as Heptadecane	155.2756	ND	78	152	ND	0	152	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
n-Octadecane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
C18 as Octodecane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
n-Nonadecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C19 as Nonadecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Eicosane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
C20 as Eicosane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	9	41	4.09E-08	4.09E-08
n-Heneicosane	158.4252	ND	79	155	ND	0	155	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
C21 as Heneicosane	158.4252	ND	79	155	ND	0	155	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
n-Docosane	156.6299	ND	78	153	ND	0	153	ND	0	78	0.08	9	41	4.08E-08	4.08E-08
C22 as Docosane	156.6299	ND	78	153	ND	0	153	ND	0	78	0.08	9	41	4.08E-08	4.08E-08
n-Tricosane	157.4803	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C23 as Tricosane	157.4803	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Tetracosane	157.7008	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C24 as Tetracosane	157.7008	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
Total Hydrocarbon			3,221			0			0		3.22	363	1,677	1.68E-06	1.68E-06

Bagging Data Form **Vacuum Method** **Sample Id** **C049**

Equipment type:	Connector			**Component ID:**	**20306.3**		
Equipment Subtype:	Tubing			**Unit:**	Refinery C		
Line Size:	1/2	*inches*		**Date:**	2-Jul-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.97 *inHg*	761.2	*mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	81 °F	27.2	°C	**TVA ID**	36502		
Component Temp:	92 °F	33.3	°C	**Stream Pressure/Temp:**	125	*psig*	140.00 °F
Stream Description:	*Tar*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
11:53	Background	0	*ppmv*	8-sec Dwell	32	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	230 *ppm*
12:24	Initial Bag Vacuum	0.12	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	86.5	°F	Leak @	tubing connector

Bag Concentrations (ppmv)

Time	12:27	12:29	12:31	12:33	12:35	12:37	12:39	12:41	12:47	12:53				
ppmv	28.3	32.8	34.7	35.9	36.5	37.6	39.4	39.3	35.4	33.8				

Sorbent Tube Sample Collection Parameters

C049A

Time									
12:42	Volume Start	69.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:55	Volume Stop	82.8	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.971	*L/min*

C049B

12:42	Volume Start	67.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:55	Volume Stop	80.6	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	0.979	*L/min*
	Total ST Vol$_{STP}$	25.35	*Liters*	DGM Vol$_{STP}$	79.53	*Liters*	Total Run Vol$_{STP}$	104.88	*Liters*

Bagging Parameters

Time									
12:46	Vacuum check	0.11	*inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	757.9	*mmHg*
12:45	DGM$_{10L}$ Time	01:35.9	*min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$ 6.12	*liters/minute*
12:47	Bag Temp.	102.7	°F	39.3	°C	Sample$_T$	80 °F	26.7	°C

Post-Sample Data

13:29	Post Test M21	Background	2 *ppmv*	8-sec Dwell	112 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	156 *ppm*
								@	tubing connector
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A *ml*						
Density of organic condensate			N/A *g/ml*						

Average THC emissions =	3.85E-05	kg/hr
Percent difference THC ER =	20%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.69E-08
C5 as Pentane	2.69E-08
n-Hexane	3.85E-08
C6 as Hexane	3.85E-08
n-Heptane	3.20E-08
C7 as Heptane	3.20E-08
n-Octane	2.72E-07
C8 as Octane	2.91E-06
n-Nonane	8.44E-07
C9 as Nonane	6.80E-06
n-Decane	1.22E-06
C10 as Decane	9.92E-06
n-Undecane	1.39E-06
C11 as Undecane	7.80E-06
n-Dodecane	8.70E-07
C12 as Dodecane	3.61E-06
n-Tridecane	6.03E-07
C13 as Tridecane	1.18E-06
n-Tetradecane	2.00E-07
C14 as tetradecane	1.62E-07
n-Pentadecane	2.81E-08
C15 as Pentadecane	2.81E-08
n-Hexadecane	2.79E-08
C16 as Hexadecane	2.79E-08
n-Heptadecane	2.76E-08
C17 as Heptadecane	2.76E-08
n-Octadecane	2.79E-08
C18 as Octodecane	2.79E-08
n-Nonadecane	2.80E-08
C19 as Nonadecane	2.80E-08
n-Eicosane	2.79E-08
C20 as Eicosane	2.79E-08
n-Heneicosane	2.82E-08
C21 as Heneicosane	2.82E-08
n-Docosane	2.78E-08
C22 as Docosane	2.78E-08
n-Tricosane	2.80E-08
C23 as Tricosane	2.80E-08
n-Tetracosane	2.80E-08
C24 as Tetracosane	2.80E-08
Total Hydrocarbon	3.85E-05

THC:	**2.04E-03**	**lbs/day**	**3.72E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C049A	C049A		ND Adj	C050A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.46822	ND	37	147.79	ND	0	148	ND	0	37	0.04	4	18	1.80E-08	1.80E-08
C5 as Pentane	74.46822	ND	37	147.79	ND	0	148	ND	0	37	0.04	4	18	1.80E-08	1.80E-08
n-Hexane	106.7101	ND	53	211.78	ND	0	212	ND	0	53	0.05	6	26	2.58E-08	2.58E-08
C6 as Hexane	106.7101	ND	53	211.78	ND	0	212	ND	0	53	0.05	6	26	2.58E-08	2.58E-08
n-Heptane	88.65117	ND	44	175.94	ND	0	176	ND	0	44	0.04	5	21	2.15E-08	2.15E-08
C7 as Heptane	88.65117	ND	44	175.94	ND	0	176	ND	0	44	0.04	5	21	2.15E-08	2.15E-08
n-Octane	514.5311	J	515	152.25	ND	0	152	ND	0	515	0.51	54	249	2.49E-07	2.49E-07
C8 as Octane	5457.842		5,458	152.25	ND	0	152	ND	0	5,458	5.46	572	2642	2.64E-06	2.64E-06
n-Nonane	1573.951		1,574	153.38	ND	0	153	ND	0	1,574	1.57	165	762	7.62E-07	7.62E-07
C9 as Nonane	12675.84		12,676	153.38	ND	0	153	ND	0	12,676	12.68	1329	6136	6.14E-06	6.14E-06
n-Decane	2288.986		2,289	154.77	ND	0	155	ND	0	2,289	2.29	240	1108	1.11E-06	1.11E-06
C10 as Decane	18519.71		18,520	154.77	ND	0	155	ND	0	18,520	18.52	1942	8965	8.96E-06	8.96E-06
n-Undecane	2586.184		2,586	154.37	ND	0	154	ND	0	2,586	2.59	271	1252	1.25E-06	1.25E-06
C11 as Undecane	14535.69		14,536	154.37	ND	0	154	ND	0	14,536	14.54	1525	7036	7.04E-06	7.04E-06
n-Dodecane	1609.009		1,609	153.32	ND	0	153	ND	0	1,609	1.61	169	779	7.79E-07	7.79E-07
C12 as Dodecane	6805.502		6,806	153.32	ND	0	153	ND	0	6,806	6.81	714	3294	3.29E-06	3.29E-06
n-Tridecane	1120.39		1,120	153.69	ND	0	154	ND	0	1,120	1.12	118	542	5.42E-07	5.42E-07
C13 as Tridecane	2359.954		2,360	153.69	ND	0	154	ND	0	2,360	2.36	248	1142	1.14E-06	1.14E-06
n-Tetradecane	375.6719	J	376	153.54	ND	0	154	ND	0	376	0.38	39	182	1.82E-07	1.82E-07
C14 as tetradecane	370.9041	J	371	153.54	ND	0	154	ND	0	371	0.37	39	180	1.80E-07	1.80E-07
n-Pentadecane	77.75194	ND	39	154.31	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C15 as Pentadecane	77.75194	ND	39	154.31	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Hexadecane	77.33334	ND	39	153.48	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
C16 as Hexadecane	77.33334	ND	39	153.48	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
n-Heptadecane	76.43411	ND	38	151.69	ND	0	152	ND	0	38	0.04	4	18	1.85E-08	1.85E-08
C17 as Heptadecane	76.43411	ND	38	151.69	ND	0	152	ND	0	38	0.04	4	18	1.85E-08	1.85E-08
n-Octadecane	77.28682	ND	39	153.38	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
C18 as Octodecane	77.28682	ND	39	153.38	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
n-Nonadecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
C19 as Nonadecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
n-Eicosane	77.25582	ND	39	153.32	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
C20 as Eicosane	77.25582	ND	39	153.32	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
n-Heneicosane	77.9845	ND	39	154.77	ND	0	155	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
C21 as Heneicosane	77.9845	ND	39	154.77	ND	0	155	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
n-Docosane	77.10078	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
C22 as Docosane	77.10078	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
n-Tricosane	77.51938	ND	39	153.85	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C23 as Tricosane	77.51938	ND	39	153.85	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Tetracosane	77.62791	ND	39	154.06	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C24 as Tetracosane	77.62791	ND	39	154.06	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
Total Hydrocarbon			71,838			0			0		71.84	7535	34,775	3.48E-05	3.48E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C049B	C049B		ND Adj	C050A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.7908	ND	74	148	ND	0	148	ND	0	74	0.07	8	36	3.58E-08	3.58E-08
C5 as Pentane	147.7908	ND	74	148	ND	0	148	ND	0	74	0.07	8	36	3.58E-08	3.58E-08
n-Hexane	211.7785	ND	106	212	ND	0	212	ND	0	106	0.11	11	51	5.13E-08	5.13E-08
C6 as Hexane	211.7785	ND	106	212	ND	0	212	ND	0	106	0.11	11	51	5.13E-08	5.13E-08
n-Heptane	175.9385	ND	88	176	ND	0	176	ND	0	88	0.09	9	43	4.26E-08	4.26E-08
C7 as Heptane	175.9385	ND	88	176	ND	0	176	ND	0	88	0.09	9	43	4.26E-08	4.26E-08
n-Octane	607.7945	J	608	152	ND	0	152	ND	0	608	0.61	64	294	2.94E-07	2.94E-07
C8 as Octane	6560.068		6,560	152	ND	0	152	ND	0	6,560	6.56	688	3176	3.18E-06	3.18E-06
n-Nonane	1914.299		1,914	153	ND	0	153	ND	0	1,914	1.91	201	927	9.27E-07	9.27E-07
C9 as Nonane	15427.96		15,428	153	ND	0	153	ND	0	15,428	15.43	1618	7468	7.47E-06	7.47E-06
n-Decane	2767.805		2,768	155	ND	0	155	ND	0	2,768	2.77	290	1340	1.34E-06	1.34E-06
C10 as Decane	22477.09		22,477	155	ND	0	155	ND	0	22,477	22.48	2357	10881	1.09E-05	1.09E-05
n-Undecane	3169.382		3,169	154	ND	0	154	ND	0	3,169	3.17	332	1534	1.53E-06	1.53E-06
C11 as Undecane	17676.14		17,676	154	ND	0	154	ND	0	17,676	17.68	1854	8557	8.56E-06	8.56E-06
n-Dodecane	1985.653		1,986	153	ND	0	153	ND	0	1,986	1.99	208	961	9.61E-07	9.61E-07
C12 as Dodecane	8094.879		8,095	153	ND	0	153	ND	0	8,095	8.09	849	3919	3.92E-06	3.92E-06
n-Tridecane	1370.072	J	1,370	154	ND	0	154	ND	0	1,370	1.37	144	663	6.63E-07	6.63E-07
C13 as Tridecane	2530.592		2,531	154	ND	0	154	ND	0	2,531	2.53	265	1225	1.23E-06	1.23E-06
n-Tetradecane	450.7889	J	451	154	ND	0	154	ND	0	451	0.45	47	218	2.18E-07	2.18E-07
C14 as tetradecane	297.0166	J	297	154	ND	0	154	ND	0	297	0.30	31	144	1.44E-07	1.44E-07
n-Pentadecane	154.3077	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C15 as Pentadecane	154.3077	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Hexadecane	153.4769	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
C16 as Hexadecane	153.4769	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
n-Heptadecane	151.6923	ND	76	152	ND	0	152	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
C17 as Heptadecane	151.6923	ND	76	152	ND	0	152	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
n-Octadecane	153.3846	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
C18 as Octodecane	153.3846	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
n-Nonadecane	153.6923	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C19 as Nonadecane	153.6923	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Eicosane	153.3231	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
C20 as Eicosane	153.3231	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
n-Heneicosane	154.7692	ND	77	155	ND	0	155	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C21 as Heneicosane	154.7692	ND	77	155	ND	0	155	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
n-Docosane	153.0154	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
C22 as Docosane	153.0154	ND	77	153	ND	0	153	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
n-Tricosane	153.8462	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C23 as Tricosane	153.8462	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Tetracosane	154.0615	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C24 as Tetracosane	154.0615	ND	77	154	ND	0	154	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
Total Hydrocarbon			87,401			0			0		87.40	9167	42,309	4.23E-05	4.23E-05

Bagging Data Form — Vacuum Method

Sample Id C052

WSPA

Equipment type:	Plug		**Component ID:**	**20758.2**	
Equipment Subtype:			**Unit:**	Refinery C	
Line Size:	3/4 *inches*		**Date:**	3-Jul-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.88 *inHg*	759.0 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	73 °F	22.8 °C	**TVA ID**	37887	
Component Temp:	144 °F	62.2 °C	**Stream Pressure/Temp:**	125 *psig*	°F
Stream Description:	*Hot Oil*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
10:51	Background	-5	*ppmv*	8-sec Dwell	16	*ppmv*	Total Dwell	1:00	*min:sec*	Final M21	51	*ppm*
11:17	Initial Bag Vacuum	0.115	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	88.5	°F	Leak @	Plug	

Bag Concentrations (ppmv)

Time	11:20	11:22	11:24	11:26	11:28	11:30	11:32	11:39	11:42					
ppmv	7.5	5.8	5	6.2	6.2	7	4.7	3.3	3					

Sorbent Tube Sample Collection Parameters

C052A

Time										
11:32	Volume Start	85.2	*Liters*		Design Sample Flow Rate = 1 liter/min					
11:45	Volume Stop	97.6	*Liters*	Total Vol	12.4	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.954	*L/min*	Sorbent Flow$_{STP}$	0.912	*L/min*

C052B

Time										
11:32	Volume Start	82.5	*Liters*		Design Sample Flow Rate = 1 liter/min					
11:45	Volume Stop	95.0	*Liters*	Total Vol	12.5	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962	*L/min*	Sorbent Flow$_{STP}$	0.920	*L/min*
	Total ST Vol$_{STP}$	23.81	*Liters*	DGM Vol$_{STP}$	77.71	*Liters*	Total Run Vol$_{STP}$	101.52	*Liters*	

Bagging Parameters

Time										
11:37	Vacuum check	0.13	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	755.6	*mmHg*
11:36	DGM$_{10L}$ Time	01:36.4	*min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$	5.98	*liters/minute*
11:38	Bag Temp.	116.6	°F	47.0	°C	Sample$_T$	91	°F	32.8	°C

Post-Sample Data

11:55	Post Test M21	Background	-16	*ppmv*	8-sec Dwell	3	*ppmv*	Total Dwell	2:30	*min:sec*	Final M21 30 *ppm* @ Plug
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*		0:00	*hours:min*	
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	2.81E-06 kg/hr
Percent difference THC ER =	6%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.71E-08
C5 as Pentane	2.71E-08
n-Hexane	3.88E-08
C6 as Hexane	3.88E-08
n-Heptane	3.22E-08
C7 as Heptane	3.22E-08
n-Octane	1.17E-07
C8 as Octane	2.90E-07
n-Nonane	1.29E-07
C9 as Nonane	3.63E-07
n-Decane	1.37E-07
C10 as Decane	3.69E-07
n-Undecane	1.06E-07
C11 as Undecane	2.60E-07
n-Dodecane	5.59E-08
C12 as Dodecane	1.12E-07
n-Tridecane	2.82E-08
C13 as Tridecane	2.82E-08
n-Tetradecane	2.81E-08
C14 as tetradecane	2.81E-08
n-Pentadecane	2.83E-08
C15 as Pentadecane	2.83E-08
n-Hexadecane	2.81E-08
C16 as Hexadecane	2.81E-08
n-Heptadecane	2.78E-08
C17 as Heptadecane	2.78E-08
n-Octadecane	2.81E-08
C18 as Octodecane	2.81E-08
n-Nonadecane	2.82E-08
C19 as Nonadecane	2.82E-08
n-Eicosane	2.81E-08
C20 as Eicosane	2.81E-08
n-Heneicosane	2.84E-08
C21 as Heneicosane	2.84E-08
n-Docosane	2.80E-08
C22 as Docosane	2.80E-08
n-Tricosane	2.82E-08
C23 as Tricosane	2.82E-08
n-Tetracosane	2.82E-08
C24 as Tetracosane	2.82E-08
Total Hydrocarbon	2.81E-06

THC:	**1.49E-04**	**lbs/day**	**2.71E-05**	**tons/yr**

C052A

Component	ANALYTICAL RESULTS C052A µg/m³	Flag	ND Adj µg/m³	BACKGROUND C053A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	77.47097	ND	39	150.1	ND	0	148	ND	0	39	0.04	4	18	1.81E-08	1.81E-08
C5 as Pentane	77.47097	ND	39	150.1	ND	0	148	ND	0	39	0.04	4	18	1.81E-08	1.81E-08
n-Hexane	111.0129	ND	56	215.09	ND	0	212	ND	0	56	0.06	6	26	2.60E-08	2.60E-08
C6 as Hexane	111.0129	ND	56	215.09	ND	0	212	ND	0	56	0.06	6	26	2.60E-08	2.60E-08
n-Heptane	92.22581	ND	46	178.69	ND	0	176	ND	0	46	0.05	5	22	2.16E-08	2.16E-08
C7 as Heptane	92.22581	ND	46	178.69	ND	0	176	ND	0	46	0.05	5	22	2.16E-08	2.16E-08
n-Octane	254.814	J	255	154.62	ND	0	152	ND	0	255	0.25	26	119	1.19E-07	1.19E-07
C8 as Octane	710.0346	J	710	154.62	ND	0	152	ND	0	710	0.71	72	333	3.33E-07	3.33E-07
n-Nonane	278.3207	J	278	155.78	ND	0	153	ND	0	278	0.28	28	130	1.30E-07	1.30E-07
C9 as Nonane	866.0486		866	155.78	ND	0	153	ND	0	866	0.87	88	406	4.06E-07	4.06E-07
n-Decane	277.6954	J	278	157.19	ND	0	155	ND	0	278	0.28	28	130	1.30E-07	1.30E-07
C10 as Decane	895.3528		895	157.19	ND	0	155	ND	0	895	0.90	91	420	4.20E-07	4.20E-07
n-Undecane	236.8009	J	237	156.78	ND	0	154	ND	0	237	0.24	24	111	1.11E-07	1.11E-07
C11 as Undecane	636.7036	J	637	156.78	ND	0	154	ND	0	637	0.64	65	298	2.98E-07	2.98E-07
n-Dodecane	159.0688	J	159	155.72	ND	0	153	ND	0	159	0.16	16	75	7.45E-08	7.45E-08
C12 as Dodecane	269.7772	J	270	155.72	ND	0	153	ND	0	270	0.27	27	126	1.26E-07	1.26E-07
n-Tridecane	80.56452	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
C13 as Tridecane	80.56452	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
n-Tetradecane	80.48387	ND	40	155.94	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
C14 as tetradecane	80.48387	ND	40	155.94	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
n-Pentadecane	80.8871	ND	40	156.72	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C15 as Pentadecane	80.8871	ND	40	156.72	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Hexadecane	80.45162	ND	40	155.87	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C16 as Hexadecane	80.45162	ND	40	155.87	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Heptadecane	79.51613	ND	40	154.06	ND	0	152	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
C17 as Heptadecane	79.51613	ND	40	154.06	ND	0	152	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
n-Octadecane	80.40323	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C18 as Octodecane	80.40323	ND	40	155.78	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Nonadecane	80.56452	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
C19 as Nonadecane	80.56452	ND	40	156.09	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
n-Eicosane	80.37097	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C20 as Eicosane	80.37097	ND	40	155.72	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Heneicosane	81.12903	ND	41	157.19	ND	0	155	ND	0	41	0.04	4	19	1.90E-08	1.90E-08
C21 as Heneicosane	81.12903	ND	41	157.19	ND	0	155	ND	0	41	0.04	4	19	1.90E-08	1.90E-08
n-Docosane	80.20968	ND	40	155.41	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C22 as Docosane	80.20968	ND	40	155.41	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Tricosane	80.64516	ND	40	156.25	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
C23 as Tricosane	80.64516	ND	40	156.25	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
n-Tetracosane	80.75807	ND	40	156.47	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
C24 as Tetracosane	80.75807	ND	40	156.47	ND	0	154	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
Total Hydrocarbon			5,831			0			0		5.83	592	2,732	2.73E-06	2.73E-06

C052B

Component	ANALYTICAL RESULTS C052B µg/m³	Flag	ND Adj µg/m³	BACKGROUND C053A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #C006A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	153.7024	ND	77	150	ND	0	148	ND	0	77	0.08	8	36	3.60E-08	3.60E-08
C5 as Pentane	153.7024	ND	77	150	ND	0	148	ND	0	77	0.08	8	36	3.60E-08	3.60E-08
n-Hexane	220.2496	ND	110	215	ND	0	212	ND	0	110	0.11	11	52	5.16E-08	5.16E-08
C6 as Hexane	220.2496	ND	110	215	ND	0	212	ND	0	110	0.11	11	52	5.16E-08	5.16E-08
n-Heptane	182.976	ND	91	179	ND	0	176	ND	0	91	0.09	9	43	4.29E-08	4.29E-08
C7 as Heptane	182.976	ND	91	179	ND	0	176	ND	0	91	0.09	9	43	4.29E-08	4.29E-08
n-Octane	244.2873	J	244	155	ND	0	152	ND	0	244	0.24	25	114	1.14E-07	1.14E-07
C8 as Octane	527.7913	J	528	155	ND	0	152	ND	0	528	0.53	54	247	2.47E-07	2.47E-07
n-Nonane	274.2285	J	274	156	ND	0	153	ND	0	274	0.27	28	128	1.28E-07	1.28E-07
C9 as Nonane	682.3783	J	682	156	ND	0	153	ND	0	682	0.68	69	320	3.20E-07	3.20E-07
n-Decane	305.6891	J	306	157	ND	0	155	ND	0	306	0.31	31	143	1.43E-07	1.43E-07
C10 as Decane	680.9802	J	681	157	ND	0	155	ND	0	681	0.68	69	319	3.19E-07	3.19E-07
n-Undecane	214.8742	J	215	157	ND	0	154	ND	0	215	0.21	22	101	1.01E-07	1.01E-07
C11 as Undecane	474.7151	J	475	157	ND	0	154	ND	0	475	0.47	48	222	2.22E-07	2.22E-07
n-Dodecane	159.456	ND	80	156	ND	0	153	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C12 as Dodecane	209.8453	J	210	156	ND	0	153	ND	0	210	0.21	21	98	9.83E-08	9.83E-08
n-Tridecane	159.84	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C13 as Tridecane	159.84	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
n-Tetradecane	159.68	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C14 as tetradecane	159.68	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
n-Pentadecane	160.48	ND	80	157	ND	0	154	ND	0	80	0.08	8	38	3.76E-08	3.76E-08
C15 as Pentadecane	160.48	ND	80	157	ND	0	154	ND	0	80	0.08	8	38	3.76E-08	3.76E-08
n-Hexadecane	159.616	ND	80	156	ND	0	153	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C16 as Hexadecane	159.616	ND	80	156	ND	0	153	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
n-Heptadecane	157.76	ND	79	154	ND	0	152	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
C17 as Heptadecane	157.76	ND	79	154	ND	0	152	ND	0	79	0.08	8	37	3.70E-08	3.70E-08
n-Octadecane	159.52	ND	80	156	ND	0	153	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C18 as Octodecane	159.52	ND	80	156	ND	0	153	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
n-Nonadecane	159.84	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C19 as Nonadecane	159.84	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
n-Eicosane	159.456	ND	80	156	ND	0	153	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C20 as Eicosane	159.456	ND	80	156	ND	0	153	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
n-Heneicosane	160.96	ND	80	157	ND	0	155	ND	0	80	0.08	8	38	3.77E-08	3.77E-08
C21 as Heneicosane	160.96	ND	80	157	ND	0	155	ND	0	80	0.08	8	38	3.77E-08	3.77E-08
n-Docosane	159.136	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
C22 as Docosane	159.136	ND	80	155	ND	0	153	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
n-Tricosane	160	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.75E-08	3.75E-08
C23 as Tricosane	160	ND	80	156	ND	0	154	ND	0	80	0.08	8	37	3.75E-08	3.75E-08
n-Tetracosane	160.224	ND	80	156	ND	0	154	ND	0	80	0.08	8	38	3.75E-08	3.75E-08
C24 as Tetracosane	160.224	ND	80	156	ND	0	154	ND	0	80	0.08	8	38	3.75E-08	3.75E-08
Total Hydrocarbon			6,168			0			0		6.17	626	2,890	2.89E-06	2.89E-06

Bagging Data Form — Vacuum Method

Sample Id: C054

WSPA Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	201822.3		
Equipment Subtype:	Threaded		**Unit:**	Refinery C		
Line Size:	3/8	*inches*	**Date:**	6-Jul-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	30.13 *inHg*	765.3 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	74.9 *°F*	23.8 *°C*	**TVA ID**	37887		
Component Temp:	240 *°F*	115.6 *°C*	**Stream Pressure/Temp:**		*psig*	*°F*
Stream Description:	*Hot Oil*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
8:41	Background	0 *ppmv*	8-sec Dwell	8 *ppmv*	Total Dwell	1:00 *min:sec*	Final M21	12 *ppm*
9:23	Initial Bag Vacuum	0.01 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	74.1 *°F*	Leak @	Threaded Connector

Bag Concentrations (ppmv)

Time	9:25	9:27	9:29	9:31	9:36	9:41								
ppmv	18.2	17.7	17.3	16.6	14.1	13.2								

Sorbent Tube Sample Collection Parameters

C054A

Time							
9:31	Volume Start	101.2 *Liters*		Design Sample Flow Rate = 1 liter/min			
9:44	Volume Stop	114.1 *Liters*	Total Vol	12.9 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.992 *L/min*	$\text{Sorbent Flow}_{STP}$	0.996 *L/min*

C054B

Time							
9:31	Volume Start	97.9 *Liters*		Design Sample Flow Rate = 1 liter/min			
9:44	Volume Stop	110.8 *Liters*	Total Vol	12.9 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.992 *L/min*	$\text{Sorbent Flow}_{STP}$	0.996 *L/min*
	$\text{Total ST Vol}_{STP}$	25.91 *Liters*	DGM Vol_{STP}	80.74 *Liters*	$\text{Total Run Vol}_{STP}$	106.65 *Liters*	

Bagging Parameters

Time							
9:35	Vacuum check	0.01 *inches H2O*			DGM_P	2 *inches H2O vacuum*	761.6 *mmHg*
9:35	DGM_{10L} Time	01:37.2 *min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM Flow_{STP} 6.21 *liters/minute*
9:36	Bag Temp.	77.9 *°F*	25.5 *°C*		Sample_T	69 *°F*	20.6 *°C*

Post-Sample Data

9:52	Post Test M21	Background	-6 *ppmv*	8-sec Dwell	6 *ppmv*	Total Dwell	1:00 *min:sec*	Final M21 10.8 *ppm* @ Threaded Connector

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	4.50E-06 kg/hr
Percent difference THC ER =	35%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.75E-08
C5 as Pentane	2.75E-08
n-Hexane	3.94E-08
C6 as Hexane	1.95E-07
n-Heptane	3.27E-08
C7 as Heptane	3.27E-08
n-Octane	8.49E-08
C8 as Octane	2.51E-07
n-Nonane	9.72E-08
C9 as Nonane	3.03E-07
n-Decane	1.00E-07
C10 as Decane	3.58E-07
n-Undecane	6.96E-08
C11 as Undecane	3.54E-07
n-Dodecane	1.92E-07
C12 as Dodecane	2.82E-07
n-Tridecane	6.66E-08
C13 as Tridecane	3.91E-07
n-Tetradecane	8.91E-08
C14 as tetradecane	1.47E-07
n-Pentadecane	6.31E-08
C15 as Pentadecane	1.75E-07
n-Hexadecane	4.89E-08
C16 as Hexadecane	5.23E-08
n-Heptadecane	9.68E-08
C17 as Heptadecane	2.82E-08
n-Octadecane	2.85E-08
C18 as Octodecane	3.34E-07
n-Nonadecane	2.86E-08
C19 as Nonadecane	2.86E-08
n-Eicosane	2.85E-08
C20 as Eicosane	2.06E-07
n-Heneicosane	2.88E-08
C21 as Heneicosane	4.60E-08
n-Docosane	2.85E-08
C22 as Docosane	2.85E-08
n-Tricosane	2.86E-08
C23 as Tricosane	2.86E-08
n-Tetracosane	2.87E-08
C24 as Tetracosane	2.87E-08
Total Hydrocarbon	4.50E-06

THC:	2.38E-04	lbs/day	4.35E-05	tons/yr

C054A	ANALYTICAL RESULTS C054A		ND Adj	BACKGROUND C055A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.46822	ND	37	147.79	ND	0	148	ND	0	37	0.04	4	18	1.83E-08	1.83E-08
C5 as Pentane	74.46822	ND	37	147.79	ND	0	148	ND	0	37	0.04	4	18	1.83E-08	1.83E-08
n-Hexane	106.7101	ND	53	211.78	ND	0	212	ND	0	53	0.05	6	26	2.63E-08	2.63E-08
C6 as Hexane	687.1751	J	687	211.78	ND	0	212	ND	0	687	0.69	73	338	3.38E-07	3.38E-07
n-Heptane	88.65117	ND	44	175.94	ND	0	176	ND	0	44	0.04	5	22	2.18E-08	2.18E-08
C7 as Heptane	88.65117	ND	44	175.94	ND	0	176	ND	0	44	0.04	5	22	2.18E-08	2.18E-08
n-Octane	190.4672	J	190	152.25	ND	0	152	ND	0	190	0.19	20	94	9.38E-08	9.38E-08
C8 as Octane	611.5225	J	612	152.25	ND	0	152	ND	0	612	0.61	65	301	3.01E-07	3.01E-07
n-Nonane	225.9446	J	226	153.38	ND	0	153	ND	0	226	0.23	24	111	1.11E-07	1.11E-07
C9 as Nonane	739.3344	J	739	153.38	ND	0	153	ND	0	739	0.74	79	364	3.64E-07	3.64E-07
n-Decane	232.2499	J	232	154.77	ND	0	155	ND	0	232	0.23	25	114	1.14E-07	1.14E-07
C10 as Decane	876.1644		876	154.77	ND	0	155	ND	0	876	0.88	93	431	4.31E-07	4.31E-07
n-Undecane	205.0588	J	205	154.37	ND	0	154	ND	0	205	0.21	22	101	1.01E-07	1.01E-07
C11 as Undecane	917.9191		918	154.37	ND	0	154	ND	0	918	0.92	98	452	4.52E-07	4.52E-07
n-Dodecane	443.5485	J	444	153.32	ND	0	153	ND	0	444	0.44	47	218	2.18E-07	2.18E-07
C12 as Dodecane	691.3883	J	691	153.32	ND	0	153	ND	0	691	0.69	74	340	3.40E-07	3.40E-07
n-Tridecane	193.0255	J	193	153.69	ND	0	154	ND	0	193	0.19	21	95	9.50E-08	9.50E-08
C13 as Tridecane	1000.937		1,001	153.69	ND	0	154	ND	0	1,001	1.00	107	493	4.93E-07	4.93E-07
n-Tetradecane	205.7078	J	206	153.54	ND	0	154	ND	0	206	0.21	22	101	1.01E-07	1.01E-07
C14 as tetradecane	433.8597	J	434	153.54	ND	0	154	ND	0	434	0.43	46	214	2.14E-07	2.14E-07
n-Pentadecane	178.7231	J	179	154.31	ND	0	154	ND	0	179	0.18	19	88	8.80E-08	8.80E-08
C15 as Pentadecane	466.3851	J	466	154.31	ND	0	154	ND	0	466	0.47	50	230	2.30E-07	2.30E-07
n-Hexadecane	121.4724	J	121	153.48	ND	0	153	ND	0	121	0.12	13	60	5.98E-08	5.98E-08
C16 as Hexadecane	135.0873	J	135	153.48	ND	0	153	ND	0	135	0.14	14	66	6.65E-08	6.65E-08
n-Heptadecane	201.1631	J	201	151.69	ND	0	152	ND	0	201	0.20	21	99	9.90E-08	9.90E-08
C17 as Heptadecane	76.43411	ND	38	151.69	ND	0	152	ND	0	38	0.04	4	19	1.88E-08	1.88E-08
n-Octadecane	77.28682	ND	39	153.38	ND	0	153	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C18 as Octodecane	766.2661	J	766	153.38	ND	0	153	ND	0	766	0.77	82	377	3.77E-07	3.77E-07
n-Nonadecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
C19 as Nonadecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
n-Eicosane	77.25582	ND	39	153.32	ND	0	153	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C20 as Eicosane	461.9123	J	462	153.32	ND	0	153	ND	0	462	0.46	49	227	2.27E-07	2.27E-07
n-Heneicosane	77.9845	ND	39	154.77	ND	0	155	ND	0	39	0.04	4	19	1.92E-08	1.92E-08
C21 as Heneicosane	108.7321	J	109	154.77	ND	0	155	ND	0	109	0.11	12	54	5.35E-08	5.35E-08
n-Docosane	77.10078	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C22 as Docosane	77.10078	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
n-Tricosane	77.51938	ND	39	153.85	ND	0	154	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
C23 as Tricosane	77.51938	ND	39	153.85	ND	0	154	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
n-Tetracosane	77.62791	ND	39	154.06	ND	0	154	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
C24 as Tetracosane	77.62791	ND	39	154.06	ND	0	154	ND	0	39	0.04	4	19	1.91E-08	1.91E-08
Total Hydrocarbon			10,775			0			0		10.77	1149	5,303	5.30E-06	5.30E-06

C054B	ANALYTICAL RESULTS C054B		ND Adj	BACKGROUND C055A		ND Adj	TRIP BLANK #C006A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.9364	ND	74	148	ND	0	148	ND	0	74	0.07	8	37	3.67E-08	3.67E-08
C5 as Pentane	148.9364	ND	74	148	ND	0	148	ND	0	74	0.07	8	37	3.67E-08	3.67E-08
n-Hexane	213.4202	ND	107	212	ND	0	212	ND	0	107	0.11	11	53	5.25E-08	5.25E-08
C6 as Hexane	213.4202	ND	107	212	ND	0	212	ND	0	107	0.11	11	53	5.25E-08	5.25E-08
n-Heptane	177.3023	ND	89	176	ND	0	176	ND	0	89	0.09	9	44	4.36E-08	4.36E-08
C7 as Heptane	177.3023	ND	89	176	ND	0	176	ND	0	89	0.09	9	44	4.36E-08	4.36E-08
n-Octane	154.6027	J	155	152	ND	0	152	ND	0	155	0.15	16	76	7.61E-08	7.61E-08
C8 as Octane	408.951	J	409	152	ND	0	152	ND	0	409	0.41	44	201	2.01E-07	2.01E-07
n-Nonane	168.9586	J	169	153	ND	0	153	ND	0	169	0.17	18	83	8.32E-08	8.32E-08
C9 as Nonane	491.7383	J	492	153	ND	0	153	ND	0	492	0.49	52	242	2.42E-07	2.42E-07
n-Decane	175.2825	J	175	155	ND	0	155	ND	0	175	0.18	19	86	8.63E-08	8.63E-08
C10 as Decane	577.4248	J	577	155	ND	0	155	ND	0	577	0.58	62	284	2.84E-07	2.84E-07
n-Undecane	155.5659	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C11 as Undecane	518.8167	J	519	154	ND	0	154	ND	0	519	0.52	55	255	2.55E-07	2.55E-07
n-Dodecane	337.1414	J	337	153	ND	0	153	ND	0	337	0.34	36	166	1.66E-07	1.66E-07
C12 as Dodecane	454.7593	J	455	153	ND	0	153	ND	0	455	0.45	48	224	2.24E-07	2.24E-07
n-Tridecane	154.8837	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C13 as Tridecane	589.2947	J	589	154	ND	0	154	ND	0	589	0.59	63	290	2.90E-07	2.90E-07
n-Tetradecane	156.2839	J	156	154	ND	0	154	ND	0	156	0.16	17	77	7.69E-08	7.69E-08
C14 as tetradecane	162.0457	J	162	154	ND	0	154	ND	0	162	0.16	17	80	7.98E-08	7.98E-08
n-Pentadecane	155.5039	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C15 as Pentadecane	246.2498	J	246	154	ND	0	154	ND	0	246	0.25	26	121	1.21E-07	1.21E-07
n-Hexadecane	154.6667	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C16 as Hexadecane	154.6667	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
n-Heptadecane	192.323	J	192	152	ND	0	152	ND	0	192	0.19	21	95	9.47E-08	9.47E-08
C17 as Heptadecane	152.8682	ND	76	152	ND	0	152	ND	0	76	0.08	8	38	3.76E-08	3.76E-08
n-Octadecane	154.5736	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C18 as Octodecane	589.3619	J	589	153	ND	0	153	ND	0	589	0.59	63	290	2.90E-07	2.90E-07
n-Nonadecane	154.8837	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C19 as Nonadecane	154.8837	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
n-Eicosane	154.5116	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C20 as Eicosane	373.1086	J	373	153	ND	0	153	ND	0	373	0.37	40	184	1.84E-07	1.84E-07
n-Heneicosane	155.969	ND	78	155	ND	0	155	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C21 as Heneicosane	155.969	ND	78	155	ND	0	155	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Docosane	154.2016	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C22 as Docosane	154.2016	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Tricosane	155.0388	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C23 as Tricosane	155.0388	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Tetracosane	155.2558	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C24 as Tetracosane	155.2558	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
Total Hydrocarbon			7,530			0			0		7.53	803	3,706	3.71E-06	3.71E-06

Bagging Data Form — Vacuum Method

Sample Id: C056

Equipment type:	Valve		**Component ID:**	416-20307-V	
Equipment Subtype:	Control		**Unit:**	Refinery C	
Line Size:	4 inches		**Date:**	11-Jul-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.92 inHg	760.0 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	66.1 °F	18.9 °C	**TVA ID**	36502	
Component Temp:	75 °F	23.9 °C	**Stream Pressure/Temp:**	psig	°F
Stream Description:	Btm Circ HC LNHF Vac Btms				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
8:56	Background	0 ppmv	8-sec Dwell	1 ppmv	Total Dwell	3:00 min:sec	Final M21	3.7 ppm
9:52	Initial Bag Vacuum	0.019 inches H2O	DGM Vac.	1.8 inches H2O	Bag Temp	66.6 °F	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:54	9:56	9:58	10:00	10:02	10:07	10:10	10:14						
ppmv	2.4	2.6	2.9	3	2.9	3.2	3.1	3.1						

Sorbent Tube Sample Collection Parameters

C056A

Time								
10:02	Volume Start	116.6 Liters		Design Sample Flow Rate = 1 liter/min				
10:15	Volume Stop	129.2 Liters	Total Vol	12.6 Liters				
	Sample Run Time	13 Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	0.978 L/min	

C056B

Time								
10:02	Volume Start	113.0 Liters		Design Sample Flow Rate = 1 liter/min				
10:15	Volume Stop	125.6 Liters	Total Vol	12.6 Liters				
	Sample Run Time	13 Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	0.978 L/min	
	Total ST Vol$_{STP}$	25.43 Liters	DGM Vol$_{STP}$	85.55 Liters	Total Run Vol$_{STP}$	110.97 Liters		

Bagging Parameters

Time								
10:06	Vacuum check	0.02 inches H2O			DGM$_P$	1.8 inches H2O vacuum	756.6 mmHg	
10:05	DGM$_{10L}$ Time	01:32.0 min:sec.frac	DGM Time	1.533	DGM Flow	6.52	DGM Flow$_{STP}$	6.58 liters/minute
10:06	Bag Temp.	70.5 °F	21.4 °C		Sample$_T$	63 °F	17.2 °C	

Post-Sample Data

10:24	Post Test M21	Background	0 ppmv	8-sec Dwell	1 ppmv	Total Dwell	2:00 min:sec	Final M21 3.4 ppm @ Packing
Condensate accumulation: starting time			N/A hour:min	Final time	N/A hour:min		0:00 hours:min	
Organic condensate collected			N/A ml					
Density of organic condensate			N/A g/ml					

Average THC emissions =	1.33E-06 kg/hr
Percent difference THC ER =	57%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.85E-08
C5 as Pentane	2.85E-08
n-Hexane	2.97E-08
C6 as Hexane	2.97E-08
n-Heptane	3.10E-08
C7 as Heptane	3.10E-08
n-Octane	3.02E-08
C8 as Octane	3.02E-08
n-Nonane	3.04E-08
C9 as Nonane	3.04E-08
n-Decane	3.07E-08
C10 as Decane	1.43E-07
n-Undecane	3.06E-08
C11 as Undecane	3.06E-08
n-Dodecane	3.04E-08
C12 as Dodecane	3.04E-08
n-Tridecane	3.05E-08
C13 as Tridecane	3.05E-08
n-Tetradecane	3.04E-08
C14 as tetradecane	3.04E-08
n-Pentadecane	3.06E-08
C15 as Pentadecane	3.06E-08
n-Hexadecane	3.04E-08
C16 as Hexadecane	3.04E-08
n-Heptadecane	3.01E-08
C17 as Heptadecane	3.01E-08
n-Octadecane	3.04E-08
C18 as Octodecane	3.04E-08
n-Nonadecane	3.05E-08
C19 as Nonadecane	3.05E-08
n-Eicosane	3.04E-08
C20 as Eicosane	3.04E-08
n-Heneicosane	3.07E-08
C21 as Heneicosane	3.07E-08
n-Docosane	3.03E-08
C22 as Docosane	3.03E-08
n-Tricosane	3.05E-08
C23 as Tricosane	3.05E-08
n-Tetracosane	3.05E-08
C24 as Tetracosane	3.05E-08
Total Hydrocarbon	1.33E-06

THC:	7.01E-05	lbs/day	1.28E-05	tons/yr

C056A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C056A	C056A		ND Adj	C057A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	144.03	ND	0	148	ND	0	37	0.04	4	19	1.90E-08	1.90E-08
C5 as Pentane	74.30159	ND	37	144.03	ND	0	148	ND	0	37	0.04	4	19	1.90E-08	1.90E-08
n-Hexane	77.19047	ND	39	149.63	ND	0	212	ND	0	39	0.04	4	20	1.98E-08	1.98E-08
C6 as Hexane	77.19047	ND	39	149.63	ND	0	212	ND	0	39	0.04	4	20	1.98E-08	1.98E-08
n-Heptane	80.66666	ND	40	156.37	ND	0	176	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
C7 as Heptane	80.66666	ND	40	156.37	ND	0	176	ND	0	40	0.04	4	21	2.07E-08	2.07E-08
n-Octane	78.53968	ND	39	152.25	ND	0	152	ND	0	39	0.04	4	20	2.01E-08	2.01E-08
C8 as Octane	78.53968	ND	39	152.25	ND	0	152	ND	0	39	0.04	4	20	2.01E-08	2.01E-08
n-Nonane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C9 as Nonane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Decane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
C10 as Decane	316.4285	J	316	154.77	ND	0	155	ND	0	316	0.32	35	162	1.62E-07	1.62E-07
n-Undecane	79.63492	ND	40	154.37	ND	0	154	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
C11 as Undecane	79.63492	ND	40	154.37	ND	0	154	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
n-Dodecane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C12 as Dodecane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Tridecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C13 as Tridecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Tetradecane	79.20635	ND	40	153.54	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C14 as tetradecane	79.20635	ND	40	153.54	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Pentadecane	79.60317	ND	40	154.31	ND	0	154	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
C15 as Pentadecane	79.60317	ND	40	154.31	ND	0	154	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
n-Hexadecane	79.1746	ND	40	153.48	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C16 as Hexadecane	79.1746	ND	40	153.48	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Heptadecane	78.25397	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	20	2.00E-08	2.00E-08
C17 as Heptadecane	78.25397	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	20	2.00E-08	2.00E-08
n-Octadecane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C18 as Octodecane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Nonadecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C19 as Nonadecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Eicosane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C20 as Eicosane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Heneicosane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
C21 as Heneicosane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
n-Docosane	78.93651	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	20	2.02E-08	2.02E-08
C22 as Docosane	78.93651	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	20	2.02E-08	2.02E-08
n-Tricosane	79.36508	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
C23 as Tricosane	79.36508	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	20	2.03E-08	2.03E-08
n-Tetracosane	79.47619	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
C24 as Tetracosane	79.47619	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	20	2.04E-08	2.04E-08
Total Hydrocarbon			1,856			0			0		1.86	206	950	9.50E-07	9.50E-07

C056B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C056B	C056B		ND Adj	C057A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.6032	ND	74	144	ND	0	148	ND	0	74	0.07	8	38	3.81E-08	3.81E-08
C5 as Pentane	148.6032	ND	74	144	ND	0	148	ND	0	74	0.07	8	38	3.81E-08	3.81E-08
n-Hexane	154.3809	ND	77	150	ND	0	212	ND	0	77	0.08	9	40	3.95E-08	3.95E-08
C6 as Hexane	154.3809	ND	77	150	ND	0	212	ND	0	77	0.08	9	40	3.95E-08	3.95E-08
n-Heptane	161.3333	ND	81	156	ND	0	176	ND	0	81	0.08	9	41	4.13E-08	4.13E-08
C7 as Heptane	161.3333	ND	81	156	ND	0	176	ND	0	81	0.08	9	41	4.13E-08	4.13E-08
n-Octane	157.0794	ND	79	152	ND	0	152	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
C8 as Octane	157.0794	ND	79	152	ND	0	152	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
n-Nonane	158.254	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
C9 as Nonane	158.254	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
n-Decane	159.6825	ND	80	155	ND	0	155	ND	0	80	0.08	9	41	4.09E-08	4.09E-08
C10 as Decane	241.1011	J	241	155	ND	0	155	ND	0	241	0.24	27	123	1.23E-07	1.23E-07
n-Undecane	159.2698	ND	80	154	ND	0	154	ND	0	80	0.08	9	41	4.08E-08	4.08E-08
C11 as Undecane	159.2698	ND	80	154	ND	0	154	ND	0	80	0.08	9	41	4.08E-08	4.08E-08
n-Dodecane	158.1905	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
C12 as Dodecane	158.1905	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
n-Tridecane	158.5714	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
C13 as Tridecane	158.5714	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
n-Tetradecane	158.4127	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
C14 as tetradecane	158.4127	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
n-Pentadecane	159.2063	ND	80	154	ND	0	154	ND	0	80	0.08	9	41	4.08E-08	4.08E-08
C15 as Pentadecane	159.2063	ND	80	154	ND	0	154	ND	0	80	0.08	9	41	4.08E-08	4.08E-08
n-Hexadecane	158.3492	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
C16 as Hexadecane	158.3492	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
n-Heptadecane	156.5079	ND	78	152	ND	0	152	ND	0	78	0.08	9	40	4.01E-08	4.01E-08
C17 as Heptadecane	156.5079	ND	78	152	ND	0	152	ND	0	78	0.08	9	40	4.01E-08	4.01E-08
n-Octadecane	158.254	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
C18 as Octodecane	158.254	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
n-Nonadecane	158.5714	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
C19 as Nonadecane	158.5714	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
n-Eicosane	158.1905	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
C20 as Eicosane	158.1905	ND	79	153	ND	0	153	ND	0	79	0.08	9	41	4.05E-08	4.05E-08
n-Heneicosane	159.6825	ND	80	155	ND	0	155	ND	0	80	0.08	9	41	4.09E-08	4.09E-08
C21 as Heneicosane	159.6825	ND	80	155	ND	0	155	ND	0	80	0.08	9	41	4.09E-08	4.09E-08
n-Docosane	157.873	ND	79	153	ND	0	153	ND	0	79	0.08	9	40	4.04E-08	4.04E-08
C22 as Docosane	157.873	ND	79	153	ND	0	153	ND	0	79	0.08	9	40	4.04E-08	4.04E-08
n-Tricosane	158.7302	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
C23 as Tricosane	158.7302	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
n-Tetracosane	158.9524	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
C24 as Tetracosane	158.9524	ND	79	154	ND	0	154	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
Total Hydrocarbon			3,319			0			0		3.32	368	1,700	1.70E-06	1.70E-06

Bagging Data Form — Vacuum Method

Sample Id C058

WSPA — Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	416-20310-V	
Equipment Subtype:	Gate			**Unit:**	Refinery C	
Line Size:	3/4 *inches*			**Date:**	11-Jul-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.92 *inHg*	760.0 *mmHg*		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	70.1 *°F*	21.2 *°C*		**TVA ID**	36502	
Component Temp:	77 *°F*	25.0 *°C*		**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*LNHF Vac Btms*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
10:28	Background	0 *ppmv*	8-sec Dwell	0 *ppmv*	Total Dwell	4:00 *min:sec*	Final M21	1 *ppm*
10:55	Initial Bag Vacuum	0.06 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	73.9 *°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	10:57	10:59	11:01	11:03	11:05	11:07	11:13	11:17						
ppmv	0.6	1	1.3	1.5	1.4	1.4	1.4	1.4						

Sorbent Tube Sample Collection Parameters

C058A

Time								
11:07	Volume Start	129.2 *Liters*		Design Sample Flow Rate = 1 liter/min				
11:20	Volume Stop	141.8 *Liters*	Total Vol	12.6 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.974 *L/min*	

C058B

11:07	Volume Start	125.6 *Liters*		Design Sample Flow Rate = 1 liter/min			
11:20	Volume Stop	138.3 *Liters*	Total Vol	12.7 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.982 *L/min*
	Total ST Vol$_{STP}$	25.43 *Liters*	DGM Vol$_{STP}$	78.40 *Liters*	Total Run Vol$_{STP}$	103.83 *Liters*	

Bagging Parameters

Time								
11:12	Vacuum check	0.075 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	756.6 *mmHg*	
11:10	DGM$_{10L}$ Time	01:39.6 *min:sec.frac*	DGM Time	1.667	DGM Flow	6.00	DGM Flow$_{STP}$	6.03 *liters/minute*
11:12	Bag Temp.	74.8 *°F*	23.8 *°C*		Sample$_T$	65 *°F*	18.3 *°C*	

Post-Sample Data

11:28	Post Test M21	Background	-1 *ppmv*	8-sec Dwell	0 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21 1 *ppm* @ Packing

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*	
Organic condensate collected	N/A *ml*				
Density of organic condensate	N/A *g/ml*				

Average THC emissions =	1.22E-06 kg/hr
Percent difference THC ER =	60%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.66E-08
C5 as Pentane	2.66E-08
n-Hexane	2.76E-08
C6 as Hexane	2.76E-08
n-Heptane	2.88E-08
C7 as Heptane	2.88E-08
n-Octane	2.81E-08
C8 as Octane	2.81E-08
n-Nonane	2.83E-08
C9 as Nonane	2.83E-08
n-Decane	2.85E-08
C10 as Decane	1.16E-07
n-Undecane	2.85E-08
C11 as Undecane	2.85E-08
n-Dodecane	2.83E-08
C12 as Dodecane	2.83E-08
n-Tridecane	2.83E-08
C13 as Tridecane	2.83E-08
n-Tetradecane	2.83E-08
C14 as tetradecane	2.83E-08
n-Pentadecane	2.85E-08
C15 as Pentadecane	2.85E-08
n-Hexadecane	2.83E-08
C16 as Hexadecane	2.83E-08
n-Heptadecane	2.80E-08
C17 as Heptadecane	2.80E-08
n-Octadecane	2.83E-08
C18 as Octodecane	2.83E-08
n-Nonadecane	2.83E-08
C19 as Nonadecane	2.83E-08
n-Eicosane	2.83E-08
C20 as Eicosane	2.83E-08
n-Heneicosane	2.85E-08
C21 as Heneicosane	2.85E-08
n-Docosane	2.82E-08
C22 as Docosane	2.82E-08
n-Tricosane	2.84E-08
C23 as Tricosane	2.84E-08
n-Tetracosane	2.84E-08
C24 as Tetracosane	2.84E-08
Total Hydrocarbon	1.22E-06

THC:	**6.44E-05**	**lbs/day**	**1.18E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C058A	C058A		ND Adj	C059A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	144.03	ND	0	148	ND	0	37	0.04	4	18	1.78E-08	1.78E-08
C5 as Pentane	74.30159	ND	37	144.03	ND	0	148	ND	0	37	0.04	4	18	1.78E-08	1.78E-08
n-Hexane	77.19047	ND	39	149.63	ND	0	212	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
C6 as Hexane	77.19047	ND	39	149.63	ND	0	212	ND	0	39	0.04	4	18	1.85E-08	1.85E-08
n-Heptane	80.66666	ND	40	156.37	ND	0	176	ND	0	40	0.04	4	19	1.93E-08	1.93E-08
C7 as Heptane	80.66666	ND	40	156.37	ND	0	176	ND	0	40	0.04	4	19	1.93E-08	1.93E-08
n-Octane	78.53968	ND	39	152.25	ND	0	152	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C8 as Octane	78.53968	ND	39	152.25	ND	0	152	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Nonane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C9 as Nonane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Decane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
C10 as Decane	239.8819	J	240	154.77	ND	0	155	ND	0	240	0.24	25	115	1.15E-07	1.15E-07
n-Undecane	79.63492	ND	40	154.37	ND	0	154	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
C11 as Undecane	79.63492	ND	40	154.37	ND	0	154	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
n-Dodecane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C12 as Dodecane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Tridecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C13 as Tridecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Tetradecane	79.20635	ND	40	153.54	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C14 as tetradecane	79.20635	ND	40	153.54	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Pentadecane	79.60317	ND	40	154.31	ND	0	154	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
C15 as Pentadecane	79.60317	ND	40	154.31	ND	0	154	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
n-Hexadecane	79.1746	ND	40	153.48	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C16 as Hexadecane	79.1746	ND	40	153.48	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Heptadecane	78.25397	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C17 as Heptadecane	78.25397	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Octadecane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C18 as Octodecane	79.12698	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Nonadecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C19 as Nonadecane	79.28571	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Eicosane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C20 as Eicosane	79.09524	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Heneicosane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
C21 as Heneicosane	79.84127	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
n-Docosane	78.93651	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
C22 as Docosane	78.93651	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
n-Tricosane	79.36508	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C23 as Tricosane	79.36508	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
n-Tetracosane	79.47619	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
C24 as Tetracosane	79.47619	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	19	1.90E-08	1.90E-08
Total Hydrocarbon			1,779			0			0		1.78	185	853	8.53E-07	8.53E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C058B	C058B		ND Adj	C059A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.4331	ND	74	144	ND	0	148	ND	0	74	0.07	8	35	3.53E-08	3.53E-08
C5 as Pentane	147.4331	ND	74	144	ND	0	148	ND	0	74	0.07	8	35	3.53E-08	3.53E-08
n-Hexane	153.1654	ND	77	150	ND	0	212	ND	0	77	0.08	8	37	3.67E-08	3.67E-08
C6 as Hexane	153.1654	ND	77	150	ND	0	212	ND	0	77	0.08	8	37	3.67E-08	3.67E-08
n-Heptane	160.063	ND	80	156	ND	0	176	ND	0	80	0.08	8	38	3.84E-08	3.84E-08
C7 as Heptane	160.063	ND	80	156	ND	0	176	ND	0	80	0.08	8	38	3.84E-08	3.84E-08
n-Octane	155.8425	ND	78	152	ND	0	152	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
C8 as Octane	155.8425	ND	78	152	ND	0	152	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
n-Nonane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C9 as Nonane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Decane	158.4252	ND	79	155	ND	0	155	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
C10 as Decane	245.911	J	246	155	ND	0	155	ND	0	246	0.25	26	118	1.18E-07	1.18E-07
n-Undecane	158.0158	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C11 as Undecane	158.0158	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Dodecane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C12 as Dodecane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Tridecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C13 as Tridecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
n-Tetradecane	157.1654	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C14 as tetradecane	157.1654	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
n-Pentadecane	157.9528	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
C15 as Pentadecane	157.9528	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
n-Hexadecane	157.1024	ND	79	153	ND	0	153	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C16 as Hexadecane	157.1024	ND	79	153	ND	0	153	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Heptadecane	155.2756	ND	78	152	ND	0	152	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
C17 as Heptadecane	155.2756	ND	78	152	ND	0	152	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
n-Octadecane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C18 as Octodecane	157.0079	ND	79	153	ND	0	153	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Nonadecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C19 as Nonadecane	157.3228	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
n-Eicosane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C20 as Eicosane	156.9449	ND	78	153	ND	0	153	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Heneicosane	158.4252	ND	79	155	ND	0	155	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
C21 as Heneicosane	158.4252	ND	79	155	ND	0	155	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
n-Docosane	156.6299	ND	78	153	ND	0	153	ND	0	78	0.08	8	38	3.75E-08	3.75E-08
C22 as Docosane	156.6299	ND	78	153	ND	0	153	ND	0	78	0.08	8	38	3.75E-08	3.75E-08
n-Tricosane	157.4803	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C23 as Tricosane	157.4803	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
n-Tetracosane	157.7008	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
C24 as Tetracosane	157.7008	ND	79	154	ND	0	154	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
Total Hydrocarbon			3,300			0			0		3.30	343	1,581	1.58E-06	1.58E-06

Bagging Data Form — Vacuum Method

Sample Id: C060

Equipment type:	Valve	**Component ID:**	420-20376
Equipment Subtype:	Gate	**Unit:**	Refinery C
Line Size:	6 *inches*	**Date:**	11-Jul-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.87 *inHg* / 758.7 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	73.4 °F / 23.0 °C	**TVA ID**	34251
Component Temp:	175 °F / 79.4 °C	**Stream Pressure/Temp:**	*psig* / °F
Stream Description:	*TKC Vac*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
12:59	Background	0 *ppmv*	8-sec Dwell	7 *ppmv*	Total Dwell	2:30 *min:sec*	Final M21	30 *ppm*
13:37	Initial Bag Vacuum	0.01 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	67.1 °F	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:39	13:41	13:43	13:45	13:47	13:49	13:51	13:53	13:55	13:57	14:08			
ppmv	3.7	5.3	6.3	6.6	7	7.5	8.7	10	10.4	10.5	11			

Sorbent Tube Sample Collection Parameters

C060A

Time						
13:57	Volume Start	141.8 *Liters*		Design Sample Flow Rate = 1 liter/min		
14:10	Volume Stop	154.5 *Liters*	Total Vol	12.7 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.977 *L/min*	Sorbent Flow$_{STP}$	0.969 *L/min*

C060B

13:57	Volume Start	138.3 *Liters*		Design Sample Flow Rate = 1 liter/min		
14:10	Volume Stop	151.2 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	Sorbent Flow$_{STP}$	0.984 *L/min*

Total ST Vol$_{STP}$ 25.40 *Liters* DGM Vol$_{STP}$ 78.17 *Liters* Total Run Vol$_{STP}$ 103.57 *Liters*

Bagging Parameters

Time								
14:00	Vacuum check	0.025 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	755.3	*mmHg*
14:02	DGM$_{10L}$ Time	01:38.8 *min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM Flow$_{STP}$ 6.01	*liters/minute*
14:00	Bag Temp.	59 °F	15.0	°C	Sample$_T$	71 °F	21.7	°C

Post-Sample Data

14:16 Post Test M21 Background 3 *ppmv* 8-sec Dwell 14 *ppmv* Total Dwell 2:00 *min:sec* Final M21 75 *ppm* @ Stem

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	5.69E-06 kg/hr
Percent difference THC ER =	7%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.62E-08
C5 as Pentane	2.62E-08
n-Hexane	2.72E-08
C6 as Hexane	2.72E-08
n-Heptane	2.84E-08
C7 as Heptane	2.84E-08
n-Octane	2.76E-08
C8 as Octane	4.37E-08
n-Nonane	8.06E-08
C9 as Nonane	1.60E-07
n-Decane	1.72E-07
C10 as Decane	4.75E-07
n-Undecane	2.01E-07
C11 as Undecane	3.80E-07
n-Dodecane	2.37E-07
C12 as Dodecane	5.77E-07
n-Tridecane	2.58E-07
C13 as Tridecane	7.64E-07
n-Tetradecane	2.16E-07
C14 as tetradecane	5.72E-07
n-Pentadecane	1.09E-07
C15 as Pentadecane	3.60E-07
n-Hexadecane	2.79E-08
C16 as Hexadecane	1.75E-07
n-Heptadecane	2.75E-08
C17 as Heptadecane	1.15E-07
n-Octadecane	2.79E-08
C18 as Octodecane	1.59E-07
n-Nonadecane	2.79E-08
C19 as Nonadecane	5.92E-08
n-Eicosane	2.78E-08
C20 as Eicosane	2.78E-08
n-Heneicosane	2.81E-08
C21 as Heneicosane	2.81E-08
n-Docosane	2.78E-08
C22 as Docosane	2.78E-08
n-Tricosane	2.79E-08
C23 as Tricosane	2.79E-08
n-Tetracosane	2.80E-08
C24 as Tetracosane	2.80E-08
Total Hydrocarbon	5.69E-06

THC:	3.01E-04	lbs/day	5.50E-05	tons/yr

C060A	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
	C060A		ND Adj	C061A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	73.71654	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	18	1.76E-08	1.76E-08
C5 as Pentane	73.71654	ND	37	145.15	ND	0	148	ND	0	37	0.04	4	18	1.76E-08	1.76E-08
n-Hexane	76.58268	ND	38	150.79	ND	0	212	ND	0	38	0.04	4	18	1.83E-08	1.83E-08
C6 as Hexane	76.58268	ND	38	150.79	ND	0	212	ND	0	38	0.04	4	18	1.83E-08	1.83E-08
n-Heptane	80.0315	ND	40	157.58	ND	0	176	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
C7 as Heptane	80.0315	ND	40	157.58	ND	0	176	ND	0	40	0.04	4	19	1.91E-08	1.91E-08
n-Octane	77.92126	ND	39	153.43	ND	0	152	ND	0	39	0.04	4	19	1.86E-08	1.86E-08
C8 as Octane	105.9278	J	106	153.43	ND	0	152	ND	0	106	0.11	11	51	5.06E-08	5.06E-08
n-Nonane	165.6286	J	166	154.57	ND	0	153	ND	0	166	0.17	17	79	7.92E-08	7.92E-08
C9 as Nonane	367.3384	J	367	154.57	ND	0	153	ND	0	367	0.37	38	176	1.76E-07	1.76E-07
n-Decane	353.35	J	353	155.97	ND	0	155	ND	0	353	0.35	37	169	1.69E-07	1.69E-07
C10 as Decane	962.482		962	155.97	ND	0	155	ND	0	962	0.96	100	460	4.60E-07	4.60E-07
n-Undecane	409.2509	J	409	155.57	ND	0	154	ND	0	409	0.41	42	196	1.96E-07	1.96E-07
C11 as Undecane	798.074		798	155.57	ND	0	154	ND	0	798	0.80	83	381	3.81E-07	3.81E-07
n-Dodecane	476.1905	J	476	154.51	ND	0	153	ND	0	476	0.48	49	228	2.28E-07	2.28E-07
C12 as Dodecane	1176.204		1,176	154.51	ND	0	153	ND	0	1,176	1.18	122	562	5.62E-07	5.62E-07
n-Tridecane	516.3471	J	516	154.88	ND	0	154	ND	0	516	0.52	53	247	2.47E-07	2.47E-07
C13 as Tridecane	1549.927		1,550	154.88	ND	0	154	ND	0	1,550	1.55	161	741	7.41E-07	7.41E-07
n-Tetradecane	422.1505	J	422	154.73	ND	0	154	ND	0	422	0.42	44	202	2.02E-07	2.02E-07
C14 as tetradecane	1149.038		1,149	154.73	ND	0	154	ND	0	1,149	1.15	119	549	5.49E-07	5.49E-07
n-Pentadecane	213.396	J	213	155.5	ND	0	154	ND	0	213	0.21	22	102	1.02E-07	1.02E-07
C15 as Pentadecane	762.966	J	763	155.5	ND	0	154	ND	0	763	0.76	79	365	3.65E-07	3.65E-07
n-Hexadecane	78.55118	ND	39	154.67	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C16 as Hexadecane	370.1182	J	370	154.67	ND	0	153	ND	0	370	0.37	38	177	1.77E-07	1.77E-07
n-Heptadecane	77.6378	ND	39	152.87	ND	0	152	ND	0	39	0.04	4	19	1.86E-08	1.86E-08
C17 as Heptadecane	325.5944	J	326	152.87	ND	0	152	ND	0	326	0.33	34	156	1.56E-07	1.56E-07
n-Octadecane	78.50394	ND	39	154.57	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C18 as Octodecane	387.683	J	388	154.57	ND	0	153	ND	0	388	0.39	40	185	1.85E-07	1.85E-07
n-Nonadecane	78.66142	ND	39	154.88	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C19 as Nonadecane	170.3974	J	170	154.88	ND	0	154	ND	0	170	0.17	18	81	8.14E-08	8.14E-08
n-Eicosane	78.47244	ND	39	154.51	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C20 as Eicosane	78.47244	ND	39	154.51	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Heneicosane	79.2126	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
C21 as Heneicosane	79.2126	ND	40	155.97	ND	0	155	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
n-Docosane	78.31496	ND	39	154.2	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
C22 as Docosane	78.31496	ND	39	154.2	ND	0	153	ND	0	39	0.04	4	19	1.87E-08	1.87E-08
n-Tricosane	78.74016	ND	39	155.04	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C23 as Tricosane	78.74016	ND	39	155.04	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Tetracosane	78.85039	ND	39	155.26	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C24 as Tetracosane	78.85039	ND	39	155.26	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
Total Hydrocarbon			11,502			0			0		11.50	1191	5,498	5.50E-06	5.50E-06

C060B	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
	C060B		ND Adj	C061A		ND Adj	#C006A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	145.1473	ND	73	145	ND	0	148	ND	0	73	0.07	8	35	3.47E-08	3.47E-08
C5 as Pentane	145.1473	ND	73	145	ND	0	148	ND	0	73	0.07	8	35	3.47E-08	3.47E-08
n-Hexane	150.7907	ND	75	151	ND	0	212	ND	0	75	0.08	8	36	3.60E-08	3.60E-08
C6 as Hexane	150.7907	ND	75	151	ND	0	212	ND	0	75	0.08	8	36	3.60E-08	3.60E-08
n-Heptane	157.5814	ND	79	158	ND	0	176	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C7 as Heptane	157.5814	ND	79	158	ND	0	176	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
n-Octane	153.4264	ND	77	153	ND	0	152	ND	0	77	0.08	8	37	3.67E-08	3.67E-08
C8 as Octane	153.4264	ND	77	153	ND	0	152	ND	0	77	0.08	8	37	3.67E-08	3.67E-08
n-Nonane	171.7377	J	172	155	ND	0	153	ND	0	172	0.17	18	82	8.21E-08	8.21E-08
C9 as Nonane	301.1783	J	301	155	ND	0	153	ND	0	301	0.30	31	144	1.44E-07	1.44E-07
n-Decane	367.9838	J	368	156	ND	0	155	ND	0	368	0.37	38	176	1.76E-07	1.76E-07
C10 as Decane	1026.297	J	1,026	156	ND	0	155	ND	0	1,026	1.03	106	491	4.91E-07	4.91E-07
n-Undecane	431.8526	J	432	156	ND	0	154	ND	0	432	0.43	45	206	2.06E-07	2.06E-07
C11 as Undecane	789.983	J	790	156	ND	0	154	ND	0	790	0.79	82	378	3.78E-07	3.78E-07
n-Dodecane	513.4709	J	513	155	ND	0	153	ND	0	513	0.51	53	245	2.45E-07	2.45E-07
C12 as Dodecane	1239.057	J	1,239	155	ND	0	153	ND	0	1,239	1.24	128	592	5.92E-07	5.92E-07
n-Tridecane	561.3129	J	561	155	ND	0	154	ND	0	561	0.56	58	268	2.68E-07	2.68E-07
C13 as Tridecane	1644.689		1,645	155	ND	0	154	ND	0	1,645	1.64	170	786	7.86E-07	7.86E-07
n-Tetradecane	481.0838	J	481	155	ND	0	154	ND	0	481	0.48	50	230	2.30E-07	2.30E-07
C14 as tetradecane	1245.146	J	1,245	155	ND	0	154	ND	0	1,245	1.25	129	595	5.95E-07	5.95E-07
n-Pentadecane	242.6384	J	243	156	ND	0	154	ND	0	243	0.24	25	116	1.16E-07	1.16E-07
C15 as Pentadecane	745.2558	J	745	156	ND	0	154	ND	0	745	0.75	77	356	3.56E-07	3.56E-07
n-Hexadecane	154.6667	ND	77	155	ND	0	153	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
C16 as Hexadecane	360.4449	J	360	155	ND	0	153	ND	0	360	0.36	37	172	1.72E-07	1.72E-07
n-Heptadecane	152.8682	ND	76	153	ND	0	152	ND	0	76	0.08	8	37	3.65E-08	3.65E-08
C17 as Heptadecane	157.627	J	158	153	ND	0	152	ND	0	158	0.16	16	75	7.53E-08	7.53E-08
n-Octadecane	154.5736	ND	77	155	ND	0	153	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C18 as Octodecane	278.6957	J	279	155	ND	0	153	ND	0	279	0.28	29	133	1.33E-07	1.33E-07
n-Nonadecane	154.8837	ND	77	155	ND	0	154	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
C19 as Nonadecane	154.8837	ND	77	155	ND	0	154	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
n-Eicosane	154.5116	ND	77	155	ND	0	153	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C20 as Eicosane	154.5116	ND	77	155	ND	0	153	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
n-Heneicosane	155.969	ND	78	156	ND	0	155	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
C21 as Heneicosane	155.969	ND	78	156	ND	0	155	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
n-Docosane	154.2016	ND	77	154	ND	0	153	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C22 as Docosane	154.2016	ND	77	154	ND	0	153	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
n-Tricosane	155.0388	ND	78	155	ND	0	154	ND	0	78	0.08	8	37	3.71E-08	3.71E-08
C23 as Tricosane	155.0388	ND	78	155	ND	0	154	ND	0	78	0.08	8	37	3.71E-08	3.71E-08
n-Tetracosane	155.2558	ND	78	155	ND	0	154	ND	0	78	0.08	8	37	3.71E-08	3.71E-08
C24 as Tetracosane	155.2558	ND	78	155	ND	0	154	ND	0	78	0.08	8	37	3.71E-08	3.71E-08
Total Hydrocarbon			12,326			0			0		12.33	1277	5,892	5.89E-06	5.89E-06

Bagging Data Form — Vacuum Method

Sample Id C062

Equipment type:	Connector		**Component ID:**	420-20347.2	
Equipment Subtype:	Plug		**Unit:**	Refinery C	
Line Size:	3/4	inches	**Date:**	11-Jul-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.84 inHg	757.9 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	78.6 °F	25.9 °C	**TVA ID**	36502	
Component Temp:	104 °F	40.0 °C	**Stream Pressure/Temp:**	psig	°F
Stream Description:	TKC Vac				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
14:23	Background	-5	ppmv	8-sec Dwell	6	ppmv	Total Dwell	1:00	min:sec	Final M21	13 ppm
14:46	Initial Bag Vacuum	0.08	inches H2O	DGM Vac.	1.7	inches H2O	Bag Temp	81	°F	Leak @	threaded connection

Bag Concentrations (ppmv)

Time	14:48	14:50	14:52	14:54	14:56	14:58	15:02	15:06						
ppmv	5.7	8.8	9.3	10.3	10.5	10.6	10.4	10.3						

Sorbent Tube Sample Collection Parameters

C062A

Time									
14:58	Volume Start	154.5	Liters		Design Sample Flow Rate = 1 liter/min				
15:11	Volume Stop	167.0	Liters	Total Vol	12.5	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.962 L/min	Sorbent $Flow_{STP}$	0.950	L/min

C062B

14:58	Volume Start	151.2	Liters		Design Sample Flow Rate = 1 liter/min				
15:11	Volume Stop	163.8	Liters	Total Vol	12.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.969 L/min	Sorbent $Flow_{STP}$	0.958	L/min

Total ST Vol_{STP} 24.80 Liters — DGM Vol_{STP} 77.07 Liters — Total Run Vol_{STP} 101.87 Liters

Bagging Parameters

Time										
15:04	Vacuum check	0.075	inches H2O			DGM_P		inches H2O vacuum	757.9	mmHg
15:02	DGM_{10L} Time	01:39.9	min:sec.frac	DGM Time	1.667	DGM Flow	6.00	DGM $Flow_{STP}$	5.93	liters/minute
15:05	Bag Temp.	80.6	°F	27.0	°C	$Sample_T$	75	°F	23.9	°C

Post-Sample Data

15:22	Post Test M21	Background	-5	ppmv	8-sec Dwell	8	ppmv	Total Dwell	1:00 min:sec	Final M21	12 ppm @ threaded connection

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00 hours:min
Organic condensate collected	N/A	ml				
Density of organic condensate	N/A	g/ml				

Average THC emissions = 5.48E-06 kg/hr
Percent difference THC ER = 10%

Acceptable? Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.63E-08
C5 as Pentane	2.63E-08
n-Hexane	2.73E-08
C6 as Hexane	2.73E-08
n-Heptane	2.85E-08
C7 as Heptane	2.85E-08
n-Octane	2.78E-08
C8 as Octane	4.68E-08
n-Nonane	4.39E-08
C9 as Nonane	2.36E-07
n-Decane	1.83E-07
C10 as Decane	9.82E-07
n-Undecane	2.95E-07
C11 as Undecane	5.56E-07
n-Dodecane	2.86E-07
C12 as Dodecane	6.87E-07
n-Tridecane	1.21E-07
C13 as Tridecane	5.57E-07
n-Tetradecane	1.37E-07
C14 as tetradecane	3.29E-07
n-Pentadecane	7.02E-08
C15 as Pentadecane	2.20E-07
n-Hexadecane	2.80E-08
C16 as Hexadecane	6.11E-08
n-Heptadecane	2.77E-08
C17 as Heptadecane	2.77E-08
n-Octadecane	2.80E-08
C18 as Octodecane	2.80E-08
n-Nonadecane	2.80E-08
C19 as Nonadecane	2.80E-08
n-Eicosane	2.80E-08
C20 as Eicosane	2.80E-08
n-Heneicosane	2.82E-08
C21 as Heneicosane	2.82E-08
n-Docosane	2.79E-08
C22 as Docosane	2.79E-08
n-Tricosane	2.81E-08
C23 as Tricosane	2.81E-08
n-Tetracosane	2.81E-08
C24 as Tetracosane	2.81E-08
Total Hydrocarbon	5.48E-06

THC: 2.90E-04 lbs/day 5.29E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C062A	C062A		ND Adj	C063A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	74.896	ND	37	144.03	ND	0	148	ND	0	37	0.04	4	18	1.76E-08	1.76E-08
C5 as Pentane	74.896	ND	37	144.03	ND	0	148	ND	0	37	0.04	4	18	1.76E-08	1.76E-08
n-Hexane	77.808	ND	39	149.63	ND	0	212	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
C6 as Hexane	77.808	ND	39	149.63	ND	0	212	ND	0	39	0.04	4	18	1.83E-08	1.83E-08
n-Heptane	81.312	ND	41	156.37	ND	0	176	ND	0	41	0.04	4	19	1.91E-08	1.91E-08
C7 as Heptane	81.312	ND	41	156.37	ND	0	176	ND	0	41	0.04	4	19	1.91E-08	1.91E-08
n-Octane	79.168	ND	40	152.25	ND	0	152	ND	0	40	0.04	4	19	1.86E-08	1.86E-08
C8 as Octane	120.3678	J	120	152.25	ND	0	152	ND	0	120	0.12	12	57	5.66E-08	5.66E-08
n-Nonane	107.7604	J	108	153.38	ND	0	153	ND	0	108	0.11	11	51	5.07E-08	5.07E-08
C9 as Nonane	528.7807	J	529	153.38	ND	0	153	ND	0	529	0.53	54	249	2.49E-07	2.49E-07
n-Decane	378.6623	J	379	154.77	ND	0	155	ND	0	379	0.38	39	178	1.78E-07	1.78E-07
C10 as Decane	2029.087		2,029	154.77	ND	0	155	ND	0	2,029	2.03	207	954	9.54E-07	9.54E-07
n-Undecane	597.5257	J	598	154.37	ND	0	154	ND	0	598	0.60	61	281	2.81E-07	2.81E-07
C11 as Undecane	1166.92		1,167	154.37	ND	0	154	ND	0	1,167	1.17	119	549	5.49E-07	5.49E-07
n-Dodecane	585.0542	J	585	153.32	ND	0	153	ND	0	585	0.59	60	275	2.75E-07	2.75E-07
C12 as Dodecane	1650.881		1,651	153.32	ND	0	153	ND	0	1,651	1.65	168	776	7.76E-07	7.76E-07
n-Tridecane	79.92	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C13 as Tridecane	1146.919		1,147	153.69	ND	0	154	ND	0	1,147	1.15	117	539	5.39E-07	5.39E-07
n-Tetradecane	274.8443	J	275	153.54	ND	0	154	ND	0	275	0.27	28	129	1.29E-07	1.29E-07
C14 as tetradecane	698.4404	J	698	153.54	ND	0	154	ND	0	698	0.70	71	328	3.28E-07	3.28E-07
n-Pentadecane	136.6223	J	137	154.31	ND	0	154	ND	0	137	0.14	14	64	6.42E-08	6.42E-08
C15 as Pentadecane	473.7234	J	474	154.31	ND	0	154	ND	0	474	0.47	48	223	2.23E-07	2.23E-07
n-Hexadecane	79.808	ND	40	153.48	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C16 as Hexadecane	180.6834	J	181	153.48	ND	0	153	ND	0	181	0.18	18	85	8.50E-08	8.50E-08
n-Heptadecane	78.88	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	19	1.85E-08	1.85E-08
C17 as Heptadecane	78.88	ND	39	151.69	ND	0	152	ND	0	39	0.04	4	19	1.85E-08	1.85E-08
n-Octadecane	79.76	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C18 as Octodecane	79.76	ND	40	153.38	ND	0	153	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Nonadecane	79.92	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C19 as Nonadecane	79.92	ND	40	153.69	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Eicosane	79.728	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C20 as Eicosane	79.728	ND	40	153.32	ND	0	153	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
n-Heneicosane	80.48	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
C21 as Heneicosane	80.48	ND	40	154.77	ND	0	155	ND	0	40	0.04	4	19	1.89E-08	1.89E-08
n-Docosane	79.568	ND	40	153.02	ND	0	153	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
C22 as Docosane	79.568	ND	40	153.02	ND	0	153	ND	0	40	0.04	4	19	1.87E-08	1.87E-08
n-Tricosane	80	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C23 as Tricosane	80	ND	40	153.85	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
n-Tetracosane	80.112	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
C24 as Tetracosane	80.112	ND	40	154.06	ND	0	154	ND	0	40	0.04	4	19	1.88E-08	1.88E-08
Total Hydrocarbon			11,068			0			0		11.07	1128	5,204	5.20E-06	5.20E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C062B	C062B		ND Adj	C063A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.6032	ND	74	144	ND	0	148	ND	0	74	0.07	8	35	3.49E-08	3.49E-08
C5 as Pentane	148.6032	ND	74	144	ND	0	148	ND	0	74	0.07	8	35	3.49E-08	3.49E-08
n-Hexane	154.3809	ND	77	150	ND	0	212	ND	0	77	0.08	8	36	3.63E-08	3.63E-08
C6 as Hexane	154.3809	ND	77	150	ND	0	212	ND	0	77	0.08	8	36	3.63E-08	3.63E-08
n-Heptane	161.3333	ND	81	156	ND	0	176	ND	0	81	0.08	8	38	3.79E-08	3.79E-08
C7 as Heptane	161.3333	ND	81	156	ND	0	176	ND	0	81	0.08	8	38	3.79E-08	3.79E-08
n-Octane	157.0794	ND	79	152	ND	0	152	ND	0	79	0.08	8	37	3.69E-08	3.69E-08
C8 as Octane	157.0794	ND	79	152	ND	0	152	ND	0	79	0.08	8	37	3.69E-08	3.69E-08
n-Nonane	158.254	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
C9 as Nonane	475.2234	J	475	153	ND	0	153	ND	0	475	0.48	48	223	2.23E-07	2.23E-07
n-Decane	399.5719	J	400	155	ND	0	155	ND	0	400	0.40	41	188	1.88E-07	1.88E-07
C10 as Decane	2146.483		2,146	155	ND	0	155	ND	0	2,146	2.15	219	1009	1.01E-06	1.01E-06
n-Undecane	655.7598	J	656	154	ND	0	154	ND	0	656	0.66	67	308	3.08E-07	3.08E-07
C11 as Undecane	1198.167	J	1,198	154	ND	0	154	ND	0	1,198	1.20	122	563	5.63E-07	5.63E-07
n-Dodecane	631.0251	J	631	153	ND	0	153	ND	0	631	0.63	64	297	2.97E-07	2.97E-07
C12 as Dodecane	1269.455	J	1,269	153	ND	0	153	ND	0	1,269	1.27	129	597	5.97E-07	5.97E-07
n-Tridecane	473.3013	J	473	154	ND	0	154	ND	0	473	0.47	48	223	2.23E-07	2.23E-07
C13 as Tridecane	1221.341	J	1,221	154	ND	0	154	ND	0	1,221	1.22	124	574	5.74E-07	5.74E-07
n-Tetradecane	306.109	J	306	154	ND	0	154	ND	0	306	0.31	31	144	1.44E-07	1.44E-07
C14 as tetradecane	700.7928	J	701	154	ND	0	154	ND	0	701	0.70	71	329	3.29E-07	3.29E-07
n-Pentadecane	161.8222	J	162	154	ND	0	154	ND	0	162	0.16	16	76	7.61E-08	7.61E-08
C15 as Pentadecane	460.7515	J	461	154	ND	0	154	ND	0	461	0.46	47	217	2.17E-07	2.17E-07
n-Hexadecane	158.3492	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
C16 as Hexadecane	158.3492	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
n-Heptadecane	156.5079	ND	78	152	ND	0	152	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C17 as Heptadecane	156.5079	ND	78	152	ND	0	152	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Octadecane	158.254	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
C18 as Octodecane	158.254	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
n-Nonadecane	158.5714	ND	79	154	ND	0	154	ND	0	79	0.08	8	37	3.73E-08	3.73E-08
C19 as Nonadecane	158.5714	ND	79	154	ND	0	154	ND	0	79	0.08	8	37	3.73E-08	3.73E-08
n-Eicosane	158.1905	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
C20 as Eicosane	158.1905	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
n-Heneicosane	159.6825	ND	80	155	ND	0	155	ND	0	80	0.08	8	38	3.75E-08	3.75E-08
C21 as Heneicosane	159.6825	ND	80	155	ND	0	155	ND	0	80	0.08	8	38	3.75E-08	3.75E-08
n-Docosane	157.873	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
C22 as Docosane	157.873	ND	79	153	ND	0	153	ND	0	79	0.08	8	37	3.71E-08	3.71E-08
n-Tricosane	158.7302	ND	79	154	ND	0	154	ND	0	79	0.08	8	37	3.73E-08	3.73E-08
C23 as Tricosane	158.7302	ND	79	154	ND	0	154	ND	0	79	0.08	8	37	3.73E-08	3.73E-08
n-Tetracosane	158.9524	ND	79	154	ND	0	154	ND	0	79	0.08	8	37	3.74E-08	3.74E-08
C24 as Tetracosane	158.9524	ND	79	154	ND	0	154	ND	0	79	0.08	8	37	3.74E-08	3.74E-08
Total Hydrocarbon			12,225			0			0		12.23	1245	5,748	5.75E-06	5.75E-06

Bagging Data Form **Vacuum Method**

Sample Id C064

Equipment type:	Pump		**Component ID:**	162020293-P		
Equipment Subtype:	Seal		**Unit:**	Refinery C		
Line Size:	1	*inches*	**Date:**	12-Jul-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/PP		
Barometric pressure	29.79 *inHg*	756.7 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	79.6 *°F*	26.4 *°C*	**TVA ID**	36502		
Component Temp:	77 *°F*	25.0 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*	
Stream Description:	*Tetramer*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:32	Background	0	*ppmv*	8-sec Dwell	14	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	16 *ppm*
11:30	Initial Bag Vacuum	0.04	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	92.3	*°F*	Leak @	Seal

Bag Concentrations (ppmv)

Time	11:31	11:36	11:38	11:40	11:42	11:46	11:51							
ppmv	1.2	3.2	3.4	3.5	3.4	2	1							

Sorbent Tube Sample Collection Parameters

C064A

Time										
11:42	Volume Start	169.3	*Liters*		Design Sample Flow Rate = 1 liter/min					
11:55	Volume Stop	182.2	*Liters*	Total Vol	12.9	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992	*L/min*	Sorbent $Flow_{STP}$	0.971	*L/min*

C064B

11:42	Volume Start	165.8	*Liters*		Design Sample Flow Rate = 1 liter/min					
11:55	Volume Stop	178.7	*Liters*	Total Vol	12.9	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992	*L/min*	Sorbent $Flow_{STP}$	0.971	*L/min*
	Total ST Vol_{STP}	25.24	*Liters*	DGM Vol_{STP}	80.33	*Liters*	Total Run Vol_{STP}	105.57	*Liters*	

Bagging Parameters

Time										
11:46	Vacuum check	0.035	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	753.3	*mmHg*
11:45	DGM_{10L} Time	01:34.9	*min:sec.frac*	DGM Time	1.583	DGM Flow	6.32	DGM $Flow_{STP}$	6.18	*liters/minute*
11:46	Bag Temp.	94.6	*°F*	34.8	*°C*	$Sample_T$	77	*°F*	25.0	*°C*

Post-Sample Data

12:04	Post Test M21	Background	-3	*ppmv*	8-sec Dwell	23	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21 41 *ppm* @ Seal
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*		0:00	*hours:min*	
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	1.25E-06	kg/hr
Percent difference THC ER =	57%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.65E-08
C5 as Pentane	2.65E-08
n-Hexane	2.76E-08
C6 as Hexane	2.76E-08
n-Heptane	2.88E-08
C7 as Heptane	2.88E-08
n-Octane	2.80E-08
C8 as Octane	2.80E-08
n-Nonane	2.82E-08
C9 as Nonane	2.82E-08
n-Decane	2.85E-08
C10 as Decane	1.54E-07
n-Undecane	2.84E-08
C11 as Undecane	2.84E-08
n-Dodecane	2.82E-08
C12 as Dodecane	2.82E-08
n-Tridecane	2.83E-08
C13 as Tridecane	2.83E-08
n-Tetradecane	2.83E-08
C14 as tetradecane	2.83E-08
n-Pentadecane	2.84E-08
C15 as Pentadecane	2.84E-08
n-Hexadecane	2.83E-08
C16 as Hexadecane	2.83E-08
n-Heptadecane	2.79E-08
C17 as Heptadecane	2.79E-08
n-Octadecane	2.82E-08
C18 as Octodecane	2.82E-08
n-Nonadecane	2.83E-08
C19 as Nonadecane	2.83E-08
n-Eicosane	2.82E-08
C20 as Eicosane	2.82E-08
n-Heneicosane	2.85E-08
C21 as Heneicosane	2.85E-08
n-Docosane	2.82E-08
C22 as Docosane	2.82E-08
n-Tricosane	2.83E-08
C23 as Tricosane	2.83E-08
n-Tetracosane	2.84E-08
C24 as Tetracosane	2.84E-08
Total Hydrocarbon	1.25E-06

THC:	**6.63E-05**	**lbs/day**	**1.21E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C064A	C064A		ND Adj	C065A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	72.57365	ND	36	144.03	ND	0	148	ND	0	36	0.04	4	18	1.77E-08	1.77E-08
C5 as Pentane	72.57365	ND	36	144.03	ND	0	148	ND	0	36	0.04	4	18	1.77E-08	1.77E-08
n-Hexane	75.39535	ND	38	149.63	ND	0	212	ND	0	38	0.04	4	18	1.84E-08	1.84E-08
C6 as Hexane	75.39535	ND	38	149.63	ND	0	212	ND	0	38	0.04	4	18	1.84E-08	1.84E-08
n-Heptane	78.7907	ND	39	156.37	ND	0	176	ND	0	39	0.04	4	19	1.92E-08	1.92E-08
C7 as Heptane	78.7907	ND	39	156.37	ND	0	176	ND	0	39	0.04	4	19	1.92E-08	1.92E-08
n-Octane	76.71318	ND	38	152.25	ND	0	152	ND	0	38	0.04	4	19	1.87E-08	1.87E-08
C8 as Octane	76.71318	ND	38	152.25	ND	0	152	ND	0	38	0.04	4	19	1.87E-08	1.87E-08
n-Nonane	77.28682	ND	39	153.38	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C9 as Nonane	77.28682	ND	39	153.38	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Decane	77.9845	ND	39	154.77	ND	0	155	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C10 as Decane	331.7004	J	332	154.77	ND	0	155	ND	0	332	0.33	35	162	1.62E-07	1.62E-07
n-Undecane	77.78295	ND	39	154.37	ND	0	154	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C11 as Undecane	77.78295	ND	39	154.37	ND	0	154	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
n-Dodecane	77.25582	ND	39	153.32	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C12 as Dodecane	77.25582	ND	39	153.32	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Tridecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
C13 as Tridecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
n-Tetradecane	77.36434	ND	39	153.54	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C14 as tetradecane	77.36434	ND	39	153.54	ND	0	154	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Pentadecane	77.75194	ND	39	154.31	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
C15 as Pentadecane	77.75194	ND	39	154.31	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
n-Hexadecane	77.33334	ND	39	153.48	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C16 as Hexadecane	77.33334	ND	39	153.48	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Heptadecane	76.43411	ND	38	151.69	ND	0	152	ND	0	38	0.04	4	19	1.86E-08	1.86E-08
C17 as Heptadecane	76.43411	ND	38	151.69	ND	0	152	ND	0	38	0.04	4	19	1.86E-08	1.86E-08
n-Octadecane	77.28682	ND	39	153.38	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C18 as Octodecane	77.28682	ND	39	153.38	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Nonadecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
C19 as Nonadecane	77.44186	ND	39	153.69	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
n-Eicosane	77.25582	ND	39	153.32	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C20 as Eicosane	77.25582	ND	39	153.32	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Heneicosane	77.9845	ND	39	154.77	ND	0	155	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
C21 as Heneicosane	77.9845	ND	39	154.77	ND	0	155	ND	0	39	0.04	4	19	1.90E-08	1.90E-08
n-Docosane	77.10078	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
C22 as Docosane	77.10078	ND	39	153.02	ND	0	153	ND	0	39	0.04	4	19	1.88E-08	1.88E-08
n-Tricosane	77.51938	ND	39	153.85	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
C23 as Tricosane	77.51938	ND	39	153.85	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
n-Tetracosane	77.62791	ND	39	154.06	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
C24 as Tetracosane	77.62791	ND	39	154.06	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	1.89E-08
Total Hydrocarbon			1,835			0			0		1.84	194	894	8.94E-07	8.94E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
C064B	C064B		ND Adj	C065A		ND Adj	#C006A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	145.1473	ND	73	144	ND	0	148	ND	0	73	0.07	8	35	3.54E-08	3.54E-08
C5 as Pentane	145.1473	ND	73	144	ND	0	148	ND	0	73	0.07	8	35	3.54E-08	3.54E-08
n-Hexane	150.7907	ND	75	150	ND	0	212	ND	0	75	0.08	8	37	3.67E-08	3.67E-08
C6 as Hexane	150.7907	ND	75	150	ND	0	212	ND	0	75	0.08	8	37	3.67E-08	3.67E-08
n-Heptane	157.5814	ND	79	156	ND	0	176	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
C7 as Heptane	157.5814	ND	79	156	ND	0	176	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
n-Octane	153.4264	ND	77	152	ND	0	152	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
C8 as Octane	153.4264	ND	77	152	ND	0	152	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
n-Nonane	154.5736	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C9 as Nonane	154.5736	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Decane	155.969	ND	78	155	ND	0	155	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C10 as Decane	299.2607	J	299	155	ND	0	155	ND	0	299	0.30	32	146	1.46E-07	1.46E-07
n-Undecane	155.5659	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C11 as Undecane	155.5659	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Dodecane	154.5116	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C12 as Dodecane	154.5116	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Tridecane	154.8837	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C13 as Tridecane	154.8837	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Tetradecane	154.7287	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C14 as tetradecane	154.7287	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Pentadecane	155.5039	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C15 as Pentadecane	155.5039	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Hexadecane	154.6667	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C16 as Hexadecane	154.6667	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Heptadecane	152.8682	ND	76	152	ND	0	152	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
C17 as Heptadecane	152.8682	ND	76	152	ND	0	152	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
n-Octadecane	154.5736	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C18 as Octodecane	154.5736	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Nonadecane	154.8837	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C19 as Nonadecane	154.8837	ND	77	154	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Eicosane	154.5116	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C20 as Eicosane	154.5116	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Heneicosane	155.969	ND	78	155	ND	0	155	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C21 as Heneicosane	155.969	ND	78	155	ND	0	155	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Docosane	154.2016	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C22 as Docosane	154.2016	ND	77	153	ND	0	153	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Tricosane	155.0388	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C23 as Tricosane	155.0388	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Tetracosane	155.2558	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C24 as Tetracosane	155.2558	ND	78	154	ND	0	154	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
Total Hydrocarbon			3,306			0			0		3.31	349	1,611	1.61E-06	1.61E-06

Refinery D Sample Results

Bagging Data Form — Vacuum Method

Sample Id: D01

WSPA — Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	D-265
Equipment Subtype:	Plug			**Plant ID:**	Refinery D
Line Size:	1/2	*inches*		**Date:**	21-Mar-18
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR
Barometric pressure	29.73 *inHg*	755.1	*mmHg*	**Sample Pump A**	LP52979
				Sample Pump B	LP52975
Ambient Temp:	71 °F	21.7	°C	**TVA ID**	37887
Component Temp:	68.4 °F	20.2	°C	**Stream Pressure/Temp:**	*psig* / °F
Stream Description:	*Bleeder to PIC475 (DSU to Tank 257)*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
14:38	Background	3	*ppmv*	8-sec Dwell	3	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	3 *ppm*
15:26	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	63	°F	Leak @	Plug

Bag Concentrations (ppmv)

Time	15:29	15:32	15:34	15:36	15:37	15:38	15:39	15:45	15:49	15:53	15:54			
ppmv	372	25.5	17	14	12	12.6	12.1	11.8	10	10.7	10.7			

Sorbent Tube Sample Collection Parameters

D01A

Time										
15:43	Volume Start	3.1	*Liters*		Design Sample Flow Rate = 1 liter/min					
15:55	Volume Stop	15.3	*Liters*	Total Vol	12.2	*Liters*				
	Sample Run Time	12	*Minutes*		Sorbent Flow	1.020	*L/min*	Sorbent $Flow_{STP}$	1.006	*L/min*

D01B

Time										
15:43	Volume Start	2.1	*Liters*		Design Sample Flow Rate = 1 liter/min					
15:55	Volume Stop	13.6	*Liters*	Total Vol	11.5	*Liters*				
	Sample Run Time	12	*Minutes*		Sorbent Flow	0.958	*L/min*	Sorbent $Flow_{STP}$	0.945	*L/min*
	Total ST Vol_{STP}	23.42	*Liters*	DGM Vol_{STP}	85.58	*Liters*	Total Run Vol_{STP}	109.00	*Liters*	

Bagging Parameters

Time										
15:44	Vacuum check	0.005	*inches H2O*			DGM_P	2	*inches H2O vacuum*	751.4	*mmHg*
15:44	DGM_{10L} Time	01:23.4	*min:sec.frac*	DGM Time	1.383	DGM Flow	7.23	DGM $Flow_{STP}$	7.13	*liters/minute*
15:44	Bag Temp.	63	°F	17.2	°C	$Sample_T$	71.2	°F	21.8	°C

Post-Sample Data

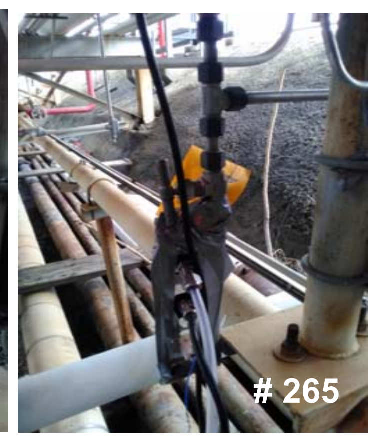
16:08	Post Test M21		8-sec Dwell	0.5	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	0.5	*ppm*
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*			
Organic condensate collected		N/A	*ml*								
Density of organic condensate		N/A	*g/ml*								

Average THC emissions =	1.44E-06	kg/hr
Percent difference THC ER =	72%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.33E-08
C5 as Pentane	3.33E-08
n-Hexane	4.36E-08
C6 as Hexane	4.36E-08
n-Heptane	3.85E-08
C7 as Heptane	3.85E-08
n-Octane	3.46E-08
C8 as Octane	4.61E-08
n-Nonane	3.49E-08
C9 as Nonane	3.49E-08
n-Decane	3.52E-08
C10 as Decane	4.68E-08
n-Undecane	3.51E-08
C11 as Undecane	3.51E-08
n-Dodecane	3.48E-08
C12 as Dodecane	3.48E-08
n-Tridecane	3.49E-08
C13 as Tridecane	3.49E-08
n-Tetradecane	3.12E-08
C14 as tetradecane	3.49E-08
n-Pentadecane	3.51E-08
C15 as Pentadecane	3.51E-08
n-Hexadecane	3.49E-08
C16 as Hexadecane	3.49E-08
n-Heptadecane	3.45E-08
C17 as Heptadecane	3.45E-08
n-Octadecane	3.49E-08
C18 as Octodecane	3.49E-08
n-Nonadecane	3.49E-08
C19 as Nonadecane	3.49E-08
n-Eicosane	3.48E-08
C20 as Eicosane	3.48E-08
n-Heneicosane	3.52E-08
C21 as Heneicosane	3.52E-08
n-Docosane	3.48E-08
C22 as Docosane	3.48E-08
n-Tricosane	3.50E-08
C23 as Tricosane	3.50E-08
n-Tetracosane	3.50E-08
C24 as Tetracosane	3.50E-08
Total Hydrocarbon	1.44E-06

THC:	7.60E-05	lbs/day	1.39E-05	tons/yr



D01A Component	ANALYTICAL RESULTS D01A µg/m³	Flag	ND Adj µg/m³	BACKGROUND D02A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #D013 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#D0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	77.3719	ND	39	170.02	ND	0	150	ND	0	39	0.04	4	21	2.11E-08	0	0	0.00E+00	2.11E-08
C5 as Pentane	77.3719	ND	39	170.02	ND	0	150	ND	0	39	0.04	4	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Hexane	80.38016	ND	40	243.64	ND	0	156	ND	0	40	0.04	4	22	2.19E-08	0	0	0.00E+00	2.19E-08
C6 as Hexane	80.38016	ND	40	243.64	ND	0	156	ND	0	40	0.04	4	22	2.19E-08	0	0	0.00E+00	2.19E-08
n-Heptane	84	ND	42	202.41	ND	0	163	ND	0	42	0.04	5	23	2.29E-08	0	0	0.00E+00	2.29E-08
C7 as Heptane	84	ND	42	202.41	ND	0	163	ND	0	42	0.04	5	23	2.29E-08	0	0	0.00E+00	2.29E-08
n-Octane	81.78512	ND	41	175.15	ND	0	158	ND	0	41	0.04	4	22	2.23E-08	0	0	0.00E+00	2.23E-08
C8 as Octane	83.01008	J	83	175.15	ND	0	158	ND	0	83	0.08	9	45	4.52E-08	0	0	0.00E+00	4.52E-08
n-Nonane	82.39669	ND	41	176.46	ND	0	159	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
C9 as Nonane	82.39669	ND	41	176.46	ND	0	159	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Decane	83.14049	ND	42	178.05	ND	0	161	ND	0	42	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
C10 as Decane	84.22068	J	84	178.05	ND	0	161	ND	0	84	0.08	9	46	4.59E-08	0	0	0.00E+00	4.59E-08
n-Undecane	82.92562	ND	41	177.59	ND	0	161	ND	0	41	0.04	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
C11 as Undecane	82.92562	ND	41	177.59	ND	0	161	ND	0	41	0.04	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
n-Dodecane	82.36363	ND	41	176.39	ND	0	159	ND	0	41	0.04	4	22	2.24E-08	0	0	0.00E+00	2.24E-08
C12 as Dodecane	82.36363	ND	41	176.39	ND	0	159	ND	0	41	0.04	4	22	2.24E-08	0	0	0.00E+00	2.24E-08
n-Tridecane	82.56198	ND	41	176.81	ND	0	160	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
C13 as Tridecane	82.56198	ND	41	176.81	ND	0	160	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Tetradecane	88.58417	J	89	279.66	J	280	160	ND	0	-191	0.00	0	0	0.00E+00	0	0	0.00E+00	0.00E+00
C14 as tetradecane	82.47934	ND	41	176.64	ND	0	160	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Pentadecane	82.89256	ND	41	177.52	ND	0	160	ND	0	41	0.04	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
C15 as Pentadecane	82.89256	ND	41	177.52	ND	0	160	ND	0	41	0.04	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
n-Hexadecane	82.44628	ND	41	176.57	ND	0	160	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
C16 as Hexadecane	82.44628	ND	41	176.57	ND	0	160	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Heptadecane	81.4876	ND	41	174.51	ND	0	158	ND	0	41	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
C17 as Heptadecane	81.4876	ND	41	174.51	ND	0	158	ND	0	41	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Octadecane	82.39669	ND	41	176.46	ND	0	159	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
C18 as Octodecane	82.39669	ND	41	176.46	ND	0	159	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Nonadecane	82.56198	ND	41	176.81	ND	0	160	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
C19 as Nonadecane	82.56198	ND	41	176.81	ND	0	160	ND	0	41	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Eicosane	82.36363	ND	41	176.39	ND	0	159	ND	0	41	0.04	4	22	2.24E-08	0	0	0.00E+00	2.24E-08
C20 as Eicosane	82.36363	ND	41	176.39	ND	0	159	ND	0	41	0.04	4	22	2.24E-08	0	0	0.00E+00	2.24E-08
n-Heneicosane	83.14049	ND	42	178.05	ND	0	161	ND	0	42	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
C21 as Heneicosane	83.14049	ND	42	178.05	ND	0	161	ND	0	42	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
n-Docosane	82.19834	ND	41	176.04	ND	0	159	ND	0	41	0.04	4	22	2.24E-08	0	0	0.00E+00	2.24E-08
C22 as Docosane	82.19834	ND	41	176.04	ND	0	159	ND	0	41	0.04	4	22	2.24E-08	0	0	0.00E+00	2.24E-08
n-Tricosane	82.64463	ND	41	176.99	ND	0	160	ND	0	41	0.04	5	23	2.25E-08	0	0	0.00E+00	2.25E-08
C23 as Tricosane	82.64463	ND	41	176.99	ND	0	160	ND	0	41	0.04	5	23	2.25E-08	0	0	0.00E+00	2.25E-08
n-Tetracosane	82.76033	ND	41	177.24	ND	0	160	ND	0	41	0.04	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
C24 as Tetracosane	82.76033	ND	41	177.24	ND	0	160	ND	0	41	0.04	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
Total Hydrocarbon			1,776			280			0		1.69	184	920	9.20E-07	0	0	0.00E+00	9.20E-07

D01B Component	ANALYTICAL RESULTS D01B µg/m³	Flag	ND Adj µg/m³	BACKGROUND D02A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #D013 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	167.0678	ND	84	170	ND	0	150	ND	0	84	0.08	9	46	4.55E-08	4.55E-08
C5 as Pentane	167.0678	ND	84	170	ND	0	150	ND	0	84	0.08	9	46	4.55E-08	4.55E-08
n-Hexane	239.4017	ND	120	244	ND	0	156	ND	0	120	0.12	13	65	6.52E-08	6.52E-08
C6 as Hexane	239.4017	ND	120	244	ND	0	156	ND	0	120	0.12	13	65	6.52E-08	6.52E-08
n-Heptane	198.887	ND	99	202	ND	0	163	ND	0	99	0.10	11	54	5.42E-08	5.42E-08
C7 as Heptane	198.887	ND	99	202	ND	0	163	ND	0	99	0.10	11	54	5.42E-08	5.42E-08
n-Octane	172.1043	ND	86	175	ND	0	158	ND	0	86	0.09	9	47	4.69E-08	4.69E-08
C8 as Octane	172.1043	ND	86	175	ND	0	158	ND	0	86	0.09	9	47	4.69E-08	4.69E-08
n-Nonane	173.3913	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
C9 as Nonane	173.3913	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
n-Decane	174.9565	ND	87	178	ND	0	161	ND	0	87	0.09	10	48	4.77E-08	4.77E-08
C10 as Decane	174.9565	ND	87	178	ND	0	161	ND	0	87	0.09	10	48	4.77E-08	4.77E-08
n-Undecane	174.5043	ND	87	178	ND	0	161	ND	0	87	0.09	10	48	4.76E-08	4.76E-08
C11 as Undecane	174.5043	ND	87	178	ND	0	161	ND	0	87	0.09	10	48	4.76E-08	4.76E-08
n-Dodecane	173.3217	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
C12 as Dodecane	173.3217	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
n-Tridecane	173.7391	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.73E-08	4.73E-08
C13 as Tridecane	173.7391	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.73E-08	4.73E-08
n-Tetradecane	394.328	J	394	280	J	280	160	ND	0	115	0.11	12	62	6.25E-08	6.25E-08
C14 as tetradecane	173.5652	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.73E-08	4.73E-08
n-Pentadecane	174.4348	ND	87	178	ND	0	160	ND	0	87	0.09	10	48	4.75E-08	4.75E-08
C15 as Pentadecane	174.4348	ND	87	178	ND	0	160	ND	0	87	0.09	10	48	4.75E-08	4.75E-08
n-Hexadecane	173.4957	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.73E-08	4.73E-08
C16 as Hexadecane	173.4957	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.73E-08	4.73E-08
n-Heptadecane	171.4783	ND	86	175	ND	0	158	ND	0	86	0.09	9	47	4.67E-08	4.67E-08
C17 as Heptadecane	171.4783	ND	86	175	ND	0	158	ND	0	86	0.09	9	47	4.67E-08	4.67E-08
n-Octadecane	173.3913	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
C18 as Octodecane	173.3913	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
n-Nonadecane	173.7391	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.73E-08	4.73E-08
C19 as Nonadecane	173.7391	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.73E-08	4.73E-08
n-Eicosane	173.3217	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
C20 as Eicosane	173.3217	ND	87	176	ND	0	159	ND	0	87	0.09	9	47	4.72E-08	4.72E-08
n-Heneicosane	174.9565	ND	87	178	ND	0	161	ND	0	87	0.09	10	48	4.77E-08	4.77E-08
C21 as Heneicosane	174.9565	ND	87	178	ND	0	161	ND	0	87	0.09	10	48	4.77E-08	4.77E-08
n-Docosane	172.9739	ND	86	176	ND	0	159	ND	0	86	0.09	9	47	4.71E-08	4.71E-08
C22 as Docosane	172.9739	ND	86	176	ND	0	159	ND	0	86	0.09	9	47	4.71E-08	4.71E-08
n-Tricosane	173.913	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.74E-08	4.74E-08
C23 as Tricosane	173.913	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.74E-08	4.74E-08
n-Tetracosane	174.1565	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.75E-08	4.75E-08
C24 as Tetracosane	174.1565	ND	87	177	ND	0	160	ND	0	87	0.09	9	47	4.75E-08	4.75E-08
Total Hydrocarbon			3,864			280			0		3.58	391	1,954	1.95E-06	1.95E-06

Bagging Data Form **Vacuum Method** **Sample Id** D03

Equipment type:	Connector		**Component ID:**	D-596	
Equipment Subtype:	SwageLok fitting		**Plant ID:**	Refinery D	
Line Size:	1/2 *inches*		**Date:**	23-Mar-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.13 *inHg*	765.3 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	63.2 °F	17.3 °C	**TVA ID**	36502	
Component Temp:	57.9 °F	14.4 °C	**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Jet A Stab btms to Jet/1 Jet Blend*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:35	Background	5.6	*ppmv*	8-sec Dwell	1540	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	1847 *ppm*
9:35	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	50	°F	Leak @	Compression Fitting

Bag Concentrations (ppmv)

Time	9:30	9:35	9:37	9:39	9:40	9:45	9:49	9:52	9:53					
ppmv	137	133	129	123	124	174	174	177	175					

Sorbent Tube Sample Collection Parameters

D03A

Time									
9:41	Volume Start	32.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
9:53	Volume Stop	44.6	*Liters*	Total Vol	12.1	*Liters*			
	Sample Run Time	12	*Minutes*		Sorbent Flow	1.008 *L/min*	Sorbent $Flow_{STP}$	1.045	*L/min*

D03B

9:41	Volume Start	30.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
9:53	Volume Stop	41.2	*Liters*	Total Vol	11.1	*Liters*			
	Sample Run Time	12	*Minutes*		Sorbent Flow	0.925 *L/min*	Sorbent $Flow_{STP}$	0.958	*L/min*
	Total ST Vol_{STP}	24.03	*Liters*	DGM Vol_{STP}	82.87	*Liters*	Total Run Vol_{STP}	106.91	*Liters*

Bagging Parameters

Time										
9:42	Vacuum check	0.005	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	761.9	*mmHg*
9:42	DGM_{10L} Time	01:30.5	*min:sec.frac*	DGM Time	1.500	DGM Flow	6.67	DGM $Flow_{STP}$	6.91	*liters/minute*
9:42	Bag Temp.	68.9	°F	20.5	°C	$Sample_T$	53	°F	11.7	°C

Post-Sample Data

9:58	Post Test M21		8-sec Dwell	762	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21 2420 *ppm*
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*	
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	3.41E-04 kg/hr
Percent difference THC ER =	2%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.35E-08
C5 as Pentane	3.35E-08
n-Hexane	4.39E-08
C6 as Hexane	4.39E-08
n-Heptane	3.88E-08
C7 as Heptane	1.87E-07
n-Octane	1.65E-06
C8 as Octane	6.90E-05
n-Nonane	5.94E-06
C9 as Nonane	9.41E-05
n-Decane	7.68E-06
C10 as Decane	9.06E-05
n-Undecane	5.04E-06
C11 as Undecane	4.42E-05
n-Dodecane	3.79E-06
C12 as Dodecane	1.41E-05
n-Tridecane	9.34E-07
C13 as Tridecane	2.56E-06
n-Tetradecane	2.13E-07
C14 as tetradecane	3.51E-08
n-Pentadecane	3.52E-08
C15 as Pentadecane	3.52E-08
n-Hexadecane	3.50E-08
C16 as Hexadecane	3.50E-08
n-Heptadecane	3.46E-08
C17 as Heptadecane	3.46E-08
n-Octadecane	3.50E-08
C18 as Octodecane	3.50E-08
n-Nonadecane	3.51E-08
C19 as Nonadecane	3.51E-08
n-Eicosane	3.50E-08
C20 as Eicosane	3.50E-08
n-Heneicosane	3.53E-08
C21 as Heneicosane	3.53E-08
n-Docosane	3.49E-08
C22 as Docosane	3.49E-08
n-Tricosane	3.51E-08
C23 as Tricosane	3.51E-08
n-Tetracosane	3.52E-08
C24 as Tetracosane	3.52E-08
Total Hydrocarbon	3.41E-04

THC:	1.80E-02	lbs/day	3.29E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D03A	D03A		ND Adj	#D04A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	77.3719	ND	39	164.21	ND	0	150	ND	0	39	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C5 as Pentane	77.3719	ND	39	164.21	ND	0	150	ND	0	39	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Hexane	80.38016	ND	40	235.31	ND	0	156	ND	0	40	0.04	4	21	2.15E-08	0	0	0.00E+00	2.15E-08
C6 as Hexane	80.38016	ND	40	235.31	ND	0	156	ND	0	40	0.04	4	21	2.15E-08	0	0	0.00E+00	2.15E-08
n-Heptane	84	ND	42	195.49	ND	0	163	ND	0	42	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
C7 as Heptane	595.2528	J	595	195.49	ND	0	163	ND	0	595	0.60	64	318	3.18E-07	0	0	0.00E+00	3.18E-07
n-Octane	3099.753		3,100	169.16	ND	0	158	ND	0	3,100	3.10	331	1657	1.66E-06	0	0	0.00E+00	1.66E-06
C8 as Octane	126801.5		126,801	169.16	ND	0	158	ND	0	126,801	126.80	13556	67781	6.78E-05	0	0	0.00E+00	6.78E-05
n-Nonane	10851.37		10,851	170.43	ND	0	159	ND	0	10,851	10.85	1160	5800	5.80E-06	0	0	0.00E+00	5.80E-06
C9 as Nonane	176456.6		176,457	170.43	ND	0	159	ND	0	176,457	176.46	18865	94323	9.43E-05	0	0	0.00E+00	9.43E-05
n-Decane	16817.47		16,817	171.97	ND	0	161	ND	0	16,817	16.82	1798	8990	8.99E-06	0	0	0.00E+00	8.99E-06
C10 as Decane	165997.2		165,997	171.97	ND	0	161	ND	0	165,997	166.00	17746	88732	8.87E-05	0	0	0.00E+00	8.87E-05
n-Undecane	7769.871		7,770	171.52	ND	0	161	ND	0	7,770	7.77	831	4153	4.15E-06	0	0	0.00E+00	4.15E-06
C11 as Undecane	80701.6		80,702	171.52	ND	0	161	ND	0	80,702	80.70	8628	43138	4.31E-05	0	0	0.00E+00	4.31E-05
n-Dodecane	7827.014		7,827	170.36	ND	0	159	ND	0	7,827	7.83	837	4184	4.18E-06	0	0	0.00E+00	4.18E-06
C12 as Dodecane	26595.94		26,596	170.36	ND	0	159	ND	0	26,596	26.60	2843	14217	1.42E-05	0	0	0.00E+00	1.42E-05
n-Tridecane	1980.287		1,980	170.77	ND	0	160	ND	0	1,980	1.98	212	1059	1.06E-06	0	0	0.00E+00	1.06E-06
C13 as Tridecane	5167.282		5,167	170.77	ND	0	160	ND	0	5,167	5.17	552	2762	2.76E-06	0	0	0.00E+00	2.76E-06
n-Tetradecane	506.1523	J	506	170.6	ND	0	160	ND	0	506	0.51	54	271	2.71E-07	0	0	0.00E+00	2.71E-07
C14 as tetradecane	82.47934	ND	41	170.6	ND	0	160	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Pentadecane	82.89256	ND	41	171.45	ND	0	160	ND	0	41	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
C15 as Pentadecane	82.89256	ND	41	171.45	ND	0	160	ND	0	41	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Hexadecane	82.44628	ND	41	170.53	ND	0	160	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
C16 as Hexadecane	82.44628	ND	41	170.53	ND	0	160	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Heptadecane	81.4876	ND	41	168.55	ND	0	158	ND	0	41	0.04	4	22	2.18E-08	0	0	0.00E+00	2.18E-08
C17 as Heptadecane	81.4876	ND	41	168.55	ND	0	158	ND	0	41	0.04	4	22	2.18E-08	0	0	0.00E+00	2.18E-08
n-Octadecane	82.39669	ND	41	170.43	ND	0	159	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
C18 as Octodecane	82.39669	ND	41	170.43	ND	0	159	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Nonadecane	82.56198	ND	41	170.77	ND	0	160	ND	0	41	0.04	4	22	2.21E-08	0	0	0.00E+00	2.21E-08
C19 as Nonadecane	82.56198	ND	41	170.77	ND	0	160	ND	0	41	0.04	4	22	2.21E-08	0	0	0.00E+00	2.21E-08
n-Eicosane	82.36363	ND	41	170.36	ND	0	159	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
C20 as Eicosane	82.36363	ND	41	170.36	ND	0	159	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Heneicosane	83.14049	ND	42	171.97	ND	0	161	ND	0	42	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
C21 as Heneicosane	83.14049	ND	42	171.97	ND	0	161	ND	0	42	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Docosane	82.19834	ND	41	170.02	ND	0	159	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
C22 as Docosane	82.19834	ND	41	170.02	ND	0	159	ND	0	41	0.04	4	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Tricosane	82.64463	ND	41	170.94	ND	0	160	ND	0	41	0.04	4	22	2.21E-08	0	0	0.00E+00	2.21E-08
C23 as Tricosane	82.64463	ND	41	170.94	ND	0	160	ND	0	41	0.04	4	22	2.21E-08	0	0	0.00E+00	2.21E-08
n-Tetracosane	82.76033	ND	41	171.18	ND	0	160	ND	0	41	0.04	4	22	2.21E-08	0	0	0.00E+00	2.21E-08
C24 as Tetracosane	82.76033	ND	41	171.18	ND	0	160	ND	0	41	0.04	4	22	2.21E-08	0	0	0.00E+00	2.21E-08
Total Hydrocarbon			632,233			0			0		632.23	67591	337,954	3.38E-04	0	0	0.00E+00	3.38E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
D03B	D03B		ND Adj	#D04A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	173.0883	ND	87	164	ND	0	150	ND	0	87	0.09	9	46	4.63E-08		4.63E-08
C5 as Pentane	173.0883	ND	87	164	ND	0	150	ND	0	87	0.09	9	46	4.63E-08		4.63E-08
n-Hexane	248.0288	ND	124	235	ND	0	156	ND	0	124	0.12	13	66	6.63E-08		6.63E-08
C6 as Hexane	248.0288	ND	124	235	ND	0	156	ND	0	124	0.12	13	66	6.63E-08		6.63E-08
n-Heptane	206.054	ND	103	195	ND	0	163	ND	0	103	0.10	11	55	5.51E-08		5.51E-08
C7 as Heptane	206.054	ND	103	195	ND	0	163	ND	0	103	0.10	11	55	5.51E-08		5.51E-08
n-Octane	3070.479		3,070	169	ND	0	158	ND	0	3,070	3.07	328	1641	1.64E-06		1.64E-06
C8 as Octane	131351		131,351	169	ND	0	158	ND	0	131,351	131.35	14042	70212	7.02E-05		7.02E-05
n-Nonane	11385.11		11,385	170	ND	0	159	ND	0	11,385	11.39	1217	6086	6.09E-06		6.09E-06
C9 as Nonane	175450.9		175,451	170	ND	0	159	ND	0	175,451	175.45	18757	93786	9.38E-05		9.38E-05
n-Decane	11935.41		11,935	172	ND	0	161	ND	0	11,935	11.94	1276	6380	6.38E-06		6.38E-06
C10 as Decane	173128		173,128	172	ND	0	161	ND	0	173,128	173.13	18509	92544	9.25E-05		9.25E-05
n-Undecane	11103.16		11,103	172	ND	0	161	ND	0	11,103	11.10	1187	5935	5.94E-06		5.94E-06
C11 as Undecane	84729.42		84,729	172	ND	0	161	ND	0	84,729	84.73	9058	45291	4.53E-05		4.53E-05
n-Dodecane	6337.467		6,337	170	ND	0	159	ND	0	6,337	6.34	678	3388	3.39E-06		3.39E-06
C12 as Dodecane	26005.23		26,005	170	ND	0	159	ND	0	26,005	26.01	2780	13901	1.39E-05		1.39E-05
n-Tridecane	1515.493	J	1,515	171	ND	0	160	ND	0	1,515	1.52	162	810	8.10E-07		8.10E-07
C13 as Tridecane	4425.259		4,425	171	ND	0	160	ND	0	4,425	4.43	473	2365	2.37E-06		2.37E-06
n-Tetradecane	292.4318	J	292	171	ND	0	160	ND	0	292	0.29	31	156	1.56E-07		1.56E-07
C14 as tetradecane	179.8198	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.81E-08		4.81E-08
n-Pentadecane	180.7207	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.83E-08		4.83E-08
C15 as Pentadecane	180.7207	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.83E-08		4.83E-08
n-Hexadecane	179.7477	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.80E-08		4.80E-08
C16 as Hexadecane	179.7477	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.80E-08		4.80E-08
n-Heptadecane	177.6577	ND	89	169	ND	0	158	ND	0	89	0.09	9	47	4.75E-08		4.75E-08
C17 as Heptadecane	177.6577	ND	89	169	ND	0	158	ND	0	89	0.09	9	47	4.75E-08		4.75E-08
n-Octadecane	179.6396	ND	90	170	ND	0	159	ND	0	90	0.09	10	48	4.80E-08		4.80E-08
C18 as Octodecane	179.6396	ND	90	170	ND	0	159	ND	0	90	0.09	10	48	4.80E-08		4.80E-08
n-Nonadecane	180	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.81E-08		4.81E-08
C19 as Nonadecane	180	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.81E-08		4.81E-08
n-Eicosane	179.5676	ND	90	170	ND	0	159	ND	0	90	0.09	10	48	4.80E-08		4.80E-08
C20 as Eicosane	179.5676	ND	90	170	ND	0	159	ND	0	90	0.09	10	48	4.80E-08		4.80E-08
n-Heneicosane	181.2613	ND	91	172	ND	0	161	ND	0	91	0.09	10	48	4.84E-08		4.84E-08
C21 as Heneicosane	181.2613	ND	91	172	ND	0	161	ND	0	91	0.09	10	48	4.84E-08		4.84E-08
n-Docosane	179.2072	ND	90	170	ND	0	159	ND	0	90	0.09	10	48	4.79E-08		4.79E-08
C22 as Docosane	179.2072	ND	90	170	ND	0	159	ND	0	90	0.09	10	48	4.79E-08		4.79E-08
n-Tricosane	180.1802	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.82E-08		4.82E-08
C23 as Tricosane	180.1802	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.82E-08		4.82E-08
n-Tetracosane	180.4324	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.82E-08		4.82E-08
C24 as Tetracosane	180.4324	ND	90	171	ND	0	160	ND	0	90	0.09	10	48	4.82E-08		4.82E-08
Total Hydrocarbon			643,245			0			0		643.24	68768	343,840	3.44E-04		3.44E-04

Bagging Data Form — Vacuum Method

Sample Id	D05				
Equipment type:	Connector	Component ID:	D-690		
Equipment Subtype:	Pipe Union	Plant ID:	Refinery D		
Line Size:	1 inches	Date:	23-Mar-18		
Phase (G, LL, HL):	HL	Analysis team:	EG/DR		
Barometric pressure	30.14 inHg	765.7 mmHg	Sample Pump A	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	60.1 °F	15.6 °C	TVA ID	36502	
Component Temp:	75.38 °F	24.1 °C	Stream Pressure/Temp:	psig	°F
Stream Description:	STAB Bottoms@ Sample Station				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:38	Background	8	ppmv	8-sec Dwell	256	ppmv	Total Dwell	2:00	min:sec	Final M21	306 ppm
10:59	Initial Bag Vacuum	0.03	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	84.7	°F	Leak @	bottom of connector

Bag Concentrations (ppmv)

Time	11:00	11:01	11:03	11:05	11:06	11:07	11:09	11:12	11:14	11:22	11:24	11:28		
ppmv	33.9	44.3	48.6	53.1	57	58.4	61.3	71.7	75	85	88.4	93.2		

Sorbent Tube Sample Collection Parameters

D05A

Time									
11:14	Volume Start	44.7	Liters		Design Sample Flow Rate = 1 liter/min				
11:26	Volume Stop	56.1	Liters	Total Vol	11.4	Liters			
	Sample Run Time	12	Minutes		Sorbent Flow	0.950 L/min	Sorbent Flow$_{STP}$	0.987	L/min

D05B

11:15	Volume Start	42.3	Liters		Design Sample Flow Rate = 1 liter/min				
11:27	Volume Stop	54.4	Liters	Total Vol	12.1	Liters			
	Sample Run Time	12	Minutes		Sorbent Flow	1.008 L/min	Sorbent Flow$_{STP}$	1.047	L/min
	Total ST Vol$_{STP}$	24.40	Liters	DGM Vol$_{STP}$	79.54	Liters	Total Run Vol$_{STP}$	103.95	Liters

Bagging Parameters

Time									
11:20	Vacuum check	0.04	inches H2O			DGM$_P$	1.8	inches H2O vacuum	762.3 mmHg
11:20	DGM$_{10L}$ Time	01:34.1	min:sec.frac	DGM Time	1.567	DGM Flow	6.38	DGM Flow$_{STP}$	6.63 liters/minute
11:20	Bag Temp.	88	°F	31.1	°C	Sample$_T$	52	°F	11.1 °C

Post-Sample Data

11:36	Post Test M21	8-sec Dwell	408	ppmv	Total Dwell	2:00 min:sec	Final M21	556 ppm
Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00 hours:min		
Organic condensate collected	N/A	ml						
Density of organic condensate	N/A	g/ml						

Average THC emissions =	1.58E-04	kg/hr
Percent difference THC ER =	8%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.13E-08
C5 as Pentane	3.13E-08
n-Hexane	4.06E-08
C6 as Hexane	4.06E-08
n-Heptane	3.61E-08
C7 as Heptane	1.48E-07
n-Octane	3.78E-07
C8 as Octane	2.16E-05
n-Nonane	2.40E-06
C9 as Nonane	3.46E-05
n-Decane	3.46E-06
C10 as Decane	4.43E-05
n-Undecane	3.00E-06
C11 as Undecane	2.68E-05
n-Dodecane	2.70E-06
C12 as Dodecane	1.15E-05
n-Tridecane	1.47E-06
C13 as Tridecane	4.00E-06
n-Tetradecane	4.28E-07
C14 as tetradecane	3.77E-07
n-Pentadecane	5.42E-08
C15 as Pentadecane	3.30E-08
n-Hexadecane	3.28E-08
C16 as Hexadecane	3.28E-08
n-Heptadecane	3.24E-08
C17 as Heptadecane	3.24E-08
n-Octadecane	3.28E-08
C18 as Octodecane	3.28E-08
n-Nonadecane	3.28E-08
C19 as Nonadecane	3.28E-08
n-Eicosane	3.28E-08
C20 as Eicosane	3.28E-08
n-Heneicosane	3.31E-08
C21 as Heneicosane	4.48E-08
n-Docosane	3.27E-08
C22 as Docosane	3.27E-08
n-Tricosane	3.29E-08
C23 as Tricosane	3.29E-08
n-Tetracosane	3.29E-08
C24 as Tetracosane	3.29E-08
Total Hydrocarbon	1.58E-04

THC:	**8.36E-03**	**lbs/day**	**1.53E-03**	**tons/yr**

D05A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D05A	D05A		ND Adj	#D06A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	82.12281	ND	41	154.94	ND	0	150	ND	0	41	0.04	4	21	2.13E-08	0	0	0.00E+00	2.13E-08
C5 as Pentane	82.12281	ND	41	154.94	ND	0	150	ND	0	41	0.04	4	21	2.13E-08	0	0	0.00E+00	2.13E-08
n-Hexane	85.31579	ND	43	222.03	ND	0	156	ND	0	43	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
C6 as Hexane	85.31579	ND	43	222.03	ND	0	156	ND	0	43	0.04	4	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Heptane	89.1579	ND	45	184.45	ND	0	163	ND	0	45	0.04	5	23	2.32E-08	0	0	0.00E+00	2.32E-08
C7 as Heptane	473.6155	J	474	184.45	ND	0	163	ND	0	474	0.47	49	246	2.46E-07	0	0	0.00E+00	2.46E-07
n-Octane	731.2738	J	731	159.61	ND	0	158	ND	0	731	0.73	76	380	3.80E-07	0	0	0.00E+00	3.80E-07
C8 as Octane	41863.09		41,863	159.61	ND	0	158	ND	0	41,863	41.86	4352	21758	2.18E-05	0	0	0.00E+00	2.18E-05
n-Nonane	4922.769		4,923	160.81	ND	0	159	ND	0	4,923	4.92	512	2559	2.56E-06	0	0	0.00E+00	2.56E-06
C9 as Nonane	61970.71		61,971	160.81	ND	0	159	ND	0	61,971	61.97	6442	32208	3.22E-05	0	0	0.00E+00	3.22E-05
n-Decane	7397.446		7,397	162.26	ND	0	161	ND	0	7,397	7.40	769	3845	3.84E-06	0	0	0.00E+00	3.84E-06
C10 as Decane	80958.48		80,958	162.26	ND	0	161	ND	0	80,958	80.96	8415	42077	4.21E-05	0	0	0.00E+00	4.21E-05
n-Undecane	4592.931		4,593	161.84	ND	0	161	ND	0	4,593	4.59	477	2387	2.39E-06	0	0	0.00E+00	2.39E-06
C11 as Undecane	48249.27		48,249	161.84	ND	0	161	ND	0	48,249	48.25	5015	25077	2.51E-05	0	0	0.00E+00	2.51E-05
n-Dodecane	5488.655		5,489	160.74	ND	0	159	ND	0	5,489	5.49	571	2853	2.85E-06	0	0	0.00E+00	2.85E-06
C12 as Dodecane	21557.49		21,557	160.74	ND	0	159	ND	0	21,557	21.56	2241	11204	1.12E-05	0	0	0.00E+00	1.12E-05
n-Tridecane	3123.218		3,123	161.13	ND	0	160	ND	0	3,123	3.12	325	1623	1.62E-06	0	0	0.00E+00	1.62E-06
C13 as Tridecane	7461.845		7,462	161.13	ND	0	160	ND	0	7,462	7.46	776	3878	3.88E-06	0	0	0.00E+00	3.88E-06
n-Tetradecane	857.8362	J	858	160.97	ND	0	160	ND	0	858	0.86	89	446	4.46E-07	0	0	0.00E+00	4.46E-07
C14 as tetradecane	784.6743	J	785	160.97	ND	0	160	ND	0	785	0.78	82	408	4.08E-07	0	0	0.00E+00	4.08E-07
n-Pentadecane	125.7384	J	126	161.77	ND	0	160	ND	0	126	0.13	13	65	6.54E-08	0	0	0.00E+00	6.54E-08
C15 as Pentadecane	87.98246	ND	44	161.77	ND	0	160	ND	0	44	0.04	5	23	2.29E-08	0	0	0.00E+00	2.29E-08
n-Hexadecane	87.50877	ND	44	160.9	ND	0	160	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
C16 as Hexadecane	87.50877	ND	44	160.9	ND	0	160	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
n-Heptadecane	86.49123	ND	43	159.03	ND	0	158	ND	0	43	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
C17 as Heptadecane	86.49123	ND	43	159.03	ND	0	158	ND	0	43	0.04	4	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Octadecane	87.45614	ND	44	160.81	ND	0	159	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
C18 as Octodecane	87.45614	ND	44	160.81	ND	0	159	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
n-Nonadecane	87.63158	ND	44	161.13	ND	0	160	ND	0	44	0.04	5	23	2.28E-08	0	0	0.00E+00	2.28E-08
C19 as Nonadecane	87.63158	ND	44	161.13	ND	0	160	ND	0	44	0.04	5	23	2.28E-08	0	0	0.00E+00	2.28E-08
n-Eicosane	87.42106	ND	44	160.74	ND	0	159	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
C20 as Eicosane	87.42106	ND	44	160.74	ND	0	159	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
n-Heneicosane	88.24562	ND	44	162.26	ND	0	161	ND	0	44	0.04	5	23	2.29E-08	0	0	0.00E+00	2.29E-08
C21 as Heneicosane	89.21088	J	89	162.26	ND	0	161	ND	0	89	0.09	9	46	4.64E-08	0	0	0.00E+00	4.64E-08
n-Docosane	87.24562	ND	44	160.42	ND	0	159	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
C22 as Docosane	87.24562	ND	44	160.42	ND	0	159	ND	0	44	0.04	5	23	2.27E-08	0	0	0.00E+00	2.27E-08
n-Tricosane	87.7193	ND	44	161.29	ND	0	160	ND	0	44	0.04	5	23	2.28E-08	0	0	0.00E+00	2.28E-08
C23 as Tricosane	87.7193	ND	44	161.29	ND	0	160	ND	0	44	0.04	5	23	2.28E-08	0	0	0.00E+00	2.28E-08
n-Tetracosane	87.84211	ND	44	161.52	ND	0	160	ND	0	44	0.04	5	23	2.28E-08	0	0	0.00E+00	2.28E-08
C24 as Tetracosane	87.84211	ND	44	161.52	ND	0	160	ND	0	44	0.04	5	23	2.28E-08	0	0	0.00E+00	2.28E-08
Total Hydrocarbon			291,648			0			0		291.65	30316	151,578	1.52E-04	0	0	0.00E+00	1.52E-04

D05B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D05B	D05B		ND Adj	#D06A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	158.7835	ND	79	155	ND	0	150	ND	0	79	0.08	8	41	4.13E-08	4.13E-08
C5 as Pentane	158.7835	ND	79	155	ND	0	150	ND	0	79	0.08	8	41	4.13E-08	4.13E-08
n-Hexane	227.5306	ND	114	222	ND	0	156	ND	0	114	0.11	12	59	5.91E-08	5.91E-08
C6 as Hexane	227.5306	ND	114	222	ND	0	156	ND	0	114	0.11	12	59	5.91E-08	5.91E-08
n-Heptane	189.0248	ND	95	184	ND	0	163	ND	0	95	0.09	10	49	4.91E-08	4.91E-08
C7 as Heptane	189.0248	ND	95	184	ND	0	163	ND	0	95	0.09	10	49	4.91E-08	4.91E-08
n-Octane	721.6735	J	722	160	ND	0	158	ND	0	722	0.72	75	375	3.75E-07	3.75E-07
C8 as Octane	41278.36		41,278	160	ND	0	158	ND	0	41,278	41.28	4291	21454	2.15E-05	2.15E-05
n-Nonane	4296.646		4,297	161	ND	0	159	ND	0	4,297	4.30	447	2233	2.23E-06	2.23E-06
C9 as Nonane	71143.94		71,144	161	ND	0	159	ND	0	71,144	71.14	7395	36976	3.70E-05	3.70E-05
n-Decane	5929.214		5,929	162	ND	0	161	ND	0	5,929	5.93	616	3082	3.08E-06	3.08E-06
C10 as Decane	89499.33		89,499	162	ND	0	161	ND	0	89,499	89.50	9303	46516	4.65E-05	4.65E-05
n-Undecane	6947.664		6,948	162	ND	0	161	ND	0	6,948	6.95	722	3611	3.61E-06	3.61E-06
C11 as Undecane	54923.68		54,924	162	ND	0	161	ND	0	54,924	54.92	5709	28546	2.85E-05	2.85E-05
n-Dodecane	4915.226		4,915	161	ND	0	159	ND	0	4,915	4.92	511	2555	2.55E-06	2.55E-06
C12 as Dodecane	22719.81		22,720	161	ND	0	159	ND	0	22,720	22.72	2362	11808	1.18E-05	1.18E-05
n-Tridecane	2524.535		2,525	161	ND	0	160	ND	0	2,525	2.52	262	1312	1.31E-06	1.31E-06
C13 as Tridecane	7923.453		7,923	161	ND	0	160	ND	0	7,923	7.92	824	4118	4.12E-06	4.12E-06
n-Tetradecane	787.7135	J	788	161	ND	0	160	ND	0	788	0.79	82	409	4.09E-07	4.09E-07
C14 as tetradecane	665.4193	J	665	161	ND	0	160	ND	0	665	0.67	69	346	3.46E-07	3.46E-07
n-Pentadecane	165.7851	ND	83	162	ND	0	160	ND	0	83	0.08	9	43	4.31E-08	4.31E-08
C15 as Pentadecane	165.7851	ND	83	162	ND	0	160	ND	0	83	0.08	9	43	4.31E-08	4.31E-08
n-Hexadecane	164.8926	ND	82	161	ND	0	160	ND	0	82	0.08	9	43	4.28E-08	4.28E-08
C16 as Hexadecane	164.8926	ND	82	161	ND	0	160	ND	0	82	0.08	9	43	4.28E-08	4.28E-08
n-Heptadecane	162.9752	ND	81	159	ND	0	158	ND	0	81	0.08	8	42	4.24E-08	4.24E-08
C17 as Heptadecane	162.9752	ND	81	159	ND	0	158	ND	0	81	0.08	8	42	4.24E-08	4.24E-08
n-Octadecane	164.7934	ND	82	161	ND	0	159	ND	0	82	0.08	9	43	4.28E-08	4.28E-08
C18 as Octodecane	164.7934	ND	82	161	ND	0	159	ND	0	82	0.08	9	43	4.28E-08	4.28E-08
n-Nonadecane	165.124	ND	83	161	ND	0	160	ND	0	83	0.08	9	43	4.29E-08	4.29E-08
C19 as Nonadecane	165.124	ND	83	161	ND	0	160	ND	0	83	0.08	9	43	4.29E-08	4.29E-08
n-Eicosane	164.7273	ND	82	161	ND	0	159	ND	0	82	0.08	9	43	4.28E-08	4.28E-08
C20 as Eicosane	164.7273	ND	82	161	ND	0	159	ND	0	82	0.08	9	43	4.28E-08	4.28E-08
n-Heneicosane	166.281	ND	83	162	ND	0	161	ND	0	83	0.08	9	43	4.32E-08	4.32E-08
C21 as Heneicosane	166.281	ND	83	162	ND	0	161	ND	0	83	0.08	9	43	4.32E-08	4.32E-08
n-Docosane	164.3967	ND	82	160	ND	0	159	ND	0	82	0.08	9	43	4.27E-08	4.27E-08
C22 as Docosane	164.3967	ND	82	160	ND	0	159	ND	0	82	0.08	9	43	4.27E-08	4.27E-08
n-Tricosane	165.2893	ND	83	161	ND	0	160	ND	0	83	0.08	9	43	4.30E-08	4.30E-08
C23 as Tricosane	165.2893	ND	83	161	ND	0	160	ND	0	83	0.08	9	43	4.30E-08	4.30E-08
n-Tetracosane	165.5207	ND	83	162	ND	0	160	ND	0	83	0.08	9	43	4.30E-08	4.30E-08
C24 as Tetracosane	165.5207	ND	83	162	ND	0	160	ND	0	83	0.08	9	43	4.30E-08	4.30E-08
Total Hydrocarbon			316,502			0			0		316.50	32899	164,496	1.64E-04	1.64E-04

Bagging Data Form — Vacuum Method

Sample Id D07

Equipment type:	Connector			**Component ID:**	D-711		
Equipment Subtype:	Flange			**Plant ID:**	Refinery D		
Line Size:	8	*inches*		**Date:**	23-Mar-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	30.11 *inHg*	764.7	*mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	78.8 °F	26.0	°C	**TVA ID**	36502		
Component Temp:	353 °F	178.3	°C	**Stream Pressure/Temp:**	*psig*		°F
Stream Description:	*V-752 Product to Unit*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:35	Background	4.5	*ppmv*	8-sec Dwell	670	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	1722 *ppm*
13:22	Initial Bag Vacuum	0.06	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	318	°F	Leak @	NE Side of Flange

Bag Concentrations (ppmv)

Time	13:23	13:25	13:26	13:27	13:28	13:30	13:36	13:39	13:41	13:44				
ppmv	900	738	864	980	989	970	906	912	914	915				

Sorbent Tube Sample Collection Parameters

D07A

Time									
13:31	Volume Start	56.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:43	Volume Stop	68.8	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	12	*Minutes*		Sorbent Flow	1.050 *L/min*	Sorbent Flow$_{STP}$	1.056	*L/min*

D07B

Time									
13:31	Volume Start	54.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:43	Volume Stop	66.8	*Liters*	Total Vol	12.3	*Liters*			
	Sample Run Time	12	*Minutes*		Sorbent Flow	1.025 *L/min*	Sorbent Flow$_{STP}$	1.031	*L/min*
	Total ST Vol$_{STP}$	25.04	*Liters*	DGM Vol$_{STP}$	73.14	*Liters*	Total Run Vol$_{STP}$	98.18	*Liters*

Bagging Parameters

Time										
13:35	Vacuum check	0.06	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	761.3	*mmHg*
13:35	DGM$_{10L}$ Time	01:39.0	*min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM Flow$_{STP}$	6.09	*liters/minute*
13:35	Bag Temp.	320	°F		160.0 °C	Sample$_T$	68	°F	20.0	°C

Post-Sample Data

13:57	Post Test M21	8-sec Dwell	346	*ppmv*	Total Dwell	2:30	*min:sec*	Final M21	1092 *ppm*
Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*		
Organic condensate collected	N/A	*ml*							
Density of organic condensate	N/A	*g/ml*							

Average THC emissions =	1.40E-03	kg/hr
Percent difference THC ER =	27%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.83E-08
C5 as Pentane	3.82E-08
n-Hexane	3.69E-08
C6 as Hexane	1.58E-07
n-Heptane	3.27E-08
C7 as Heptane	1.28E-07
n-Octane	1.60E-06
C8 as Octane	1.13E-04
n-Nonane	1.34E-05
C9 as Nonane	2.45E-04
n-Decane	2.58E-05
C10 as Decane	4.11E-04
n-Undecane	3.15E-05
C11 as Undecane	3.27E-04
n-Dodecane	3.51E-05
C12 as Dodecane	1.37E-04
n-Tridecane	1.12E-05
C13 as Tridecane	3.70E-05
n-Tetradecane	2.99E-06
C14 as tetradecane	8.30E-06
n-Pentadecane	1.05E-06
C15 as Pentadecane	1.75E-06
n-Hexadecane	3.60E-07
C16 as Hexadecane	1.76E-07
n-Heptadecane	1.94E-07
C17 as Heptadecane	2.93E-08
n-Octadecane	6.61E-08
C18 as Octodecane	2.96E-08
n-Nonadecane	2.97E-08
C19 as Nonadecane	2.97E-08
n-Eicosane	2.96E-08
C20 as Eicosane	2.96E-08
n-Heneicosane	2.99E-08
C21 as Heneicosane	2.99E-08
n-Docosane	2.95E-08
C22 as Docosane	2.95E-08
n-Tricosane	2.97E-08
C23 as Tricosane	2.97E-08
n-Tetracosane	2.97E-08
C24 as Tetracosane	2.97E-08
Total Hydrocarbon	1.40E-03

THC:	7.43E-02	lbs/day	1.36E-02	tons/yr

D07A	ANALYTICAL RESULTS D07A		ND Adj	BACKGROUND #D0XXA		ND Adj	TRIP BLANK #D013		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#D0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	154.94	ND	0	150	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	77.35984	J	77	154.94	ND	0	150	ND	0	77	0.08	8	38	3.80E-08	0	0	0.00E+00	3.80E-08
n-Hexane	77.19047	ND	39	222.03	ND	0	156	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C6 as Hexane	532.5783	J	533	222.03	ND	0	156	ND	0	533	0.53	52	261	2.61E-07	0	0	0.00E+00	2.61E-07
n-Heptane	80.66666	ND	40	184.45	ND	0	163	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C7 as Heptane	428.5093	J	429	184.45	ND	0	163	ND	0	429	0.43	42	210	2.10E-07	0	0	0.00E+00	2.10E-07
n-Octane	2897.141		2,897	159.61	ND	0	158	ND	0	2,897	2.90	284	1422	1.42E-06	0	0	0.00E+00	1.42E-06
C8 as Octane	198787.3		198,787	159.61	ND	0	158	ND	0	198,787	198.79	19517	97586	9.76E-05	0	0	0.00E+00	9.76E-05
n-Nonane	24947.84		24,948	160.81	ND	0	159	ND	0	24,948	24.95	2449	12247	1.22E-05	0	0	0.00E+00	1.22E-05
C9 as Nonane	428338		428,338	160.81	ND	0	159	ND	0	428,338	428.34	42055	210274	2.10E-04	0	0	0.00E+00	2.10E-04
n-Decane	49549.51		49,550	162.26	ND	0	161	ND	0	49,550	49.55	4865	24324	2.43E-05	0	0	0.00E+00	2.43E-05
C10 as Decane	730566.8		730,567	162.26	ND	0	161	ND	0	730,567	730.57	71728	358640	3.59E-04	0	0	0.00E+00	3.59E-04
n-Undecane	42148.66		42,149	161.84	ND	0	161	ND	0	42,149	42.15	4138	20691	2.07E-05	0	0	0.00E+00	2.07E-05
C11 as Undecane	580437		580,437	161.84	ND	0	161	ND	0	580,437	580.44	56988	284940	2.85E-04	0	0	0.00E+00	2.85E-04
n-Dodecane	69812.3		69,812	160.74	ND	0	159	ND	0	69,812	69.81	6854	34271	3.43E-05	0	0	0.00E+00	3.43E-05
C12 as Dodecane	234431.2		234,431	160.74	ND	0	159	ND	0	234,431	234.43	23017	115084	1.15E-04	0	0	0.00E+00	1.15E-04
n-Tridecane	21924.3		21,924	161.13	ND	0	160	ND	0	21,924	21.92	2153	10763	1.08E-05	0	0	0.00E+00	1.08E-05
C13 as Tridecane	64067.28		64,067	161.13	ND	0	160	ND	0	64,067	64.07	6290	31451	3.15E-05	0	0	0.00E+00	3.15E-05
n-Tetradecane	5366.356		5,366	160.97	ND	0	160	ND	0	5,366	5.37	527	2634	2.63E-06	0	0	0.00E+00	2.63E-06
C14 as tetradecane	14791.66		14,792	160.97	ND	0	160	ND	0	14,792	14.79	1452	7261	7.26E-06	0	0	0.00E+00	7.26E-06
n-Pentadecane	1725.711		1,726	161.77	ND	0	160	ND	0	1,726	1.73	169	847	8.47E-07	0	0	0.00E+00	8.47E-07
C15 as Pentadecane	3640.566		3,641	161.77	ND	0	160	ND	0	3,641	3.64	357	1787	1.79E-06	0	0	0.00E+00	1.79E-06
n-Hexadecane	825.1041	J	825	160.9	ND	0	160	ND	0	825	0.83	81	405	4.05E-07	0	0	0.00E+00	4.05E-07
C16 as Hexadecane	382.1914	J	382	160.9	ND	0	160	ND	0	382	0.38	38	188	1.88E-07	0	0	0.00E+00	1.88E-07
n-Heptadecane	350.7658	J	351	159.03	ND	0	158	ND	0	351	0.35	34	172	1.72E-07	0	0	0.00E+00	1.72E-07
C17 as Heptadecane	78.25397	ND	39	159.03	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Octadecane	92.14391	J	92	160.81	ND	0	159	ND	0	92	0.09	9	45	4.52E-08	0	0	0.00E+00	4.52E-08
C18 as Octodecane	79.12698	ND	40	160.81	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Nonadecane	79.28571	ND	40	161.13	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C19 as Nonadecane	79.28571	ND	40	161.13	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Eicosane	79.09524	ND	40	160.74	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C20 as Eicosane	79.09524	ND	40	160.74	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heneicosane	79.84127	ND	40	162.26	ND	0	161	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C21 as Heneicosane	79.84127	ND	40	162.26	ND	0	161	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Docosane	78.93651	ND	39	160.42	ND	0	159	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C22 as Docosane	78.93651	ND	39	160.42	ND	0	159	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tricosane	79.36508	ND	40	161.29	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C23 as Tricosane	79.36508	ND	40	161.29	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tetracosane	79.47619	ND	40	161.52	ND	0	160	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C24 as Tetracosane	79.47619	ND	40	161.52	ND	0	160	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
Total Hydrocarbon			2,476,791			0			0		2476.79	243175	1,215,873	1.22E-03	0	0	0.00E+00	1.22E-03

D07B	ANALYTICAL RESULTS D07B		ND Adj	BACKGROUND #D0XXA		ND Adj	TRIP BLANK #D013		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	156.2016	ND	78	155	ND	0	150	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C5 as Pentane	156.2016	ND	78	155	ND	0	150	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Hexane	223.8309	ND	112	222	ND	0	156	ND	0	112	0.11	11	55	5.49E-08	5.49E-08
C6 as Hexane	223.8309	ND	112	222	ND	0	156	ND	0	112	0.11	11	55	5.49E-08	5.49E-08
n-Heptane	185.9512	ND	93	184	ND	0	163	ND	0	93	0.09	9	46	4.56E-08	4.56E-08
C7 as Heptane	185.9512	ND	93	184	ND	0	163	ND	0	93	0.09	9	46	4.56E-08	4.56E-08
n-Octane	3629.815		3,630	160	ND	0	158	ND	0	3,630	3.63	356	1782	1.78E-06	1.78E-06
C8 as Octane	259817.8		259,818	160	ND	0	158	ND	0	259,818	259.82	25509	127546	1.28E-04	1.28E-04
n-Nonane	29669.78		29,670	161	ND	0	159	ND	0	29,670	29.67	2913	14565	1.46E-05	1.46E-05
C9 as Nonane	568672.8		568,673	161	ND	0	159	ND	0	568,673	568.67	55833	279165	2.79E-04	2.79E-04
n-Decane	55560.37		55,560	162	ND	0	161	ND	0	55,560	55.56	5455	27275	2.73E-05	2.73E-05
C10 as Decane	944742.4		944,742	162	ND	0	161	ND	0	944,742	944.74	92756	463780	4.64E-04	4.64E-04
n-Undecane	86149.47		86,149	162	ND	0	161	ND	0	86,149	86.15	8458	42291	4.23E-05	4.23E-05
C11 as Undecane	752027.1		752,027	162	ND	0	161	ND	0	752,027	752.03	73835	369175	3.69E-04	3.69E-04
n-Dodecane	73122.87		73,123	161	ND	0	159	ND	0	73,123	73.12	7179	35896	3.59E-05	3.59E-05
C12 as Dodecane	322647.5		322,648	161	ND	0	159	ND	0	322,648	322.65	31678	158390	1.58E-04	1.58E-04
n-Tridecane	23878.76		23,879	161	ND	0	160	ND	0	23,879	23.88	2344	11722	1.17E-05	1.17E-05
C13 as Tridecane	86674.27		86,674	161	ND	0	160	ND	0	86,674	86.67	8510	42549	4.25E-05	4.25E-05
n-Tetradecane	6811.685		6,812	161	ND	0	160	ND	0	6,812	6.81	669	3344	3.34E-06	3.34E-06
C14 as tetradecane	19018.89		19,019	161	ND	0	160	ND	0	19,019	19.02	1867	9336	9.34E-06	9.34E-06
n-Pentadecane	2567.352		2,567	162	ND	0	160	ND	0	2,567	2.57	252	1260	1.26E-06	1.26E-06
C15 as Pentadecane	3488.987		3,489	162	ND	0	160	ND	0	3,489	3.49	343	1713	1.71E-06	1.71E-06
n-Hexadecane	642.6878	J	643	161	ND	0	160	ND	0	643	0.64	63	315	3.15E-07	3.15E-07
C16 as Hexadecane	333.9363	J	334	161	ND	0	160	ND	0	334	0.33	33	164	1.64E-07	1.64E-07
n-Heptadecane	440.0642	J	440	159	ND	0	158	ND	0	440	0.44	43	216	2.16E-07	2.16E-07
C17 as Heptadecane	160.3252	ND	80	159	ND	0	158	ND	0	80	0.08	8	39	3.94E-08	3.94E-08
n-Octadecane	176.9697	J	177	161	ND	0	159	ND	0	177	0.18	17	87	8.69E-08	8.69E-08
C18 as Octodecane	162.1138	ND	81	161	ND	0	159	ND	0	81	0.08	8	40	3.98E-08	3.98E-08
n-Nonadecane	162.439	ND	81	161	ND	0	160	ND	0	81	0.08	8	40	3.99E-08	3.99E-08
C19 as Nonadecane	162.439	ND	81	161	ND	0	160	ND	0	81	0.08	8	40	3.99E-08	3.99E-08
n-Eicosane	162.0488	ND	81	161	ND	0	159	ND	0	81	0.08	8	40	3.98E-08	3.98E-08
C20 as Eicosane	162.0488	ND	81	161	ND	0	159	ND	0	81	0.08	8	40	3.98E-08	3.98E-08
n-Heneicosane	163.5772	ND	82	162	ND	0	161	ND	0	82	0.08	8	40	4.02E-08	4.02E-08
C21 as Heneicosane	163.5772	ND	82	162	ND	0	161	ND	0	82	0.08	8	40	4.02E-08	4.02E-08
n-Docosane	161.7236	ND	81	160	ND	0	159	ND	0	81	0.08	8	40	3.97E-08	3.97E-08
C22 as Docosane	161.7236	ND	81	160	ND	0	159	ND	0	81	0.08	8	40	3.97E-08	3.97E-08
n-Tricosane	162.6016	ND	81	161	ND	0	160	ND	0	81	0.08	8	40	3.99E-08	3.99E-08
C23 as Tricosane	162.6016	ND	81	161	ND	0	160	ND	0	81	0.08	8	40	3.99E-08	3.99E-08
n-Tetracosane	162.8293	ND	81	162	ND	0	160	ND	0	81	0.08	8	40	4.00E-08	4.00E-08
C24 as Tetracosane	162.8293	ND	81	162	ND	0	160	ND	0	81	0.08	8	40	4.00E-08	4.00E-08
Total Hydrocarbon			3,241,776			0			0		3241.78	318282	1,591,409	1.59E-03	1.59E-03

Bagging Data Form — Vacuum Method

Sample Id: D09

WSPA — Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	D-599	
Equipment Subtype:	Gate			**Plant ID:**	Refinery D	
Line Size:	1	*inches*		**Date:**	26-Mar-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30.14	*inHg*	765.6 *mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	55.1	*°F*	12.8 *°C*	**TVA ID**	37887	
Component Temp:	57	*°F*	13.9 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Jet*					

CONVERSIONS:
- 1 inch Hg = 25.4 mmHg
- 1 inch H2O column = 1.87 mmHg
- °F= (F-32)*5/9 °C
- 1 m³ = 1000 liters
- 1 kg = 1E+9 µg
- 1 kg = 2.20462 pounds
- 1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:48	Background	2	*ppmv*	8-sec Dwell	1422	*ppmv*	Total Dwell	1:20	*min:sec*	Final M21	2222 *ppm*
10:02	Initial Bag Vacuum	0.02	*inches H2O*	DGM Vac.	2.2	*inches H2O*	Bag Temp	58.6	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	10:04	10:05	10:07	10:08	10:09	10:11	10:13	10:15	10:16	10:24	10:28			
ppmv	184	316	406	515	600	706	763	791	725	843	812			

Sorbent Tube Sample Collection Parameters

D09A

Time									
10:18	Volume Start	72.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:31	Volume Stop	85.5	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	1.046	*L/min*

D09B

Time									
10:18	Volume Start	69.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:31	Volume Stop	82.8	*Liters*	Total Vol	13.1	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.008 *L/min*	Sorbent Flow$_{STP}$	1.054	*L/min*
	Total ST Vol$_{STP}$	27.30	*Liters*	DGM Vol$_{STP}$	20.92	*Liters*	Total Run Vol$_{STP}$	48.22	*Liters*

Bagging Parameters

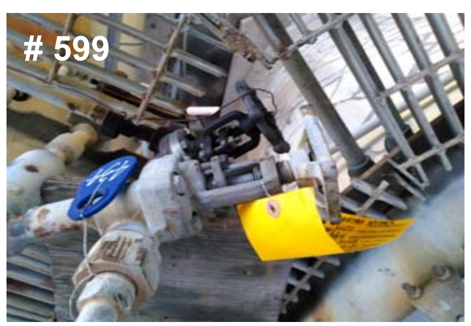
Time										
10:25	Vacuum check	0.03	*inches H2O*			DGM$_P$	2	*inches H2O vacuum*	761.8	*mmHg*
10:25	DGM$_{1L}$ Time	00:38.9	*min:sec.frac*	DGM Time	0.650	DGM Flow	1.54	DGM Flow$_{STP}$	1.61	*liters/minute*
10:26	Bag Temp.	59.7	*°F*	15.4	*°C*	Sample$_T$	48	*°F*	8.9	*°C*

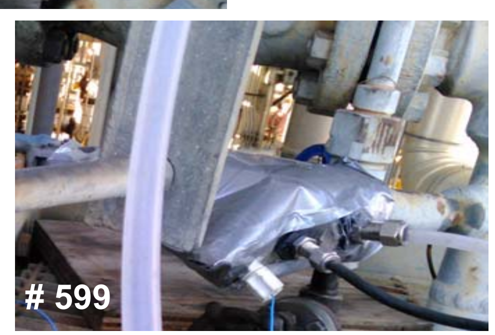
Post-Sample Data

10:43	Post Test M21	Background	10	*ppmv*	8-sec Dwell	3300	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	5512 *ppm*
											@	Packing

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*
Organic condensate collected	N/A	*ml*					
Density of organic condensate	N/A	*g/ml*					

Average THC emissions =	5.20E-04	kg/hr
Percent difference THC ER =	36%	
Acceptable?	No	





AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.27E-07
C5 as Pentane	4.49E-07
n-Hexane	1.37E-07
C6 as Hexane	1.06E-06
n-Heptane	4.64E-07
C7 as Heptane	2.82E-06
n-Octane	7.53E-06
C8 as Octane	1.83E-04
n-Nonane	1.64E-05
C9 as Nonane	1.63E-04
n-Decane	1.07E-05
C10 as Decane	9.67E-05
n-Undecane	4.20E-06
C11 as Undecane	2.86E-05
n-Dodecane	1.12E-06
C12 as Dodecane	3.57E-06
n-Tridecane	1.27E-07
C13 as Tridecane	6.16E-08
n-Tetradecane	1.27E-08
C14 as tetradecane	1.27E-08
n-Pentadecane	1.28E-08
C15 as Pentadecane	1.28E-08
n-Hexadecane	1.27E-08
C16 as Hexadecane	1.27E-08
n-Heptadecane	1.26E-08
C17 as Heptadecane	1.26E-08
n-Octadecane	1.27E-08
C18 as Octodecane	1.27E-08
n-Nonadecane	1.28E-08
C19 as Nonadecane	1.28E-08
n-Eicosane	1.27E-08
C20 as Eicosane	1.27E-08
n-Heneicosane	1.29E-08
C21 as Heneicosane	1.29E-08
n-Docosane	1.27E-08
C22 as Docosane	1.27E-08
n-Tricosane	1.28E-08
C23 as Tricosane	1.28E-08
n-Tetracosane	1.28E-08
C24 as Tetracosane	1.28E-08
Total Hydrocarbon	5.20E-04

THC:	2.75E-02	lbs/day	5.03E-03	tons/yr

D09A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D09A	D09A		ND Adj	#D010A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	804.209		804	145.55	ND	0	150	ND	0	804	0.80	39	179	1.79E-07	0	0	0.00E+00	1.79E-07
C5 as Pentane	1574.761		1,575	145.55	ND	0	150	ND	0	1,575	1.57	76	350	3.50E-07	0	0	0.00E+00	3.50E-07
n-Hexane	499.5981	J	500	208.57	ND	0	156	ND	0	500	0.50	24	111	1.11E-07	0	0	0.00E+00	1.11E-07
C6 as Hexane	3815.776		3,816	208.57	ND	0	156	ND	0	3,816	3.82	184	849	8.49E-07	0	0	0.00E+00	8.49E-07
n-Heptane	2041.651		2,042	173.27	ND	0	163	ND	0	2,042	2.04	98	454	4.54E-07	0	0	0.00E+00	4.54E-07
C7 as Heptane	9958.052		9,958	173.27	ND	0	163	ND	0	9,958	9.96	480	2216	2.22E-06	0	0	0.00E+00	2.22E-06
n-Octane	28690.13		28,690	149.94	ND	0	158	ND	0	28,690	28.69	1383	6385	6.39E-06	0	0	0.00E+00	6.39E-06
C8 as Octane	670542.9		670,543	149.94	ND	0	158	ND	0	670,543	670.54	32334	149233	1.49E-04	0	0	0.00E+00	1.49E-04
n-Nonane	66522.92		66,523	151.06	ND	0	159	ND	0	66,523	66.52	3208	14805	1.48E-05	0	0	0.00E+00	1.48E-05
C9 as Nonane	603597.4		603,597	151.06	ND	0	159	ND	0	603,597	603.60	29106	134334	1.34E-04	0	0	0.00E+00	1.34E-04
n-Decane	46982.81		46,983	152.42	ND	0	161	ND	0	46,983	46.98	2266	10456	1.05E-05	0	0	0.00E+00	1.05E-05
C10 as Decane	346328.7		346,329	152.42	ND	0	161	ND	0	346,329	346.33	16700	77077	7.71E-05	0	0	0.00E+00	7.71E-05
n-Undecane	12257.76		12,258	152.03	ND	0	161	ND	0	12,258	12.26	591	2728	2.73E-06	0	0	0.00E+00	2.73E-06
C11 as Undecane	104510.3		104,510	152.03	ND	0	161	ND	0	104,510	104.51	5040	23259	2.33E-05	0	0	0.00E+00	2.33E-05
n-Dodecane	3286.22		3,286	151	ND	0	159	ND	0	3,286	3.29	158	731	7.31E-07	0	0	0.00E+00	7.31E-07
C12 as Dodecane	14016.83		14,017	151	ND	0	159	ND	0	14,017	14.02	676	3120	3.12E-06	0	0	0.00E+00	3.12E-06
n-Tridecane	657.1353	J	657	151.36	ND	0	160	ND	0	657	0.66	32	146	1.46E-07	0	0	0.00E+00	1.46E-07
C13 as Tridecane	477.6722	J	478	151.36	ND	0	160	ND	0	478	0.48	23	106	1.06E-07	0	0	0.00E+00	1.06E-07
n-Tetradecane	76.76923	ND	38	151.21	ND	0	160	ND	0	38	0.04	2	9	8.54E-09	0	0	0.00E+00	8.54E-09
C14 as tetradecane	76.76923	ND	38	151.21	ND	0	160	ND	0	38	0.04	2	9	8.54E-09	0	0	0.00E+00	8.54E-09
n-Pentadecane	77.15385	ND	39	151.97	ND	0	160	ND	0	39	0.04	2	9	8.59E-09	0	0	0.00E+00	8.59E-09
C15 as Pentadecane	77.15385	ND	39	151.97	ND	0	160	ND	0	39	0.04	2	9	8.59E-09	0	0	0.00E+00	8.59E-09
n-Hexadecane	76.73846	ND	38	151.15	ND	0	160	ND	0	38	0.04	2	9	8.54E-09	0	0	0.00E+00	8.54E-09
C16 as Hexadecane	76.73846	ND	38	151.15	ND	0	160	ND	0	38	0.04	2	9	8.54E-09	0	0	0.00E+00	8.54E-09
n-Heptadecane	75.84615	ND	38	149.39	ND	0	158	ND	0	38	0.04	2	8	8.44E-09	0	0	0.00E+00	8.44E-09
C17 as Heptadecane	75.84615	ND	38	149.39	ND	0	158	ND	0	38	0.04	2	8	8.44E-09	0	0	0.00E+00	8.44E-09
n-Octadecane	76.69231	ND	38	151.06	ND	0	159	ND	0	38	0.04	2	9	8.53E-09	0	0	0.00E+00	8.53E-09
C18 as Octodecane	76.69231	ND	38	151.06	ND	0	159	ND	0	38	0.04	2	9	8.53E-09	0	0	0.00E+00	8.53E-09
n-Nonadecane	76.84615	ND	38	151.36	ND	0	160	ND	0	38	0.04	2	9	8.55E-09	0	0	0.00E+00	8.55E-09
C19 as Nonadecane	76.84615	ND	38	151.36	ND	0	160	ND	0	38	0.04	2	9	8.55E-09	0	0	0.00E+00	8.55E-09
n-Eicosane	76.66154	ND	38	151	ND	0	159	ND	0	38	0.04	2	9	8.53E-09	0	0	0.00E+00	8.53E-09
C20 as Eicosane	76.66154	ND	38	151	ND	0	159	ND	0	38	0.04	2	9	8.53E-09	0	0	0.00E+00	8.53E-09
n-Heneicosane	77.38462	ND	39	152.42	ND	0	161	ND	0	39	0.04	2	9	8.61E-09	0	0	0.00E+00	8.61E-09
C21 as Heneicosane	77.38462	ND	39	152.42	ND	0	161	ND	0	39	0.04	2	9	8.61E-09	0	0	0.00E+00	8.61E-09
n-Docosane	76.50769	ND	38	150.7	ND	0	159	ND	0	38	0.04	2	9	8.51E-09	0	0	0.00E+00	8.51E-09
C22 as Docosane	76.50769	ND	38	150.7	ND	0	159	ND	0	38	0.04	2	9	8.51E-09	0	0	0.00E+00	8.51E-09
n-Tricosane	76.92308	ND	38	151.52	ND	0	160	ND	0	38	0.04	2	9	8.56E-09	0	0	0.00E+00	8.56E-09
C23 as Tricosane	76.92308	ND	38	151.52	ND	0	160	ND	0	38	0.04	2	9	8.56E-09	0	0	0.00E+00	8.56E-09
n-Tetracosane	77.03077	ND	39	151.73	ND	0	160	ND	0	39	0.04	2	9	8.57E-09	0	0	0.00E+00	8.57E-09
C24 as Tetracosane	77.03077	ND	39	151.73	ND	0	160	ND	0	39	0.04	2	9	8.57E-09	0	0	0.00E+00	8.57E-09
Total Hydrocarbon			1917409.39			0			0		1917.41	92458	426,730	4.27E-04	0	0	0.00E+00	4.27E-04

D09B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D09B	D09B		ND Adj	#D010A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	1231.653	J	1,232	146	ND	0	150	ND	0	1,232	1.23	59	274	2.74E-07	2.74E-07
C5 as Pentane	2457.429		2,457	146	ND	0	150	ND	0	2,457	2.46	118	547	5.47E-07	5.47E-07
n-Hexane	729.2809	J	729	209	ND	0	156	ND	0	729	0.73	35	162	1.62E-07	1.62E-07
C6 as Hexane	5669.796		5,670	209	ND	0	156	ND	0	5,670	5.67	273	1262	1.26E-06	1.26E-06
n-Heptane	2130.923		2,131	173	ND	0	163	ND	0	2,131	2.13	103	474	4.74E-07	4.74E-07
C7 as Heptane	15407.64		15,408	173	ND	0	163	ND	0	15,408	15.41	743	3429	3.43E-06	3.43E-06
n-Octane	39016.24		39,016	150	ND	0	158	ND	0	39,016	39.02	1881	8683	8.68E-06	8.68E-06
C8 as Octane	969923.7		969,924	150	ND	0	158	ND	0	969,924	969.92	46770	215862	2.16E-04	2.16E-04
n-Nonane	80630.82		80,631	151	ND	0	159	ND	0	80,631	80.63	3888	17945	1.79E-05	1.79E-05
C9 as Nonane	865054.8		865,055	151	ND	0	159	ND	0	865,055	865.05	41713	192523	1.93E-04	1.93E-04
n-Decane	49055.54		49,056	152	ND	0	161	ND	0	49,056	49.06	2365	10918	1.09E-05	1.09E-05
C10 as Decane	522991.7		522,992	152	ND	0	161	ND	0	522,992	522.99	25219	116395	1.16E-04	1.16E-04
n-Undecane	25525.54		25,526	152	ND	0	161	ND	0	25,526	25.53	1231	5681	5.68E-06	5.68E-06
C11 as Undecane	152245.5		152,246	152	ND	0	161	ND	0	152,246	152.25	7341	33883	3.39E-05	3.39E-05
n-Dodecane	6816.13		6,816	151	ND	0	159	ND	0	6,816	6.82	329	1517	1.52E-06	1.52E-06
C12 as Dodecane	18100.31		18,100	151	ND	0	159	ND	0	18,100	18.10	873	4028	4.03E-06	4.03E-06
n-Tridecane	486.3753	J	486	151	ND	0	160	ND	0	486	0.49	23	108	1.08E-07	1.08E-07
C13 as Tridecane	152.5191	ND	76	151	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
n-Tetradecane	152.3664	ND	76	151	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
C14 as tetradecane	152.3664	ND	76	151	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
n-Pentadecane	153.1298	ND	77	152	ND	0	160	ND	0	77	0.08	4	17	1.70E-08	1.70E-08
C15 as Pentadecane	153.1298	ND	77	152	ND	0	160	ND	0	77	0.08	4	17	1.70E-08	1.70E-08
n-Hexadecane	152.3053	ND	76	151	ND	0	160	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
C16 as Hexadecane	152.3053	ND	76	151	ND	0	160	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
n-Heptadecane	150.5343	ND	75	149	ND	0	158	ND	0	75	0.08	4	17	1.68E-08	1.68E-08
C17 as Heptadecane	150.5343	ND	75	149	ND	0	158	ND	0	75	0.08	4	17	1.68E-08	1.68E-08
n-Octadecane	152.2137	ND	76	151	ND	0	159	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
C18 as Octodecane	152.2137	ND	76	151	ND	0	159	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
n-Nonadecane	152.5191	ND	76	151	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
C19 as Nonadecane	152.5191	ND	76	151	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
n-Eicosane	152.1527	ND	76	151	ND	0	159	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
C20 as Eicosane	152.1527	ND	76	151	ND	0	159	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
n-Heneicosane	153.5878	ND	77	152	ND	0	161	ND	0	77	0.08	4	17	1.71E-08	1.71E-08
C21 as Heneicosane	153.5878	ND	77	152	ND	0	161	ND	0	77	0.08	4	17	1.71E-08	1.71E-08
n-Docosane	151.8473	ND	76	151	ND	0	159	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
C22 as Docosane	151.8473	ND	76	151	ND	0	159	ND	0	76	0.08	4	17	1.69E-08	1.69E-08
n-Tricosane	152.6718	ND	76	152	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
C23 as Tricosane	152.6718	ND	76	152	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
n-Tetracosane	152.8855	ND	76	152	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
C24 as Tetracosane	152.8855	ND	76	152	ND	0	160	ND	0	76	0.08	4	17	1.70E-08	1.70E-08
Total Hydrocarbon			2,759,226			0			0		2759.23	133051	614,081	6.14E-04	6.14E-04

Bagging Data Form — Vacuum Method

Sample Id: D011

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	D-601		
Equipment Subtype:	Gate			**Plant ID:**	Refinery D		
Line Size:	6	*inches*		**Date:**	26-Mar-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	30.13	*inHg*	765.3 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	62.1	°F	16.7 °C	**TVA ID**	37887		
Component Temp:	80.1	°F	26.7 °C	**Stream Pressure/Temp:**		*psig*	°F
Stream Description:	*Jet*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:58	Background	0.2	*ppmv*	8-sec Dwell	2350	*ppmv*	Total Dwell	3:30	*min:sec*	Final M21	8542 *ppm*
13:37	Initial Bag Vacuum	0.01	*inches H2O*	DGM Vac.	1.7	*inches H2O*	Bag Temp	66.9	°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:41	13:42	13:43	13:45	13:47	13:49	13:51	13:53	13:55	13:57	14:05			
ppmv	2592	2646	2627	3113	3261	3247	3359	3570	3824	3948	4166			

Sorbent Tube Sample Collection Parameters

D011A

Time									
13:58	Volume Start	85.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:11	Volume Stop	98.4	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent $Flow_{STP}$	1.011	*L/min*

D011B

13:58	Volume Start	82.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:11	Volume Stop	95.8	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent $Flow_{STP}$	1.019	*L/min*
	Total ST Vol_{STP}	26.38	*Liters*	DGM Vol_{STP}	37.83	*Liters*	Total Run Vol_{STP}	64.21	*Liters*

Bagging Parameters

Time									
14:07	Vacuum check	0.02	*inches H2O*			DGM_P	1.6 *inches H2O vacuum*	762.3	*mmHg*
14:06	DGM_{1L} Time	00:21.1	*min:sec.frac*	DGM Time	0.350	DGM Flow	2.86	DGM $Flow_{STP}$ 2.91	*liters/minute*
14:07	Bag Temp.	63.9	°F	17.7	°C	$Sample_T$	62 °F	16.7	°C

Post-Sample Data

14:45	Post Test M21	Background	20	*ppmv*	8-sec Dwell	8400	*ppmv*	Total Dwell	3:00 *min:sec*	Final M21	15200 *ppm* @ Stem
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	2.36E-03	kg/hr
Percent difference THC ER =	20%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	9.55E-07
C5 as Pentane	2.01E-06
n-Hexane	4.09E-07
C6 as Hexane	3.49E-06
n-Heptane	1.44E-06
C7 as Heptane	5.50E-06
n-Octane	2.72E-05
C8 as Octane	7.69E-04
n-Nonane	8.72E-05
C9 as Nonane	7.58E-04
n-Decane	6.62E-05
C10 as Decane	4.50E-04
n-Undecane	2.21E-05
C11 as Undecane	1.43E-04
n-Dodecane	4.01E-06
C12 as Dodecane	1.31E-05
n-Tridecane	3.03E-07
C13 as Tridecane	6.03E-07
n-Tetradecane	1.71E-08
C14 as tetradecane	1.71E-08
n-Pentadecane	1.72E-08
C15 as Pentadecane	1.72E-08
n-Hexadecane	1.71E-08
C16 as Hexadecane	1.71E-08
n-Heptadecane	1.69E-08
C17 as Heptadecane	1.69E-08
n-Octadecane	1.71E-08
C18 as Octodecane	1.71E-08
n-Nonadecane	1.71E-08
C19 as Nonadecane	1.71E-08
n-Eicosane	1.71E-08
C20 as Eicosane	1.71E-08
n-Heneicosane	1.72E-08
C21 as Heneicosane	1.72E-08
n-Docosane	1.70E-08
C22 as Docosane	1.70E-08
n-Tricosane	1.71E-08
C23 as Tricosane	1.71E-08
n-Tetracosane	1.72E-08
C24 as Tetracosane	1.72E-08
Total Hydrocarbon	2.36E-03

THC:	**1.25E-01**	**lbs/day**	**2.27E-02**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D011A	D011A		ND Adj	#D012A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	3572.423		3,572	146.66	ND	0	150	ND	0	3,572	3.57	229	1059	1.06E-06	0	0	0.00E+00	1.06E-06
C5 as Pentane	7536.473		7,536	146.66	ND	0	150	ND	0	7,536	7.54	484	2234	2.23E-06	0	0	0.00E+00	2.23E-06
n-Hexane	1428.247		1,428	210.16	ND	0	156	ND	0	1,428	1.43	92	423	4.23E-07	0	0	0.00E+00	4.23E-07
C6 as Hexane	12637.03		12,637	210.16	ND	0	156	ND	0	12,637	12.64	811	3745	3.75E-06	0	0	0.00E+00	3.75E-06
n-Heptane	5086.518		5,087	174.6	ND	0	163	ND	0	5,087	5.09	327	1507	1.51E-06	0	0	0.00E+00	1.51E-06
C7 as Heptane	17312.12		17,312	174.6	ND	0	163	ND	0	17,312	17.31	1112	5131	5.13E-06	0	0	0.00E+00	5.13E-06
n-Octane	106144		106,144	151.08	ND	0	158	ND	0	106,144	106.14	6816	31458	3.15E-05	0	0	0.00E+00	3.15E-05
C8 as Octane	2866146		2,866,146	151.08	ND	0	158	ND	0	2,866,146	2866.15	184045	849439	8.49E-04	0	0	0.00E+00	8.49E-04
n-Nonane	348224.3		348,224	152.21	ND	0	159	ND	0	348,224	348.22	22361	103203	1.03E-04	0	0	0.00E+00	1.03E-04
C9 as Nonane	2772697		2,772,697	152.21	ND	0	159	ND	0	2,772,697	2772.70	178044	821743	8.22E-04	0	0	0.00E+00	8.22E-04
n-Decane	290398.2		290,398	153.59	ND	0	161	ND	0	290,398	290.40	18647	86065	8.61E-05	0	0	0.00E+00	8.61E-05
C10 as Decane	1593112		1,593,112	153.59	ND	0	161	ND	0	1,593,112	1593.11	102299	472150	4.72E-04	0	0	0.00E+00	4.72E-04
n-Undecane	75188.96		75,189	153.19	ND	0	161	ND	0	75,189	75.19	4828	22284	2.23E-05	0	0	0.00E+00	2.23E-05
C11 as Undecane	559834.4		559,834	153.19	ND	0	161	ND	0	559,834	559.83	35949	165918	1.66E-04	0	0	0.00E+00	1.66E-04
n-Dodecane	12542		12,542	152.15	ND	0	159	ND	0	12,542	12.54	805	3717	3.72E-06	0	0	0.00E+00	3.72E-06
C12 as Dodecane	53664.91		53,665	152.15	ND	0	159	ND	0	53,665	53.66	3446	15905	1.59E-05	0	0	0.00E+00	1.59E-05
n-Tridecane	1347.552		1,348	152.52	ND	0	160	ND	0	1,348	1.35	87	399	3.99E-07	0	0	0.00E+00	3.99E-07
C13 as Tridecane	3853.055		3,853	152.52	ND	0	160	ND	0	3,853	3.85	247	1142	1.14E-06	0	0	0.00E+00	1.14E-06
n-Tetradecane	77.36434	ND	39	152.37	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
C14 as tetradecane	77.36434	ND	39	152.37	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
n-Pentadecane	77.75194	ND	39	153.13	ND	0	160	ND	0	39	0.04	2	12	1.15E-08	0	0	0.00E+00	1.15E-08
C15 as Pentadecane	77.75194	ND	39	153.13	ND	0	160	ND	0	39	0.04	2	12	1.15E-08	0	0	0.00E+00	1.15E-08
n-Hexadecane	77.33334	ND	39	152.31	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
C16 as Hexadecane	77.33334	ND	39	152.31	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
n-Heptadecane	76.43411	ND	38	150.53	ND	0	158	ND	0	38	0.04	2	11	1.13E-08	0	0	0.00E+00	1.13E-08
C17 as Heptadecane	76.43411	ND	38	150.53	ND	0	158	ND	0	38	0.04	2	11	1.13E-08	0	0	0.00E+00	1.13E-08
n-Octadecane	77.28682	ND	39	152.21	ND	0	159	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
C18 as Octodecane	77.28682	ND	39	152.21	ND	0	159	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
n-Nonadecane	77.44186	ND	39	152.52	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
C19 as Nonadecane	77.44186	ND	39	152.52	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
n-Eicosane	77.25582	ND	39	152.15	ND	0	159	ND	0	39	0.04	2	11	1.14E-08	0	0	0.00E+00	1.14E-08
C20 as Eicosane	77.25582	ND	39	152.15	ND	0	159	ND	0	39	0.04	2	11	1.14E-08	0	0	0.00E+00	1.14E-08
n-Heneicosane	77.9845	ND	39	153.59	ND	0	161	ND	0	39	0.04	3	12	1.16E-08	0	0	0.00E+00	1.16E-08
C21 as Heneicosane	77.9845	ND	39	153.59	ND	0	161	ND	0	39	0.04	3	12	1.16E-08	0	0	0.00E+00	1.16E-08
n-Docosane	77.10078	ND	39	151.85	ND	0	159	ND	0	39	0.04	2	11	1.14E-08	0	0	0.00E+00	1.14E-08
C22 as Docosane	77.10078	ND	39	151.85	ND	0	159	ND	0	39	0.04	2	11	1.14E-08	0	0	0.00E+00	1.14E-08
n-Tricosane	77.51938	ND	39	152.67	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
C23 as Tricosane	77.51938	ND	39	152.67	ND	0	160	ND	0	39	0.04	2	11	1.15E-08	0	0	0.00E+00	1.15E-08
n-Tetracosane	77.62791	ND	39	152.89	ND	0	160	ND	0	39	0.04	2	12	1.15E-08	0	0	0.00E+00	1.15E-08
C24 as Tetracosane	77.62791	ND	39	152.89	ND	0	160	ND	0	39	0.04	2	12	1.15E-08	0	0	0.00E+00	1.15E-08
Total Hydrocarbon			8,731,576			0			0		8731.58	560684	#######	2.59E-03	0	0	0.00E+00	2.59E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D011B	D011B		ND Adj	#D012A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	2873.482		2,873	147	ND	0	150	ND	0	2,873	2.87	185	852	8.52E-07	8.52E-07
C5 as Pentane	6045.459		6,045	147	ND	0	150	ND	0	6,045	6.05	388	1792	1.79E-06	1.79E-06
n-Hexane	1332.081	J	1,332	210	ND	0	156	ND	0	1,332	1.33	86	395	3.95E-07	3.95E-07
C6 as Hexane	10941.37		10,941	210	ND	0	156	ND	0	10,941	10.94	703	3243	3.24E-06	3.24E-06
n-Heptane	4617.358		4,617	175	ND	0	163	ND	0	4,617	4.62	296	1368	1.37E-06	1.37E-06
C7 as Heptane	19808.46		19,808	175	ND	0	163	ND	0	19,808	19.81	1272	5871	5.87E-06	5.87E-06
n-Octane	77153.1		77,153	151	ND	0	158	ND	0	77,153	77.15	4954	22866	2.29E-05	2.29E-05
C8 as Octane	2323767		2,323,767	151	ND	0	158	ND	0	2,323,767	2323.77	149217	688694	6.89E-04	6.89E-04
n-Nonane	240019.2		240,019	152	ND	0	159	ND	0	240,019	240.02	15412	71134	7.11E-05	7.11E-05
C9 as Nonane	2341618		2,341,618	152	ND	0	159	ND	0	2,341,618	2341.62	150363	693984	6.94E-04	6.94E-04
n-Decane	156414.9		156,415	154	ND	0	161	ND	0	156,415	156.41	10044	46357	4.64E-05	4.64E-05
C10 as Decane	1443193		1,443,193	154	ND	0	161	ND	0	1,443,193	1443.19	92672	427719	4.28E-04	4.28E-04
n-Undecane	73851.08		73,851	153	ND	0	161	ND	0	73,851	73.85	4742	21887	2.19E-05	2.19E-05
C11 as Undecane	408028.3		408,028	153	ND	0	161	ND	0	408,028	408.03	26201	120927	1.21E-04	1.21E-04
n-Dodecane	14496.21		14,496	152	ND	0	159	ND	0	14,496	14.50	931	4296	4.30E-06	4.30E-06
C12 as Dodecane	34962.18		34,962	152	ND	0	159	ND	0	34,962	34.96	2245	10362	1.04E-05	1.04E-05
n-Tridecane	697.6295	J	698	153	ND	0	160	ND	0	698	0.70	45	207	2.07E-07	2.07E-07
C13 as Tridecane	215.9571	J	216	153	ND	0	160	ND	0	216	0.22	14	64	6.40E-08	6.40E-08
n-Tetradecane	153.5385	ND	77	152	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
C14 as tetradecane	153.5385	ND	77	152	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
n-Pentadecane	154.3077	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.29E-08	2.29E-08
C15 as Pentadecane	154.3077	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.29E-08	2.29E-08
n-Hexadecane	153.4769	ND	77	152	ND	0	160	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
C16 as Hexadecane	153.4769	ND	77	152	ND	0	160	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
n-Heptadecane	151.6923	ND	76	151	ND	0	158	ND	0	76	0.08	5	22	2.25E-08	2.25E-08
C17 as Heptadecane	151.6923	ND	76	151	ND	0	158	ND	0	76	0.08	5	22	2.25E-08	2.25E-08
n-Octadecane	153.3846	ND	77	152	ND	0	159	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
C18 as Octodecane	153.3846	ND	77	152	ND	0	159	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
n-Nonadecane	153.6923	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
C19 as Nonadecane	153.6923	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
n-Eicosane	153.3231	ND	77	152	ND	0	159	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
C20 as Eicosane	153.3231	ND	77	152	ND	0	159	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
n-Heneicosane	154.7692	ND	77	154	ND	0	161	ND	0	77	0.08	5	23	2.29E-08	2.29E-08
C21 as Heneicosane	154.7692	ND	77	154	ND	0	161	ND	0	77	0.08	5	23	2.29E-08	2.29E-08
n-Docosane	153.0154	ND	77	152	ND	0	159	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
C22 as Docosane	153.0154	ND	77	152	ND	0	159	ND	0	77	0.08	5	23	2.27E-08	2.27E-08
n-Tricosane	153.8462	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
C23 as Tricosane	153.8462	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
n-Tetracosane	154.0615	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
C24 as Tetracosane	154.0615	ND	77	153	ND	0	160	ND	0	77	0.08	5	23	2.28E-08	2.28E-08
Total Hydrocarbon			7,161,724			0			0		7161.72	459879	#######	2.12E-03	2.12E-03

Bagging Data Form — Vacuum Method

Sample Id D015

Equipment type:	Valve		**Component ID:**	D-796	
Equipment Subtype:	Plug		**Plant ID:**	Refinery D	
Line Size:	3	*inches*	**Date:**	27-Mar-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.17 *inHg*	766.3 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	63.17 *°F*	17.3 *°C*	**TVA ID**	37887	
Component Temp:	58 *°F*	14.4 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*HPHT Tops to Flare*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
9:00	Background	0 *ppmv*	8-sec Dwell	822 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	1395 *ppm*
9:38	Initial Bag Vacuum	0.025 *inches H2O*	DGM Vac.	2.2 *inches H2O*	Bag Temp	64.6 *°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:39	9:43	9:44	9:45	9:49	9:52	9:54	9:56	10:03	10:07				
ppmv	278	382	388	405	417	434	394	387	375	384				

Sorbent Tube Sample Collection Parameters

D015A

Time						
9:56	Volume Start	114.4 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:09	Volume Stop	126.8 *Liters*	Total Vol	12.4 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.954 *L/min*	Sorbent Flow$_{STP}$	0.987 *L/min*

D015B

9:56	Volume Start	98.1 *Liters*		Design Sample Flow Rate = 1 liter/min		
10:09	Volume Stop	110.5 *Liters*	Total Vol	12.4 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.954 *L/min*	Sorbent Flow$_{STP}$	0.987 *L/min*
	Total ST Vol$_{STP}$	25.66 *Liters*	DGM Vol$_{STP}$	92.78 *Liters*	Total Run Vol$_{STP}$	118.44 *Liters*

Bagging Parameters

Time								
10:01	Vacuum check	0.03 *inches H2O*			DGM$_P$	2 *inches H2O vacuum*		762.6 *mmHg*
10:02	DGM$_{10L}$ Time	01:27.2 *min:sec.frac*	DGM Time	1.450	DGM Flow	6.90	DGM Flow$_{STP}$	7.14 *liters/minute*
10:02	Bag Temp.	66.2 *°F*		19.0 *°C*	Sample$_T$	54 *°F*		12.2 *°C*

Post-Sample Data

10:15	Post Test M21	Background 13 *ppmv*	8-sec Dwell	1277 *ppmv*	Total Dwell	2:50 *min:sec*	Final M21	1509 *ppm* @ Packing

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	4.63E-04	kg/hr
Percent difference THC ER =	46%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.15E-08
C5 as Pentane	4.55E-08
n-Hexane	4.11E-08
C6 as Hexane	4.11E-08
n-Heptane	1.16E-07
C7 as Heptane	3.97E-07
n-Octane	1.45E-06
C8 as Octane	5.72E-05
n-Nonane	5.71E-06
C9 as Nonane	1.19E-04
n-Decane	1.30E-05
C10 as Decane	1.41E-04
n-Undecane	6.51E-06
C11 as Undecane	8.45E-05
n-Dodecane	3.56E-06
C12 as Dodecane	2.35E-05
n-Tridecane	1.53E-06
C13 as Tridecane	4.64E-06
n-Tetradecane	2.26E-07
C14 as tetradecane	2.89E-07
n-Pentadecane	3.32E-08
C15 as Pentadecane	3.32E-08
n-Hexadecane	3.30E-08
C16 as Hexadecane	3.30E-08
n-Heptadecane	3.26E-08
C17 as Heptadecane	3.26E-08
n-Octadecane	3.30E-08
C18 as Octodecane	3.30E-08
n-Nonadecane	3.30E-08
C19 as Nonadecane	4.63E-08
n-Eicosane	3.30E-08
C20 as Eicosane	3.30E-08
n-Heneicosane	3.33E-08
C21 as Heneicosane	3.33E-08
n-Docosane	3.29E-08
C22 as Docosane	3.29E-08
n-Tricosane	3.31E-08
C23 as Tricosane	3.31E-08
n-Tetracosane	3.31E-08
C24 as Tetracosane	3.31E-08
Total Hydrocarbon	4.63E-04

THC:	**2.45E-02**	**lbs/day**	**4.47E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D015A	D015A		ND Adj	#D016A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.5	ND	38	154.94	ND	0	150	ND	0	38	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C5 as Pentane	88.90382	J	89	154.94	ND	0	150	ND	0	89	0.09	11	49	4.86E-08	0	0	0.00E+00	4.86E-08
n-Hexane	78.43549	ND	39	222.03	ND	0	156	ND	0	39	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
C6 as Hexane	78.43549	ND	39	222.03	ND	0	156	ND	0	39	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
n-Heptane	238.8271	J	239	184.45	ND	0	163	ND	0	239	0.24	28	131	1.31E-07	0	0	0.00E+00	1.31E-07
C7 as Heptane	1360.966		1,361	184.45	ND	0	163	ND	0	1,361	1.36	161	744	7.44E-07	0	0	0.00E+00	7.44E-07
n-Octane	3213.786		3,214	159.61	ND	0	158	ND	0	3,214	3.21	381	1757	1.76E-06	0	0	0.00E+00	1.76E-06
C8 as Octane	127488.6		127,489	159.61	ND	0	158	ND	0	127,489	127.49	15100	69690	6.97E-05	0	0	0.00E+00	6.97E-05
n-Nonane	12822.5		12,822	160.81	ND	0	159	ND	0	12,822	12.82	1519	7009	7.01E-06	0	0	0.00E+00	7.01E-06
C9 as Nonane	266021.5		266,022	160.81	ND	0	159	ND	0	266,022	266.02	31507	145418	1.45E-04	0	0	0.00E+00	1.45E-04
n-Decane	29100.81		29,101	162.26	ND	0	161	ND	0	29,101	29.10	3447	15908	1.59E-05	0	0	0.00E+00	1.59E-05
C10 as Decane	314990.7		314,991	162.26	ND	0	161	ND	0	314,991	314.99	37307	172187	1.72E-04	0	0	0.00E+00	1.72E-04
n-Undecane	14717.09		14,717	161.84	ND	0	161	ND	0	14,717	14.72	1743	8045	8.04E-06	0	0	0.00E+00	8.04E-06
C11 as Undecane	190470.2		190,470	161.84	ND	0	161	ND	0	190,470	190.47	22559	104119	1.04E-04	0	0	0.00E+00	1.04E-04
n-Dodecane	8105.319		8,105	160.74	ND	0	159	ND	0	8,105	8.11	960	4431	4.43E-06	0	0	0.00E+00	4.43E-06
C12 as Dodecane	54326.62		54,327	160.74	ND	0	159	ND	0	54,327	54.33	6434	29697	2.97E-05	0	0	0.00E+00	2.97E-05
n-Tridecane	3916.623		3,917	161.13	ND	0	160	ND	0	3,917	3.92	464	2141	2.14E-06	0	0	0.00E+00	2.14E-06
C13 as Tridecane	11512.14		11,512	161.13	ND	0	160	ND	0	11,512	11.51	1363	6293	6.29E-06	0	0	0.00E+00	6.29E-06
n-Tetradecane	617.0482	J	617	160.97	ND	0	160	ND	0	617	0.62	73	337	3.37E-07	0	0	0.00E+00	3.37E-07
C14 as tetradecane	889.32		889	160.97	ND	0	160	ND	0	889	0.89	105	486	4.86E-07	0	0	0.00E+00	4.86E-07
n-Pentadecane	80.8871	ND	40	161.77	ND	0	160	ND	0	40	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
C15 as Pentadecane	80.8871	ND	40	161.77	ND	0	160	ND	0	40	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
n-Hexadecane	80.45162	ND	40	160.9	ND	0	160	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C16 as Hexadecane	80.45162	ND	40	160.9	ND	0	160	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Heptadecane	79.51613	ND	40	159.03	ND	0	158	ND	0	40	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
C17 as Heptadecane	79.51613	ND	40	159.03	ND	0	158	ND	0	40	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
n-Octadecane	80.40323	ND	40	160.81	ND	0	159	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C18 as Octodecane	80.40323	ND	40	160.81	ND	0	159	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Nonadecane	80.56452	ND	40	161.13	ND	0	160	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C19 as Nonadecane	88.84199	J	89	161.13	ND	0	160	ND	0	89	0.09	11	49	4.86E-08	0	0	0.00E+00	4.86E-08
n-Eicosane	80.37097	ND	40	160.74	ND	0	159	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C20 as Eicosane	80.37097	ND	40	160.74	ND	0	159	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Heneicosane	81.12903	ND	41	162.26	ND	0	161	ND	0	41	0.04	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
C21 as Heneicosane	81.12903	ND	41	162.26	ND	0	161	ND	0	41	0.04	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Docosane	80.20968	ND	40	160.42	ND	0	159	ND	0	40	0.04	5	22	2.19E-08	0	0	0.00E+00	2.19E-08
C22 as Docosane	80.20968	ND	40	160.42	ND	0	159	ND	0	40	0.04	5	22	2.19E-08	0	0	0.00E+00	2.19E-08
n-Tricosane	80.64516	ND	40	161.29	ND	0	160	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C23 as Tricosane	80.64516	ND	40	161.29	ND	0	160	ND	0	40	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Tetracosane	80.75807	ND	40	161.52	ND	0	160	ND	0	40	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
C24 as Tetracosane	80.75807	ND	40	161.52	ND	0	160	ND	0	40	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
Total Hydrocarbon			1,040,851			0			0		1040.85	123277	568,971	5.69E-04	0	0	0.00E+00	5.69E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D015B	D015B		ND Adj	#D016A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	154.9419	ND	77	155	ND	0	150	ND	0	77	0.08	9	42	4.23E-08	4.23E-08
C5 as Pentane	154.9419	ND	77	155	ND	0	150	ND	0	77	0.08	9	42	4.23E-08	4.23E-08
n-Hexane	222.0258	ND	111	222	ND	0	156	ND	0	111	0.11	13	61	6.07E-08	6.07E-08
C6 as Hexane	222.0258	ND	111	222	ND	0	156	ND	0	111	0.11	13	61	6.07E-08	6.07E-08
n-Heptane	184.9573	J	185	184	ND	0	163	ND	0	185	0.18	22	101	1.01E-07	1.01E-07
C7 as Heptane	184.4516	ND	92	184	ND	0	163	ND	0	92	0.09	11	50	5.04E-08	5.04E-08
n-Octane	2078.615		2,079	160	ND	0	158	ND	0	2,079	2.08	246	1136	1.14E-06	1.14E-06
C8 as Octane	81803.24		81,803	160	ND	0	158	ND	0	81,803	81.80	9689	44717	4.47E-05	4.47E-05
n-Nonane	8068.714		8,069	161	ND	0	159	ND	0	8,069	8.07	956	4411	4.41E-06	4.41E-06
C9 as Nonane	169306		169,306	161	ND	0	159	ND	0	169,306	169.31	20052	92549	9.25E-05	9.25E-05
n-Decane	18424.01		18,424	162	ND	0	161	ND	0	18,424	18.42	2182	10071	1.01E-05	1.01E-05
C10 as Decane	199137.8		199,138	162	ND	0	161	ND	0	199,138	199.14	23586	108857	1.09E-04	1.09E-04
n-Undecane	9091.166		9,091	162	ND	0	161	ND	0	9,091	9.09	1077	4970	4.97E-06	4.97E-06
C11 as Undecane	118749.1		118,749	162	ND	0	161	ND	0	118,749	118.75	14064	64913	6.49E-05	6.49E-05
n-Dodecane	4921.583		4,922	161	ND	0	159	ND	0	4,922	4.92	583	2690	2.69E-06	2.69E-06
C12 as Dodecane	31704.17		31,704	161	ND	0	159	ND	0	31,704	31.70	3755	17331	1.73E-05	1.73E-05
n-Tridecane	1680.968		1,681	161	ND	0	160	ND	0	1,681	1.68	199	919	9.19E-07	9.19E-07
C13 as Tridecane	5481.2		5,481	161	ND	0	160	ND	0	5,481	5.48	649	2996	3.00E-06	3.00E-06
n-Tetradecane	210.445	J	210	161	ND	0	160	ND	0	210	0.21	25	115	1.15E-07	1.15E-07
C14 as tetradecane	167.9884	J	168	161	ND	0	160	ND	0	168	0.17	20	92	9.18E-08	9.18E-08
n-Pentadecane	161.7742	ND	81	162	ND	0	160	ND	0	81	0.08	10	44	4.42E-08	4.42E-08
C15 as Pentadecane	161.7742	ND	81	162	ND	0	160	ND	0	81	0.08	10	44	4.42E-08	4.42E-08
n-Hexadecane	160.9032	ND	80	161	ND	0	160	ND	0	80	0.08	10	44	4.40E-08	4.40E-08
C16 as Hexadecane	160.9032	ND	80	161	ND	0	160	ND	0	80	0.08	10	44	4.40E-08	4.40E-08
n-Heptadecane	159.0323	ND	80	159	ND	0	158	ND	0	80	0.08	9	43	4.35E-08	4.35E-08
C17 as Heptadecane	159.0323	ND	80	159	ND	0	158	ND	0	80	0.08	9	43	4.35E-08	4.35E-08
n-Octadecane	160.8065	ND	80	161	ND	0	159	ND	0	80	0.08	10	44	4.40E-08	4.40E-08
C18 as Octodecane	160.8065	ND	80	161	ND	0	159	ND	0	80	0.08	10	44	4.40E-08	4.40E-08
n-Nonadecane	161.129	ND	81	161	ND	0	160	ND	0	81	0.08	10	44	4.40E-08	4.40E-08
C19 as Nonadecane	161.129	ND	81	161	ND	0	160	ND	0	81	0.08	10	44	4.40E-08	4.40E-08
n-Eicosane	160.7419	ND	80	161	ND	0	159	ND	0	80	0.08	10	44	4.39E-08	4.39E-08
C20 as Eicosane	160.7419	ND	80	161	ND	0	159	ND	0	80	0.08	10	44	4.39E-08	4.39E-08
n-Heneicosane	162.2581	ND	81	162	ND	0	161	ND	0	81	0.08	10	44	4.43E-08	4.43E-08
C21 as Heneicosane	162.2581	ND	81	162	ND	0	161	ND	0	81	0.08	10	44	4.43E-08	4.43E-08
n-Docosane	160.4194	ND	80	160	ND	0	159	ND	0	80	0.08	9	44	4.38E-08	4.38E-08
C22 as Docosane	160.4194	ND	80	160	ND	0	159	ND	0	80	0.08	9	44	4.38E-08	4.38E-08
n-Tricosane	161.2903	ND	81	161	ND	0	160	ND	0	81	0.08	10	44	4.41E-08	4.41E-08
C23 as Tricosane	161.2903	ND	81	161	ND	0	160	ND	0	81	0.08	10	44	4.41E-08	4.41E-08
n-Tetracosane	161.5161	ND	81	162	ND	0	160	ND	0	81	0.08	10	44	4.41E-08	4.41E-08
C24 as Tetracosane	161.5161	ND	81	162	ND	0	160	ND	0	81	0.08	10	44	4.41E-08	4.41E-08
Total Hydrocarbon			653,089			0			0		653.09	77351	357,005	3.57E-04	3.57E-04

Bagging Data Form — Vacuum Method

Sample Id: D017

WSPA — Western States Petroleum Association

Equipment type:	Valve	**Component ID:**	D-713
Equipment Subtype:	Gate	**Plant ID:**	Refinery D
Line Size:	6 *inches*	**Date:**	27-Mar-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	30.14 *inHg* 765.6 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	85.7 *°F* 29.8 *°C*	**TVA ID**	37887
Component Temp:	311 *°F* 155.0 *°C*	**Stream Pressure/Temp:**	*psig* *°F*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds
STP = 294.15 K & 760 mmHg

Stream Description: *V-752 Inventory Product to Unit/Stab Btms Product*

Pre-Sample Data

Time											
10:45	Background	12	*ppmv*	8-sec Dwell	8490	*ppmv*	Total Dwell	2:30	*min:sec*	Final M21	8922 *ppm*
12:18	Initial Bag Vacuum	0.02	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	119.3	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	12:19	12:21	12:28	12:30	12:32	12:34	12:36	12:37	12:38	12:40	12:42	12:44	12:50	12:53
ppmv	2975	4190	5043	5160	5182	5140	5300	5460	5760	5731	5823	5665	6299	6264
Time	12:55													
ppmv	6022													

Sorbent Tube Sample Collection Parameters

D017A

Time									
12:44	Volume Start	126.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:57	Volume Stop	139.4	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.908	*L/min*

D017B

12:44	Volume Start	110.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:57	Volume Stop	123.2	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.915	*L/min*
	Total ST Vol$_{STP}$	23.70	*Liters*	DGM Vol$_{STP}$	74.39	*Liters*	Total Run Vol$_{STP}$	98.09	*Liters*

Bagging Parameters

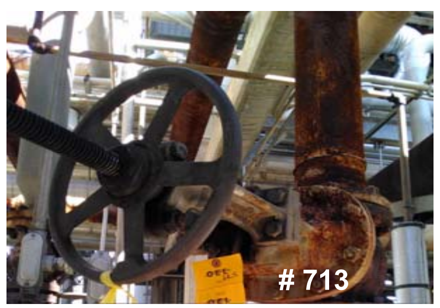
Time										
12:50	Vacuum check	0.02	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	762.2	*mmHg*
12:48	DGM$_{10L}$ Time	01:39.3	*min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM Flow$_{STP}$	5.72	*liters/minute*
12:49	Bag Temp.	138.2	*°F*	59.0	*°C*	Sample$_T$	103	*°F*	39.4	*°C*

Post-Sample Data

13:24	Post Test M21	Background	19	*ppmv*	8-sec Dwell	9742 *ppmv*	Total Dwell	2:20 *min:sec*	Final M21	11400 *ppm* @ Packing

Condensate accumulation: starting time	12:50 *hour:min*	Final time	12:57 *hour:min*	0:07	*hours:min*
Organic condensate collected	<1 *ml*				
Density of organic condensate	N/A *g/ml*				

Average THC emissions =	4.97E-03 kg/hr
Percent difference THC ER =	30%
Acceptable?	No



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	5.46E-08
C5 as Pentane	5.46E-08
n-Hexane	7.48E-08
C6 as Hexane	7.48E-08
n-Heptane	6.41E-08
C7 as Heptane	5.28E-07
n-Octane	1.60E-05
C8 as Octane	6.54E-04
n-Nonane	9.31E-05
C9 as Nonane	1.16E-03
n-Decane	1.70E-04
C10 as Decane	1.64E-03
n-Undecane	9.89E-05
C11 as Undecane	8.89E-04
n-Dodecane	5.34E-05
C12 as Dodecane	1.50E-04
n-Tridecane	1.17E-05
C13 as Tridecane	1.71E-05
n-Tetradecane	1.75E-06
C14 as tetradecane	2.70E-06
n-Pentadecane	5.87E-07
C15 as Pentadecane	1.68E-06
n-Hexadecane	3.25E-07
C16 as Hexadecane	6.69E-07
n-Heptadecane	1.92E-07
C17 as Heptadecane	2.50E-07
n-Octadecane	1.09E-07
C18 as Octodecane	1.35E-07
n-Nonadecane	8.64E-08
C19 as Nonadecane	1.11E-07
n-Eicosane	8.30E-08
C20 as Eicosane	1.91E-07
n-Heneicosane	7.67E-08
C21 as Heneicosane	2.49E-07
n-Docosane	7.67E-08
C22 as Docosane	2.46E-07
n-Tricosane	6.16E-08
C23 as Tricosane	1.96E-07
n-Tetracosane	5.66E-08
C24 as Tetracosane	1.31E-07
C25 (n-Pentacosane)	1.43E-08
Other C25 as n-Pentacosane	6.50E-08
C26 (n-Hexacosane)	8.56E-09
Other C26 as n-Hexacosane	1.66E-08
C27 (n-Heptacosane)	4.42E-09
Other C27 as n-Heptacosane	1.28E-08
C28 (n-Octacosane)	2.44E-09
Other C28 as n-Octacosane	2.97E-08
C29 (n-Nonacosane)	2.11E-09
Other C29 as n-Nonacosane	2.97E-08
C30 (n-Triacontane)	2.20E-09
Other C30 as n-Triacontane	1.12E-08
Total Hydrocarbon	4.97E-03

THC:	**2.63E-01**	**lbs/day**	**4.80E-02**	**tons/yr**

D017A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS				COMBINED
D017A	D017A		ND Adj	#D018A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture		#D017		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	74.896	ND	37	151.28	ND	0	150	ND	0	37	0.04	4	17	1.70E-08	1	ND	0.5	2.88E-08	4.58E-08
C5 as Pentane	74.896	ND	37	151.28	ND	0	150	ND	0	37	0.04	4	17	1.70E-08	1	ND	0.5	2.88E-08	4.58E-08
n-Hexane	77.808	ND	39	216.78	ND	0	156	ND	0	39	0.04	4	18	1.76E-08	1	ND	0.7	4.13E-08	5.89E-08
C6 as Hexane	77.808	ND	39	216.78	ND	0	156	ND	0	39	0.04	4	18	1.76E-08	1	ND	0.7	4.13E-08	5.89E-08
n-Heptane	81.312	ND	41	180.09	ND	0	163	ND	0	41	0.04	4	18	1.84E-08	1	ND	0.6	3.43E-08	5.27E-08
C7 as Heptane	2089.804		2,090	180.09	ND	0	163	ND	0	2,090	2.09	205	946	9.46E-07	1	ND	0.6	3.43E-08	9.80E-07
n-Octane	37496.67		37,497	155.84	ND	0	158	ND	0	37,497	37.50	3678	16975	1.70E-05	11		0.3	1.71E-08	1.70E-05
C8 as Octane	1620303		1,620,303	155.84	ND	0	158	ND	0	1,620,303	1620.30	158931	733528	7.34E-04	1,430		36.7	2.20E-06	7.36E-04
n-Nonane	230171.4		230,171	157.01	ND	0	159	ND	0	230,171	230.17	22577	104201	1.04E-04	400		10.3	6.16E-07	1.05E-04
C9 as Nonane	2775763		2,775,763	157.01	ND	0	159	ND	0	2,775,763	2775.76	272267	1256616	1.26E-03	21	ND	10.5	6.28E-07	1.26E-03
n-Decane	416363.1		416,363	158.43	ND	0	161	ND	0	416,363	416.36	40840	188492	1.88E-04	2,610		66.9	4.01E-06	1.93E-04
C10 as Decane	4264847		4,264,847	158.43	ND	0	161	ND	0	4,264,847	4264.85	418327	1930739	1.93E-03	21	ND	10.6	6.34E-07	1.93E-03
n-Undecane	229825.3		229,825	158.02	ND	0	161	ND	0	229,825	229.83	22543	104044	1.04E-04	5,292		135.7	8.14E-06	1.12E-04
C11 as Undecane	2344500		2,344,500	158.02	ND	0	161	ND	0	2,344,500	2344.50	229965	1061379	1.06E-03	21	ND	10.5	6.32E-07	1.06E-03
n-Dodecane	137242.1		137,242	156.94	ND	0	159	ND	0	137,242	137.24	13462	62131	6.21E-05	6,196		158.9	9.53E-06	7.17E-05
C12 as Dodecane	420750.5		420,750	156.94	ND	0	159	ND	0	420,750	420.75	41270	190478	1.90E-04	21	ND	10.5	6.28E-07	1.91E-04
n-Tridecane	15743.91		15,744	157.32	ND	0	160	ND	0	15,744	15.74	1544	7127	7.13E-06	3,856		98.9	5.93E-06	1.31E-05
C13 as Tridecane	45513.08		45,513	157.32	ND	0	160	ND	0	45,513	45.51	4464	20604	2.06E-05	21	ND	10.5	6.29E-07	2.12E-05
n-Tetradecane	2220.079		2,220	157.17	ND	0	160	ND	0	2,220	2.22	218	1005	1.01E-06	648		16.6	9.97E-07	2.00E-06
C14 as tetradecane	7073.811		7,074	157.17	ND	0	160	ND	0	7,074	7.07	694	3202	3.20E-06	21	ND	10.5	6.29E-07	3.83E-06
n-Pentadecane	811.5738		812	157.95	ND	0	160	ND	0	812	0.81	80	367	3.67E-07	215		5.5	3.31E-07	6.99E-07
C15 as Pentadecane	1659.75		1,660	157.95	ND	0	160	ND	0	1,660	1.66	163	751	7.51E-07	793		20.3	1.22E-06	1.97E-06
n-Hexadecane	489.3267	J	489	157.1	ND	0	160	ND	0	489	0.49	48	222	2.22E-07	109		2.8	1.67E-07	3.89E-07
C16 as Hexadecane	449.1778	J	449	157.1	ND	0	160	ND	0	449	0.45	44	203	2.03E-07	357		9.2	5.49E-07	7.53E-07
n-Heptadecane	266.4351	J	266	155.28	ND	0	158	ND	0	266	0.27	26	121	1.21E-07	62		1.6	9.60E-08	2.17E-07
C17 as Heptadecane	78.88	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	18	1.79E-08	145		3.7	2.23E-07	2.41E-07
n-Octadecane	178.2057	J	178	157.01	ND	0	159	ND	0	178	0.18	17	81	8.07E-08	33		0.8	5.09E-08	1.32E-07
C18 as Octodecane	79.76	ND	40	157.01	ND	0	159	ND	0	40	0.04	4	18	1.81E-08	70		1.8	1.08E-07	1.26E-07
n-Nonadecane	123.1132	J	123	157.32	ND	0	160	ND	0	123	0.12	12	56	5.57E-08	26		0.7	4.05E-08	9.63E-08
C19 as Nonadecane	79.92	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	18	1.81E-08	55		1.4	8.44E-08	1.03E-07
n-Eicosane	80.93814	J	81	156.94	ND	0	159	ND	0	81	0.08	8	37	3.66E-08	30		0.8	4.68E-08	8.34E-08
C20 as Eicosane	79.728	ND	40	156.94	ND	0	159	ND	0	40	0.04	4	18	1.80E-08	106		2.7	1.64E-07	1.82E-07
n-Heneicosane	80.48	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	18	1.82E-08	32		0.8	4.96E-08	6.78E-08
C21 as Heneicosane	80.48	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	18	1.82E-08	144		3.7	2.22E-07	2.40E-07
n-Docosane	79.568	ND	40	156.63	ND	0	159	ND	0	40	0.04	4	18	1.80E-08	32		0.8	4.99E-08	6.79E-08
C22 as Docosane	79.568	ND	40	156.63	ND	0	159	ND	0	40	0.04	4	18	1.80E-08	143		3.7	2.20E-07	2.38E-07
n-Tricosane	80	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	18	1.81E-08	22		0.6	3.46E-08	5.27E-08
C23 as Tricosane	80	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	18	1.81E-08	110		2.8	1.69E-07	1.87E-07
n-Tetracosane	80.112	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	18	1.81E-08	19		0.5	2.95E-08	4.77E-08
C24 as Tetracosane	80.112	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	18	1.81E-08	67		1.7	1.04E-07	1.22E-07
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	9	J	0.2	1.43E-08	1.43E-08
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	42		1.1	6.50E-08	6.50E-08
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	6	J	0.1	8.56E-09	8.56E-09
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	11		0.3	1.66E-08	1.66E-08
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	3	J	0.1	4.42E-09	4.42E-09
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	8	J	0.2	1.28E-08	1.28E-08
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	2	J	0.0	2.44E-09	2.44E-09
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	1	ND	0.5	2.97E-08	2.97E-08
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	1	J	0.0	2.11E-09	2.11E-09
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	1	ND	0.5	2.97E-08	2.97E-08
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	1	J	0.0	2.20E-09	2.20E-09
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	7	J	0.2	1.12E-08	1.12E-08
Total Hydrocarbon			########			0			0		12554.63	1231449	5,683,610	5.68E-03	23,242		660	3.96E-05	5.72E-03

D017B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS				COMBINED
D017B	D017B		ND Adj	#D018A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture		#S017		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	151	ND	0	150	ND	0	76	0.08	7	35	3.45E-08	1	ND	0.5	2.88E-08	6.33E-08
C5 as Pentane	152.4825	ND	76	151	ND	0	150	ND	0	76	0.08	7	35	3.45E-08	1	ND	0.5	2.88E-08	6.33E-08
n-Hexane	218.5016	ND	109	217	ND	0	156	ND	0	109	0.11	11	49	4.95E-08	1	ND	0.7	4.13E-08	9.08E-08
C6 as Hexane	218.5016	ND	109	217	ND	0	156	ND	0	109	0.11	11	49	4.95E-08	1	ND	0.7	4.13E-08	9.08E-08
n-Heptane	181.5238	ND	91	180	ND	0	163	ND	0	91	0.09	9	41	4.11E-08	1	ND	0.6	3.43E-08	7.54E-08
C7 as Heptane	181.5238	ND	91	180	ND	0	163	ND	0	91	0.09	9	41	4.11E-08	1	ND	0.6	3.43E-08	7.54E-08
n-Octane	32984.36		32,984	156	ND	0	158	ND	0	32,984	32.98	3235	14932	1.49E-05	11	0	0.3	1.71E-08	1.49E-05
C8 as Octane	1258602		1,258,602	156	ND	0	158	ND	0	1,258,602	1258.60	123453	569782	5.70E-04	1,430	0	36.7	2.20E-06	5.72E-04
n-Nonane	178234.1		178,234	157	ND	0	159	ND	0	178,234	178.23	17482	80688	8.07E-05	400	0	10.3	6.16E-07	8.13E-05
C9 as Nonane	2351843		2,351,843	157	ND	0	159	ND	0	2,351,843	2351.84	230686	1064703	1.06E-03	21	ND	10.5	6.28E-07	1.07E-03
n-Decane	316674.5		316,674	158	ND	0	161	ND	0	316,674	316.67	31062	143362	1.43E-04	2,610	0	66.9	4.01E-06	1.47E-04
C10 as Decane	2985397		2,985,397	158	ND	0	161	ND	0	2,985,397	2985.40	292829	1351520	1.35E-03	21	ND	10.6	6.34E-07	1.35E-03
n-Undecane	171091.2		171,091	158	ND	0	161	ND	0	171,091	171.09	16782	77455	7.75E-05	5,292	0	135.7	8.14E-06	8.56E-05
C11 as Undecane	1582243		1,582,243	158	ND	0	161	ND	0	1,582,243	1582.24	155198	716297	7.16E-04	21	ND	10.5	6.32E-07	7.17E-04
n-Dodecane	56532.69		56,533	157	ND	0	159	ND	0	56,533	56.53	5545	25593	2.56E-05	6,196	0	158.9	9.53E-06	3.51E-05
C12 as Dodecane	239411		239,411	157	ND	0	159	ND	0	239,411	239.41	23483	108384	1.08E-04	21	ND	10.5	6.28E-07	1.09E-04
n-Tridecane	9628.451		9,628	157	ND	0	160	ND	0	9,628	9.63	944	4359	4.36E-06	3,856	0	98.9	5.93E-06	1.03E-05
C13 as Tridecane	27044.45		27,044	157	ND	0	160	ND	0	27,044	27.04	2653	12243	1.22E-05	21	ND	10.5	6.29E-07	1.29E-05
n-Tetradecane	1104.779	J	1,105	157	ND	0	160	ND	0	1,105	1.10	108	500	5.00E-07	648	0	16.6	9.97E-07	1.50E-06
C14 as tetradecane	2087.16		2,087	157	ND	0	160	ND	0	2,087	2.09	205	945	9.45E-07	21	ND	10.5	6.29E-07	1.57E-06
n-Pentadecane	316.677	J	317	158	ND	0	160	ND	0	317	0.32	31	143	1.43E-07	215	0	5.5	3.31E-07	4.75E-07
C15 as Pentadecane	382.6481	J	383	158	ND	0	160	ND	0	383	0.38	38	173	1.73E-07	793	0	20.3	1.22E-06	1.39E-06
n-Hexadecane	205.8819	J	206	157	ND	0	160	ND	0	206	0.21	20	93	9.32E-08	109	0	2.8	1.67E-07	2.60E-07
C16 as Hexadecane	158.3492	ND	79	157	ND	0	160	ND	0	79	0.08	8	36	3.58E-08	357	0	9.2	5.49E-07	5.85E-07
n-Heptadecane	157.0185	J	157	155	ND	0	158	ND	0	157	0.16	15	71	7.11E-08	62	0	1.6	9.60E-08	1.67E-07
C17 as Heptadecane	156.5079	ND	78	155	ND	0	158	ND	0	78	0.08	8	35	3.54E-08	145	0	3.7	2.23E-07	2.58E-07
n-Octadecane	158.254	ND	79	157	ND	0	159	ND	0	79	0.08	8	36	3.58E-08	33	0	0.8	5.09E-08	8.67E-08
C18 as Octodecane	158.254	ND	79	157	ND	0	159	ND	0	79	0.08	8	36	3.58E-08	70	0	1.8	1.08E-07	1.44E-07
n-Nonadecane	158.5714	ND	79	157	ND	0	160	ND	0	79	0.08	8	36	3.59E-08	26	0	0.7	4.05E-08	7.64E-08
C19 as Nonadecane	158.5714	ND	79	157	ND	0	160	ND	0	79	0.08	8	36	3.59E-08	55	0	1.4	8.44E-08	1.20E-07
n-Eicosane	158.1905	ND	79	157	ND	0	159	ND	0	79	0.08	8	36	3.58E-08	30	0	0.8	4.68E-08	8.26E-08
C20 as Eicosane	158.1905	ND	79	157	ND	0	159	ND	0	79	0.08	8	36	3.58E-08	106	0	2.7	1.64E-07	1.99E-07
n-Heneicosane	159.6825	ND	80	158	ND	0	161	ND	0	80	0.08	8	36	3.61E-08	32	0	0.8	4.96E-08	8.57E-08
C21 as Heneicosane	159.6825	ND	80	158	ND	0	161	ND	0	80	0.08	8	36	3.61E-08	144	0	3.7	2.22E-07	2.58E-07
n-Docosane	157.873	ND	79	157	ND	0	159	ND	0	79	0.08	8	36	3.57E-08	32	0	0.8	4.99E-08	8.56E-08
C22 as Docosane	157.873	ND	79	157	ND	0	159	ND	0	79	0.08	8	36	3.57E-08	143	0	3.7	2.20E-07	2.55E-07
n-Tricosane	158.7302	ND	79	157	ND	0	160	ND	0	79	0.08	8	36	3.59E-08	22	0	0.6	3.46E-08	7.05E-08
C23 as Tricosane	158.7302	ND	79	157	ND	0	160	ND	0	79	0.08	8	36	3.59E-08	110	0	2.8	1.69E-07	2.05E-07
n-Tetracosane	158.9524	ND	79	158	ND	0	160	ND	0	79	0.08	8	36	3.60E-08	19	0	0.5	2.95E-08	6.55E-08
C24 as Tetracosane	158.9524	ND	79	158	ND	0	160	ND	0	79	0.08	8	36	3.60E-08	67	0	1.7	1.04E-07	1.40E-07
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	9	J	0.2	1.43E-08	1.43E-08
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	42	0	1.1	6.50E-08	6.50E-08
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	6	J	0.1	8.56E-09	8.56E-09
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	11	0	0.3	1.66E-08	1.66E-08
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	3	J	0.1	4.42E-09	4.42E-09
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	8	J	0.2	1.28E-08	1.28E-08
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	2	J	0.0	2.44E-09	2.44E-09
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	1	ND	0.5	2.97E-08	2.97E-08
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	1	J	0.0	2.11E-09	2.11E-09
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	1	ND	0.5	2.97E-08	2.97E-08
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	1	J	0.0	2.20E-09	2.20E-09
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	7	J	0.2	1.12E-08	1.12E-08
Total Hydrocarbon			9,215,761			0			0		9215.76	903948	4,172,068	4.17E-03					4.21E-03

Bagging Data Form **Vacuum Method** **Sample Id** D019

Equipment type:	Valve			**Component ID:**	D-965		
Equipment Subtype:	Gate			**Plant ID:**	Refinery D		
Line Size:	3/4	*inches*		**Date:**	28-Mar-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/MD		
Barometric pressure	30.11	*inHg*	764.8 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	74	*°F*	23.3 *°C*	**TVA ID**	36502		
Component Temp:	392	*°F*	200.0 *°C*	**Stream Pressure/Temp:**	250	*psig*	*°F*
Stream Description:	*Jet V-752 Inventory Product to Unit*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:57	Background	8	*ppmv*	8-sec Dwell	58	*ppmv*	Total Dwell	1:00	*min:sec*	Final M21	76 *ppm*
9:38	Initial Bag Vacuum	0.015	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	179.8	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:41	9:45	9:46	9:56	9:58									
ppmv	54.8	53.2	53.7	51.3	51.4									

Sorbent Tube Sample Collection Parameters

D019A

Time									
9:47	Volume Start	143.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:00	Volume Stop	156.7	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	1.011	*L/min*

D019B

9:47	Volume Start	125.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:00	Volume Stop	138.2	*Liters*	Total Vol	13.1	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.008 *L/min*	Sorbent Flow$_{STP}$	1.019	*L/min*
	Total ST Vol$_{STP}$	26.39	*Liters*	DGM Vol$_{STP}$	92.78	*Liters*	Total Run Vol$_{STP}$	119.17	*Liters*

Bagging Parameters

Time										
9:50	Vacuum check	0.005	*inches H2O*			DGM$_P$	2	*inches H2O vacuum*	761.1	*mmHg*
9:50	DGM$_{10L}$ Time	01:24.8	*min:sec.frac*	DGM Time	1.417	DGM Flow	7.06	DGM Flow$_{STP}$	7.14	*liters/minute*
9:52	Bag Temp.	189	*°F*	87.2	*°C*	Sample$_T$	65	*°F*	18.3	*°C*

Post-Sample Data

10:10	Post Test M21	Background	8 *ppmv*	8-sec Dwell	25 *ppmv*	Total Dwell	1:40 *min:sec*	Final M21	54 *ppm*
								@	Packing
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	2.43E-05	kg/hr
Percent difference THC ER =	32%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.01E-08
C5 as Pentane	3.01E-08
n-Hexane	3.92E-08
C6 as Hexane	3.92E-08
n-Heptane	3.48E-08
C7 as Heptane	3.48E-08
n-Octane	4.76E-08
C8 as Octane	2.08E-06
n-Nonane	2.90E-07
C9 as Nonane	4.23E-06
n-Decane	5.77E-07
C10 as Decane	6.28E-06
n-Undecane	4.56E-07
C11 as Undecane	4.70E-06
n-Dodecane	3.73E-07
C12 as Dodecane	2.15E-06
n-Tridecane	4.02E-07
C13 as Tridecane	1.62E-06
n-Tetradecane	1.37E-07
C14 as tetradecane	1.31E-07
n-Pentadecane	3.17E-08
C15 as Pentadecane	3.17E-08
n-Hexadecane	3.15E-08
C16 as Hexadecane	3.15E-08
n-Heptadecane	3.11E-08
C17 as Heptadecane	3.11E-08
n-Octadecane	3.15E-08
C18 as Octodecane	3.15E-08
n-Nonadecane	3.15E-08
C19 as Nonadecane	4.29E-08
n-Eicosane	3.15E-08
C20 as Eicosane	3.15E-08
n-Heneicosane	3.18E-08
C21 as Heneicosane	3.18E-08
n-Docosane	3.14E-08
C22 as Docosane	3.14E-08
n-Tricosane	3.16E-08
C23 as Tricosane	3.16E-08
n-Tetracosane	3.16E-08
C24 as Tetracosane	3.16E-08
Total Hydrocarbon	2.43E-05

THC:	**1.29E-03**	**lbs/day**	**2.35E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D019A	D019A		ND Adj	#D020A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	72.01538	ND	36	146.66	ND	0	150	ND	0	36	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C5 as Pentane	72.01538	ND	36	146.66	ND	0	150	ND	0	36	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Hexane	74.81538	ND	37	210.16	ND	0	156	ND	0	37	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C6 as Hexane	74.81538	ND	37	210.16	ND	0	156	ND	0	37	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Heptane	78.18462	ND	39	174.6	ND	0	163	ND	0	39	0.04	5	22	2.15E-08	0	0	0.00E+00	2.15E-08
C7 as Heptane	78.18462	ND	39	174.6	ND	0	163	ND	0	39	0.04	5	22	2.15E-08	0	0	0.00E+00	2.15E-08
n-Octane	97.59226	J	98	151.08	ND	0	158	ND	0	98	0.10	12	54	5.37E-08	0	0	0.00E+00	5.37E-08
C8 as Octane	4731.761		4,732	151.08	ND	0	158	ND	0	4,732	4.73	564	2603	2.60E-06	0	0	0.00E+00	2.60E-06
n-Nonane	653.6736	J	654	152.21	ND	0	159	ND	0	654	0.65	78	360	3.60E-07	0	0	0.00E+00	3.60E-07
C9 as Nonane	9599.286		9,599	152.21	ND	0	159	ND	0	9,599	9.60	1144	5280	5.28E-06	0	0	0.00E+00	5.28E-06
n-Decane	1290.176		1,290	153.59	ND	0	161	ND	0	1,290	1.29	154	710	7.10E-07	0	0	0.00E+00	7.10E-07
C10 as Decane	14239.77		14,240	153.59	ND	0	161	ND	0	14,240	14.24	1697	7832	7.83E-06	0	0	0.00E+00	7.83E-06
n-Undecane	1026.741		1,027	153.19	ND	0	161	ND	0	1,027	1.03	122	565	5.65E-07	0	0	0.00E+00	5.65E-07
C11 as Undecane	10978.76		10,979	153.19	ND	0	161	ND	0	10,979	10.98	1308	6038	6.04E-06	0	0	0.00E+00	6.04E-06
n-Dodecane	815.2498		815	152.15	ND	0	159	ND	0	815	0.82	97	448	4.48E-07	0	0	0.00E+00	4.48E-07
C12 as Dodecane	4440.928		4,441	152.15	ND	0	159	ND	0	4,441	4.44	529	2443	2.44E-06	0	0	0.00E+00	2.44E-06
n-Tridecane	449.2327	J	449	152.52	ND	0	160	ND	0	449	0.45	54	247	2.47E-07	0	0	0.00E+00	2.47E-07
C13 as Tridecane	1782.654		1,783	152.52	ND	0	160	ND	0	1,783	1.78	212	980	9.80E-07	0	0	0.00E+00	9.80E-07
n-Tetradecane	105.5046	J	106	152.37	ND	0	160	ND	0	106	0.11	13	58	5.80E-08	0	0	0.00E+00	5.80E-08
C14 as tetradecane	111.3172	J	111	152.37	ND	0	160	ND	0	111	0.11	13	61	6.12E-08	0	0	0.00E+00	6.12E-08
n-Pentadecane	77.15385	ND	39	153.13	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C15 as Pentadecane	77.15385	ND	39	153.13	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Hexadecane	76.73846	ND	38	152.31	ND	0	160	ND	0	38	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C16 as Hexadecane	76.73846	ND	38	152.31	ND	0	160	ND	0	38	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Heptadecane	75.84615	ND	38	150.53	ND	0	158	ND	0	38	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
C17 as Heptadecane	75.84615	ND	38	150.53	ND	0	158	ND	0	38	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
n-Octadecane	76.69231	ND	38	152.21	ND	0	159	ND	0	38	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C18 as Octodecane	76.69231	ND	38	152.21	ND	0	159	ND	0	38	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Nonadecane	76.84615	ND	38	152.52	ND	0	160	ND	0	38	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C19 as Nonadecane	79.56221	J	80	152.52	ND	0	160	ND	0	80	0.08	9	44	4.38E-08	0	0	0.00E+00	4.38E-08
n-Eicosane	76.66154	ND	38	152.15	ND	0	159	ND	0	38	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C20 as Eicosane	76.66154	ND	38	152.15	ND	0	159	ND	0	38	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Heneicosane	77.38462	ND	39	153.59	ND	0	161	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C21 as Heneicosane	77.38462	ND	39	153.59	ND	0	161	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
n-Docosane	76.50769	ND	38	151.85	ND	0	159	ND	0	38	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C22 as Docosane	76.50769	ND	38	151.85	ND	0	159	ND	0	38	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Tricosane	76.92308	ND	38	152.67	ND	0	160	ND	0	38	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C23 as Tricosane	76.92308	ND	38	152.67	ND	0	160	ND	0	38	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Tetracosane	77.03077	ND	39	152.89	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C24 as Tetracosane	77.03077	ND	39	152.89	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
Total Hydrocarbon			51,357			0			0		51.36	6120	28,247	2.82E-05	0	0	0.00E+00	2.82E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D019B	D019B		ND Adj	#D020A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146.6626	ND	73	147	ND	0	150	ND	0	73	0.07	9	40	4.03E-08	4.03E-08
C5 as Pentane	146.6626	ND	73	147	ND	0	150	ND	0	73	0.07	9	40	4.03E-08	4.03E-08
n-Hexane	210.1618	ND	105	210	ND	0	156	ND	0	105	0.11	13	58	5.78E-08	5.78E-08
C6 as Hexane	210.1618	ND	105	210	ND	0	156	ND	0	105	0.11	13	58	5.78E-08	5.78E-08
n-Heptane	174.5954	ND	87	175	ND	0	163	ND	0	87	0.09	10	48	4.80E-08	4.80E-08
C7 as Heptane	174.5954	ND	87	175	ND	0	163	ND	0	87	0.09	10	48	4.80E-08	4.80E-08
n-Octane	151.084	ND	76	151	ND	0	158	ND	0	76	0.08	9	42	4.15E-08	4.15E-08
C8 as Octane	2835.182		2,835	151	ND	0	158	ND	0	2,835	2.84	338	1559	1.56E-06	1.56E-06
n-Nonane	400.0261	J	400	152	ND	0	159	ND	0	400	0.40	48	220	2.20E-07	2.20E-07
C9 as Nonane	5794.14		5,794	152	ND	0	159	ND	0	5,794	5.79	690	3187	3.19E-06	3.19E-06
n-Decane	808.5348	J	809	154	ND	0	161	ND	0	809	0.81	96	445	4.45E-07	4.45E-07
C10 as Decane	8583.726		8,584	154	ND	0	161	ND	0	8,584	8.58	1023	4721	4.72E-06	4.72E-06
n-Undecane	630.149	J	630	153	ND	0	161	ND	0	630	0.63	75	347	3.47E-07	3.47E-07
C11 as Undecane	6129.241		6,129	153	ND	0	161	ND	0	6,129	6.13	730	3371	3.37E-06	3.37E-06
n-Dodecane	541.4968	J	541	152	ND	0	159	ND	0	541	0.54	65	298	2.98E-07	2.98E-07
C12 as Dodecane	3370.712		3,371	152	ND	0	159	ND	0	3,371	3.37	402	1854	1.85E-06	1.85E-06
n-Tridecane	1013.215	J	1,013	153	ND	0	160	ND	0	1,013	1.01	121	557	5.57E-07	5.57E-07
C13 as Tridecane	4125.796		4,126	153	ND	0	160	ND	0	4,126	4.13	492	2269	2.27E-06	2.27E-06
n-Tetradecane	392.8914	J	393	152	ND	0	160	ND	0	393	0.39	47	216	2.16E-07	2.16E-07
C14 as tetradecane	364.6264	J	365	152	ND	0	160	ND	0	365	0.36	43	201	2.01E-07	2.01E-07
n-Pentadecane	153.1298	ND	77	153	ND	0	160	ND	0	77	0.08	9	42	4.21E-08	4.21E-08
C15 as Pentadecane	153.1298	ND	77	153	ND	0	160	ND	0	77	0.08	9	42	4.21E-08	4.21E-08
n-Hexadecane	152.3053	ND	76	152	ND	0	160	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
C16 as Hexadecane	152.3053	ND	76	152	ND	0	160	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
n-Heptadecane	150.5343	ND	75	151	ND	0	158	ND	0	75	0.08	9	41	4.14E-08	4.14E-08
C17 as Heptadecane	150.5343	ND	75	151	ND	0	158	ND	0	75	0.08	9	41	4.14E-08	4.14E-08
n-Octadecane	152.2137	ND	76	152	ND	0	159	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
C18 as Octodecane	152.2137	ND	76	152	ND	0	159	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
n-Nonadecane	152.5191	ND	76	153	ND	0	160	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
C19 as Nonadecane	152.5191	ND	76	153	ND	0	160	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
n-Eicosane	152.1527	ND	76	152	ND	0	159	ND	0	76	0.08	9	42	4.18E-08	4.18E-08
C20 as Eicosane	152.1527	ND	76	152	ND	0	159	ND	0	76	0.08	9	42	4.18E-08	4.18E-08
n-Heneicosane	153.5878	ND	77	154	ND	0	161	ND	0	77	0.08	9	42	4.22E-08	4.22E-08
C21 as Heneicosane	153.5878	ND	77	154	ND	0	161	ND	0	77	0.08	9	42	4.22E-08	4.22E-08
n-Docosane	151.8473	ND	76	152	ND	0	159	ND	0	76	0.08	9	42	4.18E-08	4.18E-08
C22 as Docosane	151.8473	ND	76	152	ND	0	159	ND	0	76	0.08	9	42	4.18E-08	4.18E-08
n-Tricosane	152.6718	ND	76	153	ND	0	160	ND	0	76	0.08	9	42	4.20E-08	4.20E-08
C23 as Tricosane	152.6718	ND	76	153	ND	0	160	ND	0	76	0.08	9	42	4.20E-08	4.20E-08
n-Tetracosane	152.8855	ND	76	153	ND	0	160	ND	0	76	0.08	9	42	4.20E-08	4.20E-08
C24 as Tetracosane	152.8855	ND	76	153	ND	0	160	ND	0	76	0.08	9	42	4.20E-08	4.20E-08
Total Hydrocarbon			37,121			0			0		37.12	4424	20,417	2.04E-05	2.04E-05

Bagging Data Form — Vacuum Method

Sample Id	D021				
Equipment type:	Valve	**Component ID:**	D-969		
Equipment Subtype:	Gate	**Plant ID:**	Refinery D		
Line Size:	4 *inches*	**Date:**	28-Mar-18		
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR/MD		
Barometric pressure	30.11 *inHg*	764.8 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	77.2 *°F*	25.1 *°C*	**TVA ID**	36502	
Component Temp:	307 *°F*	152.8 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Reboil from Pump P2945*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
10:21	Background	10 *ppmv*	8-sec Dwell	1024 *ppmv*	Total Dwell	1:45 *min:sec*	Final M21	3051 *ppm*
11:04	Initial Bag Vacuum	0.005 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	121.5 *°F*	Leak @	Packing @ 12 O'clock

Bag Concentrations (ppmv)

Time	11:05	11:07	11:11	11:13	11:14	11:16	11:18	11:20	11:22	11:26	11:36			
ppmv	790	1015	1127	1226	1254	1299	1277	1310	1335	1363	1366			

Sorbent Tube Sample Collection Parameters

D021A

Time						
11:22	Volume Start	156.8 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:35	Volume Stop	169.5 *Liters*	Total Vol	12.7 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.977 *L/min*	Sorbent Flow$_{STP}$	0.973 *L/min*

D021B

11:22	Volume Start	138.3 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:35	Volume Stop	151.0 *Liters*	Total Vol	12.7 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.977 *L/min*	Sorbent Flow$_{STP}$	0.973 *L/min*
	Total ST Vol$_{STP}$	25.31 *Liters*	DGM Vol$_{STP}$	83.57 *Liters*	Total Run Vol$_{STP}$	108.87 *Liters*

Bagging Parameters

Time							
11:25	Vacuum check	0.005 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	761.4 *mmHg*
11:25	DGM$_{10L}$ Time	01:33.1 *min:sec.frac*	DGM Time	1.550	DGM Flow	6.45	DGM Flow$_{STP}$ 6.43 *liters/minute*
11:26	Bag Temp.	133 *°F*	56.1 *°C*		Sample$_T$	73 *°F*	22.8 *°C*

Post-Sample Data

11:52	Post Test M21	Background	15 *ppmv*	8-sec Dwell	2296 *ppmv*	Total Dwell 1:50 *min:sec*	Final M21 3022 *ppm* @ Packing @ 12 O'clock
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*	
Organic condensate collected			N/A *ml*				
Density of organic condensate			N/A *g/ml*				

Average THC emissions =	1.75E-03 kg/hr
Percent difference THC ER =	48%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.83E-08
C5 as Pentane	2.83E-08
n-Hexane	3.69E-08
C6 as Hexane	3.69E-08
n-Heptane	9.65E-08
C7 as Heptane	2.22E-07
n-Octane	3.64E-06
C8 as Octane	1.63E-04
n-Nonane	2.49E-05
C9 as Nonane	3.48E-04
n-Decane	5.16E-05
C10 as Decane	5.11E-04
n-Undecane	3.98E-05
C11 as Undecane	4.01E-04
n-Dodecane	3.63E-05
C12 as Dodecane	1.28E-04
n-Tridecane	1.05E-05
C13 as Tridecane	2.57E-05
n-Tetradecane	1.62E-06
C14 as tetradecane	3.37E-06
n-Pentadecane	2.41E-07
C15 as Pentadecane	4.69E-07
n-Hexadecane	4.45E-08
C16 as Hexadecane	2.96E-08
n-Heptadecane	2.93E-08
C17 as Heptadecane	2.93E-08
n-Octadecane	2.96E-08
C18 as Octodecane	2.96E-08
n-Nonadecane	2.96E-08
C19 as Nonadecane	2.96E-08
n-Eicosane	2.96E-08
C20 as Eicosane	2.96E-08
n-Heneicosane	2.99E-08
C21 as Heneicosane	2.99E-08
n-Docosane	2.95E-08
C22 as Docosane	2.95E-08
n-Tricosane	2.97E-08
C23 as Tricosane	2.97E-08
n-Tetracosane	2.97E-08
C24 as Tetracosane	2.97E-08
Total Hydrocarbon	1.75E-03

THC:	9.26E-02	lbs/day	1.69E-02	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D021A	D021A		ND Adj	#D022A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.71654	ND	37	152.48	ND	0	150	ND	0	37	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
C5 as Pentane	73.71654	ND	37	152.48	ND	0	150	ND	0	37	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
n-Hexane	76.58268	ND	38	218.5	ND	0	156	ND	0	38	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C6 as Hexane	76.58268	ND	38	218.5	ND	0	156	ND	0	38	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heptane	189.5903	J	190	181.52	ND	0	163	ND	0	190	0.19	21	95	9.53E-08	0	0	0.00E+00	9.53E-08
C7 as Heptane	792.6634		793	181.52	ND	0	163	ND	0	793	0.79	86	398	3.98E-07	0	0	0.00E+00	3.98E-07
n-Octane	8549.781		8,550	157.08	ND	0	158	ND	0	8,550	8.55	931	4296	4.30E-06	0	0	0.00E+00	4.30E-06
C8 as Octane	386917.1		386,917	157.08	ND	0	158	ND	0	386,917	386.92	42125	194424	1.94E-04	0	0	0.00E+00	1.94E-04
n-Nonane	61089.36		61,089	158.25	ND	0	159	ND	0	61,089	61.09	6651	30697	3.07E-05	0	0	0.00E+00	3.07E-05
C9 as Nonane	831732.9		831,733	158.25	ND	0	159	ND	0	831,733	831.73	90554	417943	4.18E-04	0	0	0.00E+00	4.18E-04
n-Decane	126254.9		126,255	159.68	ND	0	161	ND	0	126,255	126.25	13746	63443	6.34E-05	0	0	0.00E+00	6.34E-05
C10 as Decane	1213933		1,213,933	159.68	ND	0	161	ND	0	1,213,933	1213.93	132166	609997	6.10E-04	0	0	0.00E+00	6.10E-04
n-Undecane	101961.8		101,962	159.27	ND	0	161	ND	0	101,962	101.96	11101	51235	5.12E-05	0	0	0.00E+00	5.12E-05
C11 as Undecane	1012581		1,012,581	159.27	ND	0	161	ND	0	1,012,581	1012.58	110244	508818	5.09E-04	0	0	0.00E+00	5.09E-04
n-Dodecane	111438		111,438	158.19	ND	0	159	ND	0	111,438	111.44	12133	55997	5.60E-05	0	0	0.00E+00	5.60E-05
C12 as Dodecane	336596.1		336,596	158.19	ND	0	159	ND	0	336,596	336.60	36647	169138	1.69E-04	0	0	0.00E+00	1.69E-04
n-Tridecane	32061.83		32,062	158.57	ND	0	160	ND	0	32,062	32.06	3491	16111	1.61E-05	0	0	0.00E+00	1.61E-05
C13 as Tridecane	73473.57		73,474	158.57	ND	0	160	ND	0	73,474	73.47	7999	36920	3.69E-05	0	0	0.00E+00	3.69E-05
n-Tetradecane	6004.878		6,005	246.35	J	246	160	ND	0	5,759	5.76	627	2894	2.89E-06	0	0	0.00E+00	2.89E-06
C14 as tetradecane	12458.89		12,459	158.41	ND	0	160	ND	0	12,459	12.46	1356	6261	6.26E-06	0	0	0.00E+00	6.26E-06
n-Pentadecane	878.9986		879	159.21	ND	0	160	ND	0	879	0.88	96	442	4.42E-07	0	0	0.00E+00	4.42E-07
C15 as Pentadecane	1789.183		1,789	159.21	ND	0	160	ND	0	1,789	1.79	195	899	8.99E-07	0	0	0.00E+00	8.99E-07
n-Hexadecane	98.37935	J	98	158.35	ND	0	160	ND	0	98	0.10	11	49	4.94E-08	0	0	0.00E+00	4.94E-08
C16 as Hexadecane	78.55118	ND	39	158.35	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptadecane	77.6378	ND	39	156.51	ND	0	158	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C17 as Heptadecane	77.6378	ND	39	156.51	ND	0	158	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Octadecane	78.50394	ND	39	158.25	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C18 as Octodecane	78.50394	ND	39	158.25	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonadecane	78.66142	ND	39	158.57	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C19 as Nonadecane	78.66142	ND	39	158.57	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Eicosane	78.47244	ND	39	158.19	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C20 as Eicosane	78.47244	ND	39	158.19	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heneicosane	79.2126	ND	40	159.68	ND	0	161	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C21 as Heneicosane	79.2126	ND	40	159.68	ND	0	161	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Docosane	78.31496	ND	39	157.87	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C22 as Docosane	78.31496	ND	39	157.87	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tricosane	78.74016	ND	39	158.73	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C23 as Tricosane	78.74016	ND	39	158.73	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Tetracosane	78.85039	ND	39	158.95	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C24 as Tetracosane	78.85039	ND	39	158.95	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
Total Hydrocarbon			4,319,619			246			0		4319.37	470268	#######	2.17E-03	0	0	0.00E+00	2.17E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
D021B	D021B		ND Adj	#D022A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	151.2819	ND	76	152	ND	0	150	ND	0	76	0.08	8	38	3.80E-08		3.80E-08
C5 as Pentane	151.2819	ND	76	152	ND	0	150	ND	0	76	0.08	8	38	3.80E-08		3.80E-08
n-Hexane	216.7811	ND	108	219	ND	0	156	ND	0	108	0.11	12	54	5.45E-08		5.45E-08
C6 as Hexane	216.7811	ND	108	219	ND	0	156	ND	0	108	0.11	12	54	5.45E-08		5.45E-08
n-Heptane	194.5934	J	195	182	ND	0	163	ND	0	195	0.19	21	98	9.78E-08		9.78E-08
C7 as Heptane	180.0945	ND	90	182	ND	0	163	ND	0	90	0.09	10	45	4.52E-08		4.52E-08
n-Octane	5949.588		5,950	157	ND	0	158	ND	0	5,950	5.95	648	2990	2.99E-06		2.99E-06
C8 as Octane	262653.1		262,653	157	ND	0	158	ND	0	262,653	262.65	28596	131982	1.32E-04		1.32E-04
n-Nonane	37898.44		37,898	158	ND	0	159	ND	0	37,898	37.90	4126	19044	1.90E-05		1.90E-05
C9 as Nonane	553720.9		553,721	158	ND	0	159	ND	0	553,721	553.72	60286	278243	2.78E-04		2.78E-04
n-Decane	79140.28		79,140	160	ND	0	161	ND	0	79,140	79.14	8616	39768	3.98E-05		3.98E-05
C10 as Decane	818835.2		818,835	160	ND	0	161	ND	0	818,835	818.84	89150	411462	4.11E-04		4.11E-04
n-Undecane	56487.18		56,487	159	ND	0	161	ND	0	56,487	56.49	6150	28385	2.84E-05		2.84E-05
C11 as Undecane	581471.8		581,472	159	ND	0	161	ND	0	581,472	581.47	63307	292188	2.92E-04		2.92E-04
n-Dodecane	32916.46		32,916	158	ND	0	159	ND	0	32,916	32.92	3584	16540	1.65E-05		1.65E-05
C12 as Dodecane	174536.7		174,537	158	ND	0	159	ND	0	174,537	174.54	19003	87704	8.77E-05		8.77E-05
n-Tridecane	9724.345		9,724	159	ND	0	160	ND	0	9,724	9.72	1059	4886	4.89E-06		4.89E-06
C13 as Tridecane	28892.55		28,893	159	ND	0	160	ND	0	28,893	28.89	3146	14518	1.45E-05		1.45E-05
n-Tetradecane	922.0387	J	922	246	J	246	160	ND	0	676	0.68	74	340	3.40E-07		3.40E-07
C14 as tetradecane	952.788	J	953	158	ND	0	160	ND	0	953	0.95	104	479	4.79E-07		4.79E-07
n-Pentadecane	157.9528	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.97E-08		3.97E-08
C15 as Pentadecane	157.9528	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.97E-08		3.97E-08
n-Hexadecane	157.1024	ND	79	158	ND	0	160	ND	0	79	0.08	9	39	3.95E-08		3.95E-08
C16 as Hexadecane	157.1024	ND	79	158	ND	0	160	ND	0	79	0.08	9	39	3.95E-08		3.95E-08
n-Heptadecane	155.2756	ND	78	157	ND	0	158	ND	0	78	0.08	8	39	3.90E-08		3.90E-08
C17 as Heptadecane	155.2756	ND	78	157	ND	0	158	ND	0	78	0.08	8	39	3.90E-08		3.90E-08
n-Octadecane	157.0079	ND	79	158	ND	0	159	ND	0	79	0.08	9	39	3.94E-08		3.94E-08
C18 as Octodecane	157.0079	ND	79	158	ND	0	159	ND	0	79	0.08	9	39	3.94E-08		3.94E-08
n-Nonadecane	157.3228	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.95E-08		3.95E-08
C19 as Nonadecane	157.3228	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.95E-08		3.95E-08
n-Eicosane	156.9449	ND	78	158	ND	0	159	ND	0	78	0.08	9	39	3.94E-08		3.94E-08
C20 as Eicosane	156.9449	ND	78	158	ND	0	159	ND	0	78	0.08	9	39	3.94E-08		3.94E-08
n-Heneicosane	158.4252	ND	79	160	ND	0	161	ND	0	79	0.08	9	40	3.98E-08		3.98E-08
C21 as Heneicosane	158.4252	ND	79	160	ND	0	161	ND	0	79	0.08	9	40	3.98E-08		3.98E-08
n-Docosane	156.6299	ND	78	158	ND	0	159	ND	0	78	0.08	9	39	3.94E-08		3.94E-08
C22 as Docosane	156.6299	ND	78	158	ND	0	159	ND	0	78	0.08	9	39	3.94E-08		3.94E-08
n-Tricosane	157.4803	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.96E-08		3.96E-08
C23 as Tricosane	157.4803	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.96E-08		3.96E-08
n-Tetracosane	157.7008	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.96E-08		3.96E-08
C24 as Tetracosane	157.7008	ND	79	159	ND	0	160	ND	0	79	0.08	9	40	3.96E-08		3.96E-08
Total Hydrocarbon			2,646,326			246			0		2646.08	288090	#######	1.33E-03		1.33E-03

Bagging Data Form — Vacuum Method

Sample Id: D023

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	D-979	
Equipment Subtype:	Gate		**Plant ID:**	Refinery D	
Line Size:	4 inches		**Date:**	28-Mar-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/MD	
Barometric pressure	30.01 inHg	762.3 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	83.7 °F	28.7 °C	**TVA ID**	36502	
Component Temp:	315 °F	157.2 °C	**Stream Pressure/Temp:**	240 psig	°F
Stream Description:	*Reboil Pump 2945*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
14:00	Background	11	ppmv	8-sec Dwell	2240	ppmv	Total Dwell	2:40	min:sec	Final M21	5986	ppm
14:33	Initial Bag Vacuum	0.015	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	224	°F	Leak @	Packing	

Bag Concentrations (ppmv)

Time	14:32	14:35	14:38	14:41	14:45	14:48	14:51	14:52	14:54	14:59	15:02	15:04	15:08
ppmv	583	1487	1981	2116	2227	2429	2472	2455	2474	2573	2610	2475	2603

Sorbent Tube Sample Collection Parameters

D023A

Time									
14:54	Volume Start	169.5	Liters		Design Sample Flow Rate = 1 liter/min				
15:07	Volume Stop	182.0	Liters	Total Vol	12.5	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.962 L/min	Sorbent Flow$_{STP}$	0.919	L/min

D023B

Time									
14:54	Volume Start	151.1	Liters		Design Sample Flow Rate = 1 liter/min				
15:07	Volume Stop	163.9	Liters	Total Vol	12.8	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.985 L/min	Sorbent Flow$_{STP}$	0.941	L/min
	Total ST Vol$_{STP}$	24.17	Liters	DGM Vol$_{STP}$	82.80	Liters	Total Run Vol$_{STP}$	106.97	Liters

Bagging Parameters

Time										
14:58	Vacuum check	0.018	inches H2O			DGM$_P$	1.8	inches H2O vacuum	758.9	mmHg
14:58	DGM$_{10L}$ Time	01:30.4	min:sec.frac	DGM Time	1.500	DGM Flow	6.67	DGM Flow$_{STP}$	6.37	liters/minute
14:59	Bag Temp.	139.1	°F	59.5	°C	Sample$_T$	94	°F	34.4	°C

Post-Sample Data

15:23	Post Test M21	Background	19	ppmv	8-sec Dwell	5208	ppmv	Total Dwell	1:50 min:sec	Final M21	7272 ppm
										@	Packing
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A	hour:min		0:00 hours:min		
Organic condensate collected			N/A	ml							
Density of organic condensate			N/A	g/ml							

Average THC emissions =	3.17E-03 kg/hr
Percent difference THC ER =	11%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.78E-08
C5 as Pentane	2.78E-08
n-Hexane	3.62E-08
C6 as Hexane	3.62E-08
n-Heptane	1.32E-07
C7 as Heptane	2.55E-07
n-Octane	6.80E-06
C8 as Octane	3.12E-04
n-Nonane	4.34E-05
C9 as Nonane	6.02E-04
n-Decane	8.89E-05
C10 as Decane	9.43E-04
n-Undecane	6.74E-05
C11 as Undecane	7.14E-04
n-Dodecane	5.56E-05
C12 as Dodecane	2.55E-04
n-Tridecane	1.84E-05
C13 as Tridecane	5.56E-05
n-Tetradecane	3.05E-06
C14 as tetradecane	8.53E-06
n-Pentadecane	5.24E-07
C15 as Pentadecane	8.06E-07
n-Hexadecane	8.09E-08
C16 as Hexadecane	2.91E-08
n-Heptadecane	2.88E-08
C17 as Heptadecane	2.88E-08
n-Octadecane	2.91E-08
C18 as Octodecane	2.91E-08
n-Nonadecane	2.91E-08
C19 as Nonadecane	2.91E-08
n-Eicosane	2.91E-08
C20 as Eicosane	2.91E-08
n-Heneicosane	2.93E-08
C21 as Heneicosane	2.93E-08
n-Docosane	2.90E-08
C22 as Docosane	2.90E-08
n-Tricosane	2.92E-08
C23 as Tricosane	2.92E-08
n-Tetracosane	2.92E-08
C24 as Tetracosane	2.92E-08
Total Hydrocarbon	3.17E-03

THC:	1.68E-01	lbs/day	3.07E-02	tons/yr

D023A

ANALYTICAL RESULTS D023A				BACKGROUND #D024A			TRIP BLANK #D013			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#D0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.896	ND	37	152.48	ND	0	150	ND	0	37	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C5 as Pentane	74.896	ND	37	152.48	ND	0	150	ND	0	37	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Hexane	77.808	ND	39	218.5	ND	0	156	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C6 as Hexane	77.808	ND	39	218.5	ND	0	156	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heptane	194.173	J	194	181.52	ND	0	163	ND	0	194	0.19	21	96	9.59E-08	0	0	0.00E+00	9.59E-08
C7 as Heptane	941.7605		942	181.52	ND	0	163	ND	0	942	0.94	101	465	4.65E-07	0	0	0.00E+00	4.65E-07
n-Octane	12716.67		12,717	157.08	ND	0	158	ND	0	12,717	12.72	1360	6278	6.28E-06	0	0	0.00E+00	6.28E-06
C8 as Octane	591960.7		591,961	159.92	J	160	158	ND	0	591,801	591.80	63304	292173	2.92E-04	0	0	0.00E+00	2.92E-04
n-Nonane	82219.42		82,219	158.25	ND	0	159	ND	0	82,219	82.22	8795	40592	4.06E-05	0	0	0.00E+00	4.06E-05
C9 as Nonane	1123172		1,123,172	158.25	ND	0	159	ND	0	1,123,172	1123.17	120144	554512	5.55E-04	0	0	0.00E+00	5.55E-04
n-Decane	168257.8		168,258	159.68	ND	0	161	ND	0	168,258	168.26	17998	83069	8.31E-05	0	0	0.00E+00	8.31E-05
C10 as Decane	1879444		1,879,444	213.88	J	214	161	ND	0	1,879,230	1879.23	201019	927779	9.28E-04	0	0	0.00E+00	9.28E-04
n-Undecane	126170.2		126,170	159.27	ND	0	161	ND	0	126,170	126.17	13496	62290	6.23E-05	0	0	0.00E+00	6.23E-05
C11 as Undecane	1312404		1,312,404	162.91	J	163	161	ND	0	1,312,241	1312.24	140369	647856	6.48E-04	0	0	0.00E+00	6.48E-04
n-Dodecane	128594.3		128,594	158.19	ND	0	159	ND	0	128,594	128.59	13756	63487	6.35E-05	0	0	0.00E+00	6.35E-05
C12 as Dodecane	511156.9		511,157	158.19	ND	0	159	ND	0	511,157	511.16	54678	252359	2.52E-04	0	0	0.00E+00	2.52E-04
n-Tridecane	31593.89		31,594	158.57	ND	0	160	ND	0	31,594	31.59	3380	15598	1.56E-05	0	0	0.00E+00	1.56E-05
C13 as Tridecane	94250.3		94,250	158.57	ND	0	160	ND	0	94,250	94.25	10082	46532	4.65E-05	0	0	0.00E+00	4.65E-05
n-Tetradecane	4662.225		4,662	158.41	ND	0	160	ND	0	4,662	4.66	499	2302	2.30E-06	0	0	0.00E+00	2.30E-06
C14 as tetradecane	13030.12		13,030	158.41	ND	0	160	ND	0	13,030	13.03	1394	6433	6.43E-06	0	0	0.00E+00	6.43E-06
n-Pentadecane	705.23	J	705	159.21	ND	0	160	ND	0	705	0.71	75	348	3.48E-07	0	0	0.00E+00	3.48E-07
C15 as Pentadecane	1311.937		1,312	159.21	ND	0	160	ND	0	1,312	1.31	140	648	6.48E-07	0	0	0.00E+00	6.48E-07
n-Hexadecane	80.96588	J	81	158.35	ND	0	160	ND	0	81	0.08	9	40	4.00E-08	0	0	0.00E+00	4.00E-08
C16 as Hexadecane	79.808	ND	40	158.35	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptadecane	78.88	ND	39	156.51	ND	0	158	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C17 as Heptadecane	78.88	ND	39	156.51	ND	0	158	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Octadecane	79.76	ND	40	158.25	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C18 as Octodecane	79.76	ND	40	158.25	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonadecane	79.92	ND	40	158.57	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C19 as Nonadecane	79.92	ND	40	158.57	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Eicosane	79.728	ND	40	158.19	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C20 as Eicosane	79.728	ND	40	158.19	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heneicosane	80.48	ND	40	159.68	ND	0	161	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C21 as Heneicosane	80.48	ND	40	159.68	ND	0	161	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Docosane	79.568	ND	40	157.87	ND	0	159	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	79.568	ND	40	157.87	ND	0	159	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	80	ND	40	158.73	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C23 as Tricosane	80	ND	40	158.73	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetracosane	80.112	ND	40	158.95	ND	0	160	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C24 as Tetracosane	80.112	ND	40	158.95	ND	0	160	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
Total Hydrocarbon			6,083,698			537			0		6083.16	650708	#######	3.00E-03	0	0	0.00E+00	3.00E-03

D023B

ANALYTICAL RESULTS D023B				BACKGROUND #D024A			TRIP BLANK #D013			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	Flag	ND Adj µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	152	ND	0	150	ND	0	75	0.08	8	37	3.71E-08	3.71E-08
C5 as Pentane	150.1	ND	75	152	ND	0	150	ND	0	75	0.08	8	37	3.71E-08	3.71E-08
n-Hexane	215.0875	ND	108	219	ND	0	156	ND	0	108	0.11	12	53	5.31E-08	5.31E-08
C6 as Hexane	215.0875	ND	108	219	ND	0	156	ND	0	108	0.11	12	53	5.31E-08	5.31E-08
n-Heptane	342.1343	J	342	182	ND	0	163	ND	0	342	0.34	37	169	1.69E-07	1.69E-07
C7 as Heptane	178.6875	ND	89	182	ND	0	163	ND	0	89	0.09	10	44	4.41E-08	4.41E-08
n-Octane	14816.97		14,817	157	ND	0	158	ND	0	14,817	14.82	1585	7315	7.32E-06	7.32E-06
C8 as Octane	672058		672,058	160	J	160	158	ND	0	671,898	671.90	71872	331717	3.32E-04	3.32E-04
n-Nonane	93431.49		93,431	158	ND	0	159	ND	0	93,431	93.43	9994	46127	4.61E-05	4.61E-05
C9 as Nonane	1314075		1,314,075	158	ND	0	159	ND	0	1,314,075	1314.07	140565	648761	6.49E-04	6.49E-04
n-Decane	192012.7		192,013	160	ND	0	161	ND	0	192,013	192.01	20539	94797	9.48E-05	9.48E-05
C10 as Decane	1939321		1,939,321	214	J	214	161	ND	0	1,939,107	1939.11	207424	957340	9.57E-04	9.57E-04
n-Undecane	146954.9		146,955	159	ND	0	161	ND	0	146,955	146.95	15720	72552	7.26E-05	7.26E-05
C11 as Undecane	1579001		1,579,001	163	J	163	161	ND	0	1,578,838	1578.84	168886	779475	7.79E-04	7.79E-04
n-Dodecane	96723.25		96,723	158	ND	0	159	ND	0	96,723	96.72	10346	47752	4.78E-05	4.78E-05
C12 as Dodecane	520602.1		520,602	158	ND	0	159	ND	0	520,602	520.60	55688	257022	2.57E-04	2.57E-04
n-Tridecane	43095.71		43,096	159	ND	0	160	ND	0	43,096	43.10	4610	21276	2.13E-05	2.13E-05
C13 as Tridecane	130846.7		130,847	159	ND	0	160	ND	0	130,847	130.85	13997	64599	6.46E-05	6.46E-05
n-Tetradecane	7713.48		7,713	158	ND	0	160	ND	0	7,713	7.71	825	3808	3.81E-06	3.81E-06
C14 as tetradecane	21534.94		21,535	158	ND	0	160	ND	0	21,535	21.53	2304	10632	1.06E-05	1.06E-05
n-Pentadecane	1415.587	J	1,416	159	ND	0	160	ND	0	1,416	1.42	151	699	6.99E-07	6.99E-07
C15 as Pentadecane	1954.501		1,955	159	ND	0	160	ND	0	1,955	1.95	209	965	9.65E-07	9.65E-07
n-Hexadecane	246.6648	J	247	158	ND	0	160	ND	0	247	0.25	26	122	1.22E-07	1.22E-07
C16 as Hexadecane	155.875	ND	78	158	ND	0	160	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
n-Heptadecane	154.0625	ND	77	157	ND	0	158	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C17 as Heptadecane	154.0625	ND	77	157	ND	0	158	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Octadecane	155.7812	ND	78	158	ND	0	159	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
C18 as Octodecane	155.7812	ND	78	158	ND	0	159	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
n-Nonadecane	156.0937	ND	78	159	ND	0	160	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
C19 as Nonadecane	156.0937	ND	78	159	ND	0	160	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
n-Eicosane	155.7187	ND	78	158	ND	0	159	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C20 as Eicosane	155.7187	ND	78	158	ND	0	159	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Heneicosane	157.1875	ND	79	160	ND	0	161	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C21 as Heneicosane	157.1875	ND	79	160	ND	0	161	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Docosane	155.4062	ND	78	158	ND	0	159	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C22 as Docosane	155.4062	ND	78	158	ND	0	159	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Tricosane	156.25	ND	78	159	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C23 as Tricosane	156.25	ND	78	159	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
n-Tetracosane	156.4687	ND	78	159	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C24 as Tetracosane	156.4687	ND	78	159	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
Total Hydrocarbon			6,777,925			537			0		6777.39	724969	#######	3.35E-03	3.35E-03

Bagging Data Form — Vacuum Method

Sample Id: D025

WSPA Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	D-915	
Equipment Subtype:	on PRD			**Plant ID:**	Refinery D	
Line Size:	1	*inches*		**Date:**	29-Mar-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/MD	
Barometric pressure	30.04 *inHg*	763.0	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	68.4 *°F*	20.2	*°C*	**TVA ID**	37887	
Component Temp:	*°F*	-17.8	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Jet-top of V-754 HPHT Sep*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:51	Background	2	*ppmv*	8-sec Dwell	58	*ppmv*	Total Dwell	1:00	*min:sec*	Final M21	63 *ppm*
10:03	Initial Bag Vacuum	0.01	*inches H2O*	DGM Vac.	2.4	*inches H2O*	Bag Temp	76.7	*°F*	Leak @	screw connection

Bag Concentrations (ppmv)

Time	10:03	10:05	10:07	10:09	10:17	10:27								
ppmv	20.7	24.5	22.9	23.6	23.1	21.3								

Sorbent Tube Sample Collection Parameters

D025A

Time									
10:11	Volume Start	185.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:24	Volume Stop	198.2	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.952	*L/min*

D025B

10:11	Volume Start	166.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:24	Volume Stop	178.6	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.944	*L/min*
	Total ST Vol$_{STP}$	24.65	*Liters*	DGM Vol$_{STP}$	45.06	*Liters*	Total Run Vol$_{STP}$	69.70	*Liters*

Bagging Parameters

Time									
10:12	Vacuum check	0.01	*inches H2O*			DGM$_P$	2.2	*inches H2O vacuum*	758.9 *mmHg*
10:22	DGM$_{1L}$ Time	00:17.2	*min:sec.frac*	DGM Time	0.283	DGM Flow	3.53	DGM Flow$_{STP}$	3.47 *liters/minute*
10:13	Bag Temp.	76.7	*°F*	24.8	*°C*	Sample$_T$	79	*°F*	26.1 *°C*

Post-Sample Data

10:39	Post Test M21	Background	2	*ppmv*	8-sec Dwell	90	*ppmv*	Total Dwell	1:00 *min:sec*	Final M21	97 *ppm*
										@	screw connection
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*		
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	7.38E-06 kg/hr
Percent difference THC ER =	7%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.83E-08
C5 as Pentane	1.83E-08
n-Hexane	2.39E-08
C6 as Hexane	2.39E-08
n-Heptane	2.12E-08
C7 as Heptane	2.12E-08
n-Octane	1.91E-08
C8 as Octane	3.63E-07
n-Nonane	6.95E-08
C9 as Nonane	1.27E-06
n-Decane	1.87E-07
C10 as Decane	2.19E-06
n-Undecane	1.67E-07
C11 as Undecane	1.62E-06
n-Dodecane	1.90E-07
C12 as Dodecane	4.04E-07
n-Tridecane	5.52E-08
C13 as Tridecane	1.26E-07
n-Tetradecane	6.38E-08
C14 as tetradecane	8.50E-08
n-Pentadecane	4.74E-08
C15 as Pentadecane	4.42E-08
n-Hexadecane	1.92E-08
C16 as Hexadecane	1.92E-08
n-Heptadecane	1.90E-08
C17 as Heptadecane	1.90E-08
n-Octadecane	1.92E-08
C18 as Octodecane	1.92E-08
n-Nonadecane	1.92E-08
C19 as Nonadecane	1.92E-08
n-Eicosane	1.92E-08
C20 as Eicosane	1.92E-08
n-Heneicosane	1.94E-08
C21 as Heneicosane	1.94E-08
n-Docosane	1.91E-08
C22 as Docosane	1.91E-08
n-Tricosane	1.93E-08
C23 as Tricosane	1.93E-08
n-Tetracosane	1.93E-08
C24 as Tetracosane	1.93E-08
Total Hydrocarbon	7.38E-06

THC:	3.90E-04	lbs/day	7.12E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D025A	D025A		ND Adj	#D026A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	151.28	ND	0	150	ND	0	37	0.04	3	12	1.20E-08	0	0	0.00E+00	1.20E-08
C5 as Pentane	74.30159	ND	37	151.28	ND	0	150	ND	0	37	0.04	3	12	1.20E-08	0	0	0.00E+00	1.20E-08
n-Hexane	77.19047	ND	39	216.78	ND	0	156	ND	0	39	0.04	3	12	1.24E-08	0	0	0.00E+00	1.24E-08
C6 as Hexane	77.19047	ND	39	216.78	ND	0	156	ND	0	39	0.04	3	12	1.24E-08	0	0	0.00E+00	1.24E-08
n-Heptane	80.66666	ND	40	180.09	ND	0	163	ND	0	40	0.04	3	13	1.30E-08	0	0	0.00E+00	1.30E-08
C7 as Heptane	80.66666	ND	40	180.09	ND	0	163	ND	0	40	0.04	3	13	1.30E-08	0	0	0.00E+00	1.30E-08
n-Octane	78.53968	ND	39	155.84	ND	0	158	ND	0	39	0.04	3	13	1.26E-08	0	0	0.00E+00	1.26E-08
C8 as Octane	1325.483		1,325	155.84	ND	0	158	ND	0	1,325	1.33	92	426	4.26E-07	0	0	0.00E+00	4.26E-07
n-Nonane	147.2062	J	147	157.01	ND	0	159	ND	0	147	0.15	10	47	4.74E-08	0	0	0.00E+00	4.74E-08
C9 as Nonane	4369.53		4,370	157.01	ND	0	159	ND	0	4,370	4.37	305	1406	1.41E-06	0	0	0.00E+00	1.41E-06
n-Decane	636.4936	J	636	158.43	ND	0	161	ND	0	636	0.64	44	205	2.05E-07	0	0	0.00E+00	2.05E-07
C10 as Decane	7508.039		7,508	158.43	ND	0	161	ND	0	7,508	7.51	523	2415	2.42E-06	0	0	0.00E+00	2.42E-06
n-Undecane	573.8379	J	574	158.02	ND	0	161	ND	0	574	0.57	40	185	1.85E-07	0	0	0.00E+00	1.85E-07
C11 as Undecane	5539.982		5,540	158.02	ND	0	161	ND	0	5,540	5.54	386	1782	1.78E-06	0	0	0.00E+00	1.78E-06
n-Dodecane	563.5667	J	564	156.94	ND	0	159	ND	0	564	0.56	39	181	1.81E-07	0	0	0.00E+00	1.81E-07
C12 as Dodecane	1472.747		1,473	156.94	ND	0	159	ND	0	1,473	1.47	103	474	4.74E-07	0	0	0.00E+00	4.74E-07
n-Tridecane	148.4193	J	148	157.32	ND	0	160	ND	0	148	0.15	10	48	4.77E-08	0	0	0.00E+00	4.77E-08
C13 as Tridecane	288.0646	J	288	157.32	ND	0	160	ND	0	288	0.29	20	93	9.27E-08	0	0	0.00E+00	9.27E-08
n-Tetradecane	79.20635	ND	40	157.17	ND	0	160	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
C14 as tetradecane	79.20635	ND	40	157.17	ND	0	160	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
n-Pentadecane	79.60317	ND	40	157.95	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
C15 as Pentadecane	79.60317	ND	40	157.95	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
n-Hexadecane	79.1746	ND	40	157.1	ND	0	160	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
C16 as Hexadecane	79.1746	ND	40	157.1	ND	0	160	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
n-Heptadecane	78.25397	ND	39	155.28	ND	0	158	ND	0	39	0.04	3	13	1.26E-08	0	0	0.00E+00	1.26E-08
C17 as Heptadecane	78.25397	ND	39	155.28	ND	0	158	ND	0	39	0.04	3	13	1.26E-08	0	0	0.00E+00	1.26E-08
n-Octadecane	79.12698	ND	40	157.01	ND	0	159	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
C18 as Octodecane	79.12698	ND	40	157.01	ND	0	159	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
n-Nonadecane	79.28571	ND	40	157.32	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
C19 as Nonadecane	79.28571	ND	40	157.32	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
n-Eicosane	79.09524	ND	40	156.94	ND	0	159	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
C20 as Eicosane	79.09524	ND	40	156.94	ND	0	159	ND	0	40	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
n-Heneicosane	79.84127	ND	40	158.43	ND	0	161	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
C21 as Heneicosane	79.84127	ND	40	158.43	ND	0	161	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
n-Docosane	78.93651	ND	39	156.63	ND	0	159	ND	0	39	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
C22 as Docosane	78.93651	ND	39	156.63	ND	0	159	ND	0	39	0.04	3	13	1.27E-08	0	0	0.00E+00	1.27E-08
n-Tricosane	79.36508	ND	40	157.48	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
C23 as Tricosane	79.36508	ND	40	157.48	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
n-Tetracosane	79.47619	ND	40	157.7	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
C24 as Tetracosane	79.47619	ND	40	157.7	ND	0	160	ND	0	40	0.04	3	13	1.28E-08	0	0	0.00E+00	1.28E-08
Total Hydrocarbon			23,716			0			0		23.72	1653	7,630	7.63E-06	0	0	0.00E+00	7.63E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D025B	D025B		ND Adj	#D026A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	153.7024	ND	77	151	ND	0	150	ND	0	77	0.08	5	25	2.47E-08	2.47E-08
C5 as Pentane	153.7024	ND	77	151	ND	0	150	ND	0	77	0.08	5	25	2.47E-08	2.47E-08
n-Hexane	220.2496	ND	110	217	ND	0	156	ND	0	110	0.11	8	35	3.54E-08	3.54E-08
C6 as Hexane	220.2496	ND	110	217	ND	0	156	ND	0	110	0.11	8	35	3.54E-08	3.54E-08
n-Heptane	182.976	ND	91	180	ND	0	163	ND	0	91	0.09	6	29	2.94E-08	2.94E-08
C7 as Heptane	182.976	ND	91	180	ND	0	163	ND	0	91	0.09	6	29	2.94E-08	2.94E-08
n-Octane	158.336	ND	79	156	ND	0	158	ND	0	79	0.08	6	25	2.55E-08	2.55E-08
C8 as Octane	932.1852	J	932	156	ND	0	158	ND	0	932	0.93	65	300	3.00E-07	3.00E-07
n-Nonane	284.9602	J	285	157	ND	0	159	ND	0	285	0.28	20	92	9.17E-08	9.17E-08
C9 as Nonane	3549.815		3,550	157	ND	0	159	ND	0	3,550	3.55	247	1142	1.14E-06	1.14E-06
n-Decane	524.5176	J	525	158	ND	0	161	ND	0	525	0.52	37	169	1.69E-07	1.69E-07
C10 as Decane	6137.014		6,137	158	ND	0	161	ND	0	6,137	6.14	428	1974	1.97E-06	1.97E-06
n-Undecane	464.711	J	465	158	ND	0	161	ND	0	465	0.46	32	150	1.50E-07	1.50E-07
C11 as Undecane	4507.76		4,508	158	ND	0	161	ND	0	4,508	4.51	314	1450	1.45E-06	1.45E-06
n-Dodecane	615.0362	J	615	157	ND	0	159	ND	0	615	0.62	43	198	1.98E-07	1.98E-07
C12 as Dodecane	1036.189	J	1,036	157	ND	0	159	ND	0	1,036	1.04	72	333	3.33E-07	3.33E-07
n-Tridecane	194.7495	J	195	157	ND	0	160	ND	0	195	0.19	14	63	6.27E-08	6.27E-08
C13 as Tridecane	495.4146	J	495	157	ND	0	160	ND	0	495	0.50	35	159	1.59E-07	1.59E-07
n-Tetradecane	356.7895	J	357	157	ND	0	160	ND	0	357	0.36	25	115	1.15E-07	1.15E-07
C14 as tetradecane	488.6821	J	489	157	ND	0	160	ND	0	489	0.49	34	157	1.57E-07	1.57E-07
n-Pentadecane	254.9796	J	255	158	ND	0	160	ND	0	255	0.25	18	82	8.20E-08	8.20E-08
C15 as Pentadecane	234.752	J	235	158	ND	0	160	ND	0	235	0.23	16	76	7.55E-08	7.55E-08
n-Hexadecane	159.616	ND	80	157	ND	0	160	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
C16 as Hexadecane	159.616	ND	80	157	ND	0	160	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
n-Heptadecane	157.76	ND	79	155	ND	0	158	ND	0	79	0.08	5	25	2.54E-08	2.54E-08
C17 as Heptadecane	157.76	ND	79	155	ND	0	158	ND	0	79	0.08	5	25	2.54E-08	2.54E-08
n-Octadecane	159.52	ND	80	157	ND	0	159	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
C18 as Octodecane	159.52	ND	80	157	ND	0	159	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
n-Nonadecane	159.84	ND	80	157	ND	0	160	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
C19 as Nonadecane	159.84	ND	80	157	ND	0	160	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
n-Eicosane	159.456	ND	80	157	ND	0	159	ND	0	80	0.08	6	26	2.56E-08	2.56E-08
C20 as Eicosane	159.456	ND	80	157	ND	0	159	ND	0	80	0.08	6	26	2.56E-08	2.56E-08
n-Heneicosane	160.96	ND	80	158	ND	0	161	ND	0	80	0.08	6	26	2.59E-08	2.59E-08
C21 as Heneicosane	160.96	ND	80	158	ND	0	161	ND	0	80	0.08	6	26	2.59E-08	2.59E-08
n-Docosane	159.136	ND	80	157	ND	0	159	ND	0	80	0.08	6	26	2.56E-08	2.56E-08
C22 as Docosane	159.136	ND	80	157	ND	0	159	ND	0	80	0.08	6	26	2.56E-08	2.56E-08
n-Tricosane	160	ND	80	157	ND	0	160	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
C23 as Tricosane	160	ND	80	157	ND	0	160	ND	0	80	0.08	6	26	2.57E-08	2.57E-08
n-Tetracosane	160.224	ND	80	158	ND	0	160	ND	0	80	0.08	6	26	2.58E-08	2.58E-08
C24 as Tetracosane	160.224	ND	80	158	ND	0	160	ND	0	80	0.08	6	26	2.58E-08	2.58E-08
Total Hydrocarbon			22,150			0			0		22.15	1544	7,126	7.13E-06	7.13E-06

Bagging Data Form — Vacuum Method

WSPA Western States Petroleum Association

Sample Id	D027						
Equipment type:	Valve			**Component ID:**	D-810		
Equipment Subtype:	Gate			**Plant ID:**	Refinery D		
Line Size:	1/2	*inches*		**Date:**	29-Mar-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/MD		
Barometric pressure	30	*inHg*	762.0 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	93.6	*°F*	34.2 *°C*	**TVA ID**	37887		
Component Temp:	314	*°F*	156.7 *°C*	**Stream Pressure/Temp:**	10	*psig*	*°F*
Stream Description:	*Stabilizer Reboiler Surge Drum*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:15	Background	0	*ppmv*	8-sec Dwell	10400	*ppmv*	Total Dwell	1:00	*min:sec*	Final M21	12400 *ppm*
13:35	Initial Bag Vacuum	0.01	*inches H2O*	DGM Vac.	2.1	*inches H2O*	Bag Temp	133.9	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	13:38	13:41	13:43	13:46	13:48	13:50	13:52	13:54	14:02					
ppmv	4469	6448	6745	6933	6575	7054	7422	7450	6716					

Sorbent Tube Sample Collection Parameters

D027A

Time									
13:55	Volume Start	198.3	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:08	Volume Stop	210.8	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.903	*L/min*

D027B

13:56	Volume Start	178.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:09	Volume Stop	191.2	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.903	*L/min*
	Total ST Vol$_{STP}$	23.48	*Liters*	DGM Vol$_{STP}$	40.70 *Liters*	Total Run Vol$_{STP}$	64.19	*Liters*	

Bagging Parameters

Time										
13:58	Vacuum check	0.01	*inches H2O*			DGM$_P$	2	*inches H2O vacuum*	758.3	*mmHg*
14:01	DGM$_{1L}$ Time	00:17.9	*min:sec.frac*	DGM Time	0.300	DGM Flow	3.33	DGM Flow$_{STP}$	3.13	*liters/minute*
14:00	Bag Temp.	134.8	*°F*	57.1	*°C*	Sample$_T$	103	*°F*	39.4	*°C*

Post-Sample Data

14:25	Post Test M21	Background	32 *ppmv*	8-sec Dwell	8250 *ppmv*	Total Dwell	1:40 *min:sec*	Final M21	12000 *ppm*	
								@	Packing	
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*			
Organic condensate collected			N/A *ml*							
Density of organic condensate			N/A *g/ml*							

Average THC emissions =	4.01E-03 kg/hr
Percent difference THC ER =	15%
Acceptable?	Yes

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D027A	D027A		ND Adj	#D028A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.896	ND	37	145.55	ND	0	150	ND	0	37	0.04	2	11	1.11E-08	0	0	0.00E+00	1.11E-08
C5 as Pentane	74.896	ND	37	145.55	ND	0	150	ND	0	37	0.04	2	11	1.11E-08	0	0	0.00E+00	1.11E-08
n-Hexane	77.808	J	78	208.57	ND	0	156	ND	0	78	0.08	5	23	2.30E-08	0	0	0.00E+00	2.30E-08
C6 as Hexane	132.1518	J	132	208.57	ND	0	156	ND	0	132	0.13	8	39	3.91E-08	0	0	0.00E+00	3.91E-08
n-Heptane	316.1093	J	316	173.27	ND	0	163	ND	0	316	0.32	20	94	9.36E-08	0	0	0.00E+00	9.36E-08
C7 as Heptane	1933.449		1,933	173.27	ND	0	163	ND	0	1,933	1.93	124	573	5.73E-07	0	0	0.00E+00	5.73E-07
n-Octane	63355.81		63,356	149.94	ND	0	158	ND	0	63,356	63.36	4067	18768	1.88E-05	0	0	0.00E+00	1.88E-05
C8 as Octane	1541173		1,541,173	149.94	ND	0	158	ND	0	1,541,173	1541.17	98921	456556	4.57E-04	0	0	0.00E+00	4.57E-04
n-Nonane	410999		410,999	151.06	ND	0	159	ND	0	410,999	411.00	26380	121754	1.22E-04	0	0	0.00E+00	1.22E-04
C9 as Nonane	2480313		2,480,313	151.06	ND	0	159	ND	0	2,480,313	2480.31	159199	734767	7.35E-04	0	0	0.00E+00	7.35E-04
n-Decane	703301.9		703,302	152.42	ND	0	161	ND	0	703,302	703.30	45142	208346	2.08E-04	0	0	0.00E+00	2.08E-04
C10 as Decane	3654755		3,654,755	152.42	ND	0	161	ND	0	3,654,755	3654.75	234581	1082683	1.08E-03	0	0	0.00E+00	1.08E-03
n-Undecane	456415		456,415	152.03	ND	0	161	ND	0	456,415	456.42	29295	135208	1.35E-04	0	0	0.00E+00	1.35E-04
C11 as Undecane	2211723		2,211,723	152.03	ND	0	161	ND	0	2,211,723	2211.72	141960	655200	6.55E-04	0	0	0.00E+00	6.55E-04
n-Dodecane	252300.3		252,300	151	ND	0	159	ND	0	252,300	252.30	16194	74741	7.47E-05	0	0	0.00E+00	7.47E-05
C12 as Dodecane	535366.1		535,366	151	ND	0	159	ND	0	535,366	535.37	34363	158597	1.59E-04	0	0	0.00E+00	1.59E-04
n-Tridecane	76304.43		76,304	151.36	ND	0	160	ND	0	76,304	76.30	4898	22604	2.26E-05	0	0	0.00E+00	2.26E-05
C13 as Tridecane	82629.28		82,629	151.36	ND	0	160	ND	0	82,629	82.63	5304	24478	2.45E-05	0	0	0.00E+00	2.45E-05
n-Tetradecane	3364.743		3,365	151.21	ND	0	160	ND	0	3,365	3.36	216	997	9.97E-07	0	0	0.00E+00	9.97E-07
C14 as tetradecane	8867.166		8,867	151.21	ND	0	160	ND	0	8,867	8.87	569	2627	2.63E-06	0	0	0.00E+00	2.63E-06
n-Pentadecane	540.0435	J	540	151.97	ND	0	160	ND	0	540	0.54	35	160	1.60E-07	0	0	0.00E+00	1.60E-07
C15 as Pentadecane	1083.484		1,083	151.97	ND	0	160	ND	0	1,083	1.08	70	321	3.21E-07	0	0	0.00E+00	3.21E-07
n-Hexadecane	98.01789	J	98	151.15	ND	0	160	ND	0	98	0.10	6	29	2.90E-08	0	0	0.00E+00	2.90E-08
C16 as Hexadecane	79.808	ND	40	151.15	ND	0	160	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
n-Heptadecane	78.88	ND	39	149.39	ND	0	158	ND	0	39	0.04	3	12	1.17E-08	0	0	0.00E+00	1.17E-08
C17 as Heptadecane	78.88	ND	39	149.39	ND	0	158	ND	0	39	0.04	3	12	1.17E-08	0	0	0.00E+00	1.17E-08
n-Octadecane	79.76	ND	40	151.06	ND	0	159	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
C18 as Octodecane	79.76	ND	40	151.06	ND	0	159	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
n-Nonadecane	79.92	ND	40	151.36	ND	0	160	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
C19 as Nonadecane	79.92	ND	40	151.36	ND	0	160	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
n-Eicosane	79.728	ND	40	151	ND	0	159	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
C20 as Eicosane	79.728	ND	40	151	ND	0	159	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
n-Heneicosane	80.48	ND	40	152.42	ND	0	161	ND	0	40	0.04	3	12	1.19E-08	0	0	0.00E+00	1.19E-08
C21 as Heneicosane	80.48	ND	40	152.42	ND	0	161	ND	0	40	0.04	3	12	1.19E-08	0	0	0.00E+00	1.19E-08
n-Docosane	79.568	ND	40	150.7	ND	0	159	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
C22 as Docosane	79.568	ND	40	150.7	ND	0	159	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
n-Tricosane	80	ND	40	151.52	ND	0	160	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
C23 as Tricosane	80	ND	40	151.52	ND	0	160	ND	0	40	0.04	3	12	1.18E-08	0	0	0.00E+00	1.18E-08
n-Tetracosane	80.112	ND	40	151.73	ND	0	160	ND	0	40	0.04	3	12	1.19E-08	0	0	0.00E+00	1.19E-08
C24 as Tetracosane	80.112	ND	40	151.73	ND	0	160	ND	0	40	0.04	3	12	1.19E-08	0	0	0.00E+00	1.19E-08
Total Hydrocarbon			########			0			0		12485.80	801404	#######	3.70E-03	0	0	0.00E+00	3.70E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D027B	D027B		ND Adj	#D028A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.2819	ND	76	146	ND	0	150	ND	0	76	0.08	5	22	2.24E-08	2.24E-08
C5 as Pentane	194.8662	J	195	146	ND	0	150	ND	0	195	0.19	13	58	5.77E-08	5.77E-08
n-Hexane	216.7811	ND	108	209	ND	0	156	ND	0	108	0.11	7	32	3.21E-08	3.21E-08
C6 as Hexane	278.8899	J	279	209	ND	0	156	ND	0	279	0.28	18	83	8.26E-08	8.26E-08
n-Heptane	461.6024	J	462	173	ND	0	163	ND	0	462	0.46	30	137	1.37E-07	1.37E-07
C7 as Heptane	4256.247		4,256	173	ND	0	163	ND	0	4,256	4.26	273	1261	1.26E-06	1.26E-06
n-Octane	50915.1		50,915	150	ND	0	158	ND	0	50,915	50.92	3268	15083	1.51E-05	1.51E-05
C8 as Octane	1997536		1,997,536	150	ND	0	158	ND	0	1,997,536	1997.54	128212	591749	5.92E-04	5.92E-04
n-Nonane	279912.2		279,912	151	ND	0	159	ND	0	279,912	279.91	17966	82921	8.29E-05	8.29E-05
C9 as Nonane	3429864		3,429,864	151	ND	0	159	ND	0	3,429,864	3429.86	220147	1016061	1.02E-03	1.02E-03
n-Decane	486117.9		486,118	152	ND	0	161	ND	0	486,118	486.12	31202	144007	1.44E-04	1.44E-04
C10 as Decane	4209955		4,209,955	152	ND	0	161	ND	0	4,209,955	4209.95	270217	1247155	1.25E-03	1.25E-03
n-Undecane	309871.4		309,871	152	ND	0	161	ND	0	309,871	309.87	19889	91796	9.18E-05	9.18E-05
C11 as Undecane	2731398		2,731,398	152	ND	0	161	ND	0	2,731,398	2731.40	175315	809148	8.09E-04	8.09E-04
n-Dodecane	169782.4		169,782	151	ND	0	159	ND	0	169,782	169.78	10898	50296	5.03E-05	5.03E-05
C12 as Dodecane	742212.6		742,213	151	ND	0	159	ND	0	742,213	742.21	47639	219873	2.20E-04	2.20E-04
n-Tridecane	48830.61		48,831	151	ND	0	160	ND	0	48,831	48.83	3134	14466	1.45E-05	1.45E-05
C13 as Tridecane	106393.2		106,393	151	ND	0	160	ND	0	106,393	106.39	6829	31518	3.15E-05	3.15E-05
n-Tetradecane	3302.053		3,302	151	ND	0	160	ND	0	3,302	3.30	212	978	9.78E-07	9.78E-07
C14 as tetradecane	6085.547		6,086	151	ND	0	160	ND	0	6,086	6.09	391	1803	1.80E-06	1.80E-06
n-Pentadecane	281.8869	J	282	152	ND	0	160	ND	0	282	0.28	18	84	8.35E-08	8.35E-08
C15 as Pentadecane	157.9528	ND	79	152	ND	0	160	ND	0	79	0.08	5	23	2.34E-08	2.34E-08
n-Hexadecane	157.1024	ND	79	151	ND	0	160	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
C16 as Hexadecane	157.1024	ND	79	151	ND	0	160	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
n-Heptadecane	155.2756	ND	78	149	ND	0	158	ND	0	78	0.08	5	23	2.30E-08	2.30E-08
C17 as Heptadecane	155.2756	ND	78	149	ND	0	158	ND	0	78	0.08	5	23	2.30E-08	2.30E-08
n-Octadecane	157.0079	ND	79	151	ND	0	159	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
C18 as Octodecane	157.0079	ND	79	151	ND	0	159	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
n-Nonadecane	157.3228	ND	79	151	ND	0	160	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
C19 as Nonadecane	157.3228	ND	79	151	ND	0	160	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
n-Eicosane	156.9449	ND	78	151	ND	0	159	ND	0	78	0.08	5	23	2.32E-08	2.32E-08
C20 as Eicosane	156.9449	ND	78	151	ND	0	159	ND	0	78	0.08	5	23	2.32E-08	2.32E-08
n-Heneicosane	158.4252	ND	79	152	ND	0	161	ND	0	79	0.08	5	23	2.35E-08	2.35E-08
C21 as Heneicosane	158.4252	ND	79	152	ND	0	161	ND	0	79	0.08	5	23	2.35E-08	2.35E-08
n-Docosane	156.6299	ND	78	151	ND	0	159	ND	0	78	0.08	5	23	2.32E-08	2.32E-08
C22 as Docosane	156.6299	ND	78	151	ND	0	159	ND	0	78	0.08	5	23	2.32E-08	2.32E-08
n-Tricosane	157.4803	ND	79	152	ND	0	160	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
C23 as Tricosane	157.4803	ND	79	152	ND	0	160	ND	0	79	0.08	5	23	2.33E-08	2.33E-08
n-Tetracosane	157.7008	ND	79	152	ND	0	160	ND	0	79	0.08	5	23	2.34E-08	2.34E-08
C24 as Tetracosane	157.7008	ND	79	152	ND	0	160	ND	0	79	0.08	5	23	2.34E-08	2.34E-08
Total Hydrocarbon			########			0			0		14579.33	935777	#######	4.32E-03	4.32E-03

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	1.68E-08
C5 as Pentane	3.44E-08
n-Hexane	2.76E-08
C6 as Hexane	6.09E-08
n-Heptane	1.15E-07
C7 as Heptane	9.17E-07
n-Octane	1.69E-05
C8 as Octane	5.24E-04
n-Nonane	1.02E-04
C9 as Nonane	8.75E-04
n-Decane	1.76E-04
C10 as Decane	1.16E-03
n-Undecane	1.14E-04
C11 as Undecane	7.32E-04
n-Dodecane	6.25E-05
C12 as Dodecane	1.89E-04
n-Tridecane	1.85E-05
C13 as Tridecane	2.80E-05
n-Tetradecane	9.87E-07
C14 as tetradecane	2.21E-06
n-Pentadecane	1.22E-07
C15 as Pentadecane	1.72E-07
n-Hexadecane	2.62E-08
C16 as Hexadecane	1.75E-08
n-Heptadecane	1.73E-08
C17 as Heptadecane	1.73E-08
n-Octadecane	1.75E-08
C18 as Octodecane	1.75E-08
n-Nonadecane	1.76E-08
C19 as Nonadecane	1.76E-08
n-Eicosane	1.75E-08
C20 as Eicosane	1.75E-08
n-Heneicosane	1.77E-08
C21 as Heneicosane	1.77E-08
n-Docosane	1.75E-08
C22 as Docosane	1.75E-08
n-Tricosane	1.76E-08
C23 as Tricosane	1.76E-08
n-Tetracosane	1.76E-08
C24 as Tetracosane	1.76E-08
Total Hydrocarbon	4.01E-03

THC:	**2.12E-01**	**lbs/day**	**3.87E-02**	**tons/yr**

Bagging Data Form — Vacuum Method

Sample Id D029

WSPA — Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	D-192	
Equipment Subtype:	Gate			**Plant ID:**	Refinery D	
Line Size:	6	*inches*		**Date:**	2-Apr-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.78 *inHg*	756.4	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	83.2 *°F*	28.4	*°C*	**TVA ID**	36502	
Component Temp:	73.1 *°F*	22.8	*°C*	**Stream Pressure/Temp:**	38 *psig*	*°F*
Stream Description:	*Top of V-751*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:40	Background	2	*ppmv*	8-sec Dwell	8	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	14 *ppm*
9:55	Initial Bag Vacuum	0.001	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	28.5	*°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	9:57	9:59	10:09	10:12	10:14	10:22	10:26							
ppmv	26.4	29.8	26.5	27	26.1	24.7	24.7							

Sorbent Tube Sample Collection Parameters

D029A

Time									
10:15	Volume Start	213.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:28	Volume Stop	227.2	*Liters*	Total Vol	13.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.046 *L/min*	Sorbent $Flow_{STP}$	1.046	*L/min*

D029B

10:15	Volume Start	193.3	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:28	Volume Stop	206.9	*Liters*	Total Vol	13.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.046 *L/min*	Sorbent $Flow_{STP}$	1.046	*L/min*
	Total ST Vol_{STP}	27.20	*Liters*	DGM Vol_{STP}	88.63	*Liters*	Total Run Vol_{STP}	115.83	*Liters*

Bagging Parameters

Time										
10:21	Vacuum check	0.001	*inches H2O*			DGM_P	2	*inches H2O vacuum*	752.7	*mmHg*
10:17	DGM_{10L} Time	01:27.9	*min:sec.frac*	DGM Time	1.467	DGM Flow	6.82	DGM $Flow_{STP}$	6.82	*liters/minute*
10:21	Bag Temp.	86.72	*°F*	30.4	*°C*	$Sample_T$	65	*°F*	18.3	*°C*

Post-Sample Data

11:05 Post Test M21	Background	2	*ppmv*	8-sec Dwell	32	*ppmv*	Total Dwell	1:00 *min:sec*	Final M21 40 *ppm* @ Stem
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	2.81E-06 kg/hr
Percent difference THC ER =	38%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.83E-08
C5 as Pentane	2.83E-08
n-Hexane	4.06E-08
C6 as Hexane	4.06E-08
n-Heptane	3.37E-08
C7 as Heptane	3.37E-08
n-Octane	2.92E-08
C8 as Octane	1.33E-07
n-Nonane	5.27E-08
C9 as Nonane	5.80E-07
n-Decane	5.46E-08
C10 as Decane	5.31E-07
n-Undecane	5.16E-08
C11 as Undecane	3.33E-07
n-Dodecane	4.50E-08
C12 as Dodecane	8.92E-08
n-Tridecane	2.95E-08
C13 as Tridecane	2.95E-08
n-Tetradecane	2.94E-08
C14 as tetradecane	2.94E-08
n-Pentadecane	2.96E-08
C15 as Pentadecane	2.96E-08
n-Hexadecane	2.94E-08
C16 as Hexadecane	2.94E-08
n-Heptadecane	2.91E-08
C17 as Heptadecane	2.91E-08
n-Octadecane	2.94E-08
C18 as Octodecane	2.94E-08
n-Nonadecane	2.95E-08
C19 as Nonadecane	2.95E-08
n-Eicosane	2.94E-08
C20 as Eicosane	2.94E-08
n-Heneicosane	2.97E-08
C21 as Heneicosane	2.97E-08
n-Docosane	2.93E-08
C22 as Docosane	2.93E-08
n-Tricosane	2.95E-08
C23 as Tricosane	2.95E-08
n-Tetracosane	2.95E-08
C24 as Tetracosane	2.95E-08
Total Hydrocarbon	2.81E-06

THC: 1.49E-04 lbs/day 2.71E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D029A	D029A		ND Adj	#D030A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	70.63529	ND	35	141.27	ND	0	150	ND	0	35	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C5 as Pentane	70.63529	ND	35	141.27	ND	0	150	ND	0	35	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Hexane	101.2176	ND	51	202.44	ND	0	156	ND	0	51	0.05	6	27	2.71E-08	0	0	0.00E+00	2.71E-08
C6 as Hexane	101.2176	ND	51	202.44	ND	0	156	ND	0	51	0.05	6	27	2.71E-08	0	0	0.00E+00	2.71E-08
n-Heptane	84.08824	ND	42	168.18	ND	0	163	ND	0	42	0.04	5	22	2.25E-08	0	0	0.00E+00	2.25E-08
C7 as Heptane	84.08824	ND	42	168.18	ND	0	163	ND	0	42	0.04	5	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Octane	72.76471	ND	36	145.53	ND	0	158	ND	0	36	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C8 as Octane	426.0446	J	426	145.53	ND	0	158	ND	0	426	0.43	49	228	2.28E-07	0	0	0.00E+00	2.28E-07
n-Nonane	123.8938	J	124	146.62	ND	0	159	ND	0	124	0.12	14	66	6.62E-08	0	0	0.00E+00	6.62E-08
C9 as Nonane	1546.777		1,547	146.62	ND	0	159	ND	0	1,547	1.55	179	827	8.27E-07	0	0	0.00E+00	8.27E-07
n-Decane	130.3307	J	130	147.94	ND	0	161	ND	0	130	0.13	15	70	6.97E-08	0	0	0.00E+00	6.97E-08
C10 as Decane	1408.637		1,409	147.94	ND	0	161	ND	0	1,409	1.41	163	753	7.53E-07	0	0	0.00E+00	7.53E-07
n-Undecane	119.3421	J	119	147.56	ND	0	161	ND	0	119	0.12	14	64	6.38E-08	0	0	0.00E+00	6.38E-08
C11 as Undecane	971.506		972	147.56	ND	0	161	ND	0	972	0.97	113	519	5.19E-07	0	0	0.00E+00	5.19E-07
n-Dodecane	95.227	J	95	146.56	ND	0	159	ND	0	95	0.10	11	51	5.09E-08	0	0	0.00E+00	5.09E-08
C12 as Dodecane	260.2972	J	260	146.56	ND	0	159	ND	0	260	0.26	30	139	1.39E-07	0	0	0.00E+00	1.39E-07
n-Tridecane	73.45588	ND	37	146.91	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C13 as Tridecane	73.45588	ND	37	146.91	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetradecane	73.38235	ND	37	146.76	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C14 as tetradecane	73.38235	ND	37	146.76	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Pentadecane	73.75	ND	37	147.5	ND	0	160	ND	0	37	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C15 as Pentadecane	73.75	ND	37	147.5	ND	0	160	ND	0	37	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Hexadecane	73.35294	ND	37	146.71	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C16 as Hexadecane	73.35294	ND	37	146.71	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heptadecane	72.5	ND	36	145	ND	0	158	ND	0	36	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C17 as Heptadecane	72.5	ND	36	145	ND	0	158	ND	0	36	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Octadecane	73.30882	ND	37	146.62	ND	0	159	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C18 as Octodecane	73.30882	ND	37	146.62	ND	0	159	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Nonadecane	73.45588	ND	37	146.91	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C19 as Nonadecane	73.45588	ND	37	146.91	ND	0	160	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Eicosane	73.27941	ND	37	146.56	ND	0	159	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C20 as Eicosane	73.27941	ND	37	146.56	ND	0	159	ND	0	37	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heneicosane	73.97059	ND	37	147.94	ND	0	161	ND	0	37	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C21 as Heneicosane	73.97059	ND	37	147.94	ND	0	161	ND	0	37	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Docosane	73.13235	ND	37	146.26	ND	0	159	ND	0	37	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C22 as Docosane	73.13235	ND	37	146.26	ND	0	159	ND	0	37	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tricosane	73.52941	ND	37	147.06	ND	0	160	ND	0	37	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C23 as Tricosane	73.52941	ND	37	147.06	ND	0	160	ND	0	37	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetracosane	73.63235	ND	37	147.26	ND	0	160	ND	0	37	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C24 as Tetracosane	73.63235	ND	37	147.26	ND	0	160	ND	0	37	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
Total Hydrocarbon			6,255			0			0		6.26	725	3,344	3.34E-06	0	0	0.00E+00	3.34E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D029B	D029B		ND Adj	#D030A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	141.2706	ND	71	141	ND	0	150	ND	0	71	0.07	8	38	3.78E-08	3.78E-08
C5 as Pentane	141.2706	ND	71	141	ND	0	150	ND	0	71	0.07	8	38	3.78E-08	3.78E-08
n-Hexane	202.4353	ND	101	202	ND	0	156	ND	0	101	0.10	12	54	5.41E-08	5.41E-08
C6 as Hexane	202.4353	ND	101	202	ND	0	156	ND	0	101	0.10	12	54	5.41E-08	5.41E-08
n-Heptane	168.1765	ND	84	168	ND	0	163	ND	0	84	0.08	10	45	4.50E-08	4.50E-08
C7 as Heptane	168.1765	ND	84	168	ND	0	163	ND	0	84	0.08	10	45	4.50E-08	4.50E-08
n-Octane	145.5294	ND	73	146	ND	0	158	ND	0	73	0.07	8	39	3.89E-08	3.89E-08
C8 as Octane	145.5294	ND	73	146	ND	0	158	ND	0	73	0.07	8	39	3.89E-08	3.89E-08
n-Nonane	146.6176	ND	73	147	ND	0	159	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
C9 as Nonane	622.3956	J	622	147	ND	0	159	ND	0	622	0.62	72	333	3.33E-07	3.33E-07
n-Decane	147.9412	ND	74	148	ND	0	161	ND	0	74	0.07	9	40	3.95E-08	3.95E-08
C10 as Decane	576.8914	J	577	148	ND	0	161	ND	0	577	0.58	67	308	3.08E-07	3.08E-07
n-Undecane	147.5588	ND	74	148	ND	0	161	ND	0	74	0.07	9	39	3.94E-08	3.94E-08
C11 as Undecane	274.3262	J	274	148	ND	0	161	ND	0	274	0.27	32	147	1.47E-07	1.47E-07
n-Dodecane	146.5588	ND	73	147	ND	0	159	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
C12 as Dodecane	146.5588	ND	73	147	ND	0	159	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
n-Tridecane	146.9118	ND	73	147	ND	0	160	ND	0	73	0.07	9	39	3.93E-08	3.93E-08
C13 as Tridecane	146.9118	ND	73	147	ND	0	160	ND	0	73	0.07	9	39	3.93E-08	3.93E-08
n-Tetradecane	146.7647	ND	73	147	ND	0	160	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
C14 as tetradecane	146.7647	ND	73	147	ND	0	160	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
n-Pentadecane	147.5	ND	74	148	ND	0	160	ND	0	74	0.07	9	39	3.94E-08	3.94E-08
C15 as Pentadecane	147.5	ND	74	148	ND	0	160	ND	0	74	0.07	9	39	3.94E-08	3.94E-08
n-Hexadecane	146.7059	ND	73	147	ND	0	160	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
C16 as Hexadecane	146.7059	ND	73	147	ND	0	160	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
n-Heptadecane	145	ND	73	145	ND	0	158	ND	0	73	0.07	8	39	3.88E-08	3.88E-08
C17 as Heptadecane	145	ND	73	145	ND	0	158	ND	0	73	0.07	8	39	3.88E-08	3.88E-08
n-Octadecane	146.6176	ND	73	147	ND	0	159	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
C18 as Octodecane	146.6176	ND	73	147	ND	0	159	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
n-Nonadecane	146.9118	ND	73	147	ND	0	160	ND	0	73	0.07	9	39	3.93E-08	3.93E-08
C19 as Nonadecane	146.9118	ND	73	147	ND	0	160	ND	0	73	0.07	9	39	3.93E-08	3.93E-08
n-Eicosane	146.5588	ND	73	147	ND	0	159	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
C20 as Eicosane	146.5588	ND	73	147	ND	0	159	ND	0	73	0.07	8	39	3.92E-08	3.92E-08
n-Heneicosane	147.9412	ND	74	148	ND	0	161	ND	0	74	0.07	9	40	3.95E-08	3.95E-08
C21 as Heneicosane	147.9412	ND	74	148	ND	0	161	ND	0	74	0.07	9	40	3.95E-08	3.95E-08
n-Docosane	146.2647	ND	73	146	ND	0	159	ND	0	73	0.07	8	39	3.91E-08	3.91E-08
C22 as Docosane	146.2647	ND	73	146	ND	0	159	ND	0	73	0.07	8	39	3.91E-08	3.91E-08
n-Tricosane	147.0588	ND	74	147	ND	0	160	ND	0	74	0.07	9	39	3.93E-08	3.93E-08
C23 as Tricosane	147.0588	ND	74	147	ND	0	160	ND	0	74	0.07	9	39	3.93E-08	3.93E-08
n-Tetracosane	147.2647	ND	74	147	ND	0	160	ND	0	74	0.07	9	39	3.94E-08	3.94E-08
C24 as Tetracosane	147.2647	ND	74	147	ND	0	160	ND	0	74	0.07	9	39	3.94E-08	3.94E-08
Total Hydrocarbon			4,260			0			0		4.26	493	2,277	2.28E-06	2.28E-06

Bagging Data Form **Vacuum Method** Sample Id D032

WSPA Western States Petroleum Association

Equipment type:	Valve		Component ID:	D-499	
Equipment Subtype:	Gate		Plant ID:	Refinery D	
Line Size:	3/4 *inches*		Date:	2-Apr-18	
Phase (G, LL, HL):	HL		Analysis team:	EG/DR	
Barometric pressure	29.77 *inHg*	756.2 *mmHg*	Sample Pump A	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	71.1 *°F*	21.7 *°C*	TVA ID	36502	
Component Temp:	72.7 *°F*	22.6 *°C*	Stream Pressure/Temp:	*psig*	*°F*
Stream Description:	*Top of V-758*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
12:48	Background	-5	*ppmv*	8-sec Dwell	1200 *ppmv*	Total Dwell	0:20 *min:sec*	Final M21	4050 *ppm*
13:24	Initial Bag Vacuum	0.05	*inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	84.4 *°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:29	13:32	13:35	13:37	13:38	13:42	13:44	13:46	13:49					
ppmv	1911	1732	1660	1603	1527	1373	1306	1394	1386					

Sorbent Tube Sample Collection Parameters

D032A

Time								
13:37	Volume Start	242.1	*Liters*		Design Sample Flow Rate = 1 liter/min			
13:50	Volume Stop	254.4	*Liters*	Total Vol	12.3 *Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.946 *L/min*	Sorbent Flow$_{STP}$	0.923 *L/min*

D032B

13:37	Volume Start	206.9	*Liters*		Design Sample Flow Rate = 1 liter/min			
13:50	Volume Stop	219.9	*Liters*	Total Vol	13.0 *Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	0.976 *L/min*
	Total ST Vol$_{STP}$	24.69	*Liters*	DGM Vol$_{STP}$	85.53 *Liters*	Total Run Vol$_{STP}$	110.22 *Liters*	

Bagging Parameters

Time									
13:39	Vacuum check	0.07	*inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	752.8	*mmHg*
13:42	DGM$_{10L}$ Time	01:29.3	*min:sec.frac*	DGM Time	1.483	DGM Flow	6.74	DGM Flow$_{STP}$ 6.58	*liters/minute*
13:40	Bag Temp.	98.4	*°F*	36.9	*°C*	Sample$_T$	78 *°F*	25.6	*°C*

Post-Sample Data

14:04	Post Test M21	Background	2 *ppmv*	8-sec Dwell	2100 *ppmv*	Total Dwell	1:20 *min:sec*	Final M21	4100 *ppm* @ Stem
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A *ml*						
Density of organic condensate			N/A *g/ml*						

Average THC emissions =	2.05E-03 kg/hr
Percent difference THC ER =	39%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.14E-07
C5 as Pentane	3.69E-07
n-Hexane	9.14E-08
C6 as Hexane	5.16E-07
n-Heptane	1.87E-07
C7 as Heptane	5.03E-06
n-Octane	3.14E-05
C8 as Octane	7.38E-04
n-Nonane	7.73E-05
C9 as Nonane	6.80E-04
n-Decane	5.45E-05
C10 as Decane	3.60E-04
n-Undecane	1.44E-05
C11 as Undecane	8.05E-05
n-Dodecane	2.27E-06
C12 as Dodecane	6.23E-06
n-Tridecane	1.89E-07
C13 as Tridecane	2.11E-07
n-Tetradecane	2.98E-08
C14 as tetradecane	2.98E-08
n-Pentadecane	3.00E-08
C15 as Pentadecane	3.00E-08
n-Hexadecane	2.98E-08
C16 as Hexadecane	2.98E-08
n-Heptadecane	2.95E-08
C17 as Heptadecane	2.95E-08
n-Octadecane	2.98E-08
C18 as Octodecane	2.98E-08
n-Nonadecane	2.99E-08
C19 as Nonadecane	2.99E-08
n-Eicosane	2.98E-08
C20 as Eicosane	2.98E-08
n-Heneicosane	3.01E-08
C21 as Heneicosane	3.01E-08
n-Docosane	2.97E-08
C22 as Docosane	2.97E-08
n-Tricosane	2.99E-08
C23 as Tricosane	2.99E-08
n-Tetracosane	2.99E-08
C24 as Tetracosane	2.99E-08
Total Hydrocarbon	2.05E-03

THC:	1.09E-01	lbs/day	1.98E-02	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D032A	D032A		ND Adj	#D033A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	739.4428	J	739	156.2	ND	0	150	ND	0	739	0.74	82	376	3.76E-07	0	0	0.00E+00	3.76E-07
C5 as Pentane	78.10081	ND	39	156.2	ND	0	150	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Hexane	253.2739	J	253	223.83	ND	0	156	ND	0	253	0.25	28	129	1.29E-07	0	0	0.00E+00	1.29E-07
C6 as Hexane	111.9154	ND	56	223.83	ND	0	156	ND	0	56	0.06	6	28	2.85E-08	0	0	0.00E+00	2.85E-08
n-Heptane	439.9458	J	440	185.95	ND	0	163	ND	0	440	0.44	48	224	2.24E-07	0	0	0.00E+00	2.24E-07
C7 as Heptane	11523.86		11,524	185.95	ND	0	163	ND	0	11,524	11.52	1270	5862	5.86E-06	0	0	0.00E+00	5.86E-06
n-Octane	75293.6		75,294	160.91	ND	0	158	ND	0	75,294	75.29	8299	38302	3.83E-05	0	0	0.00E+00	3.83E-05
C8 as Octane	1751556		1,751,556	160.91	ND	0	158	ND	0	1,751,556	1751.56	193055	891022	8.91E-04	0	0	0.00E+00	8.91E-04
n-Nonane	191835.5		191,836	162.11	ND	0	159	ND	0	191,836	191.84	21144	97587	9.76E-05	0	0	0.00E+00	9.76E-05
C9 as Nonane	1570120		1,570,120	162.11	ND	0	159	ND	0	1,570,120	1570.12	173057	798725	7.99E-04	0	0	0.00E+00	7.99E-04
n-Decane	141974.7		141,975	163.58	ND	0	161	ND	0	141,975	141.97	15648	72223	7.22E-05	0	0	0.00E+00	7.22E-05
C10 as Decane	834352.3		834,352	163.58	ND	0	161	ND	0	834,352	834.35	91961	424437	4.24E-04	0	0	0.00E+00	4.24E-04
n-Undecane	29952.21		29,952	163.15	ND	0	161	ND	0	29,952	29.95	3301	15237	1.52E-05	0	0	0.00E+00	1.52E-05
C11 as Undecane	189582.6		189,583	163.15	ND	0	161	ND	0	189,583	189.58	20896	96441	9.64E-05	0	0	0.00E+00	9.64E-05
n-Dodecane	4670.642		4,671	162.05	ND	0	159	ND	0	4,671	4.67	515	2376	2.38E-06	0	0	0.00E+00	2.38E-06
C12 as Dodecane	15459.91		15,460	162.05	ND	0	159	ND	0	15,460	15.46	1704	7865	7.86E-06	0	0	0.00E+00	7.86E-06
n-Tridecane	473.7283	J	474	162.44	ND	0	160	ND	0	474	0.47	52	241	2.41E-07	0	0	0.00E+00	2.41E-07
C13 as Tridecane	753.5861	J	754	162.44	ND	0	160	ND	0	754	0.75	83	383	3.83E-07	0	0	0.00E+00	3.83E-07
n-Tetradecane	81.13821	ND	41	162.28	ND	0	160	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C14 as tetradecane	81.13821	ND	41	162.28	ND	0	160	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Pentadecane	81.54472	ND	41	163.09	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C15 as Pentadecane	81.54472	ND	41	163.09	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Hexadecane	81.10569	ND	41	162.21	ND	0	160	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C16 as Hexadecane	81.10569	ND	41	162.21	ND	0	160	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Heptadecane	80.1626	ND	40	160.33	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C17 as Heptadecane	80.1626	ND	40	160.33	ND	0	158	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Octadecane	81.05691	ND	41	162.11	ND	0	159	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C18 as Octodecane	81.05691	ND	41	162.11	ND	0	159	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Nonadecane	81.21951	ND	41	162.44	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C19 as Nonadecane	81.21951	ND	41	162.44	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Eicosane	81.02439	ND	41	162.05	ND	0	159	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C20 as Eicosane	81.02439	ND	41	162.05	ND	0	159	ND	0	41	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Heneicosane	81.78862	ND	41	163.58	ND	0	161	ND	0	41	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C21 as Heneicosane	81.78862	ND	41	163.58	ND	0	161	ND	0	41	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Docosane	80.86179	ND	40	161.72	ND	0	159	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C22 as Docosane	80.86179	ND	40	161.72	ND	0	159	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Tricosane	81.30081	ND	41	162.6	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C23 as Tricosane	81.30081	ND	41	162.6	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Tetracosane	81.41463	ND	41	162.83	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C24 as Tetracosane	81.41463	ND	41	162.83	ND	0	160	ND	0	41	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
Total Hydrocarbon			4,819,969			0			0		4819.97	531252	#######	2.45E-03	0	0	0.00E+00	2.45E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D032B	D032B		ND Adj	#D033A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	493.9876	J	494	156	ND	0	150	ND	0	494	0.49	54	251	2.51E-07	2.51E-07
C5 as Pentane	1411.7	J	1,412	156	ND	0	150	ND	0	1,412	1.41	156	718	7.18E-07	7.18E-07
n-Hexane	211.7785	ND	106	224	ND	0	156	ND	0	106	0.11	12	54	5.39E-08	5.39E-08
C6 as Hexane	1972.701		1,973	224	ND	0	156	ND	0	1,973	1.97	217	1004	1.00E-06	1.00E-06
n-Heptane	293.3949	J	293	186	ND	0	163	ND	0	293	0.29	32	149	1.49E-07	1.49E-07
C7 as Heptane	8253.303		8,253	186	ND	0	163	ND	0	8,253	8.25	910	4198	4.20E-06	4.20E-06
n-Octane	48239.63		48,240	161	ND	0	158	ND	0	48,240	48.24	5317	24540	2.45E-05	2.45E-05
C8 as Octane	1151634		1,151,634	161	ND	0	158	ND	0	1,151,634	1151.63	126932	585839	5.86E-04	5.86E-04
n-Nonane	111947.1		111,947	162	ND	0	159	ND	0	111,947	111.95	12339	56948	5.69E-05	5.69E-05
C9 as Nonane	1102101		1,102,101	162	ND	0	159	ND	0	1,102,101	1102.10	121472	560642	5.61E-04	5.61E-04
n-Decane	72386.44		72,386	164	ND	0	161	ND	0	72,386	72.39	7978	36823	3.68E-05	3.68E-05
C10 as Decane	580695.9		580,696	164	ND	0	161	ND	0	580,696	580.70	64004	295402	2.95E-04	2.95E-04
n-Undecane	26652.65		26,653	163	ND	0	161	ND	0	26,653	26.65	2938	13558	1.36E-05	1.36E-05
C11 as Undecane	127071.7		127,072	163	ND	0	161	ND	0	127,072	127.07	14006	64642	6.46E-05	6.46E-05
n-Dodecane	4265.404		4,265	162	ND	0	159	ND	0	4,265	4.27	470	2170	2.17E-06	2.17E-06
C12 as Dodecane	9026.809		9,027	162	ND	0	159	ND	0	9,027	9.03	995	4592	4.59E-06	4.59E-06
n-Tridecane	267.8045	J	268	162	ND	0	160	ND	0	268	0.27	30	136	1.36E-07	1.36E-07
C13 as Tridecane	153.6923	ND	77	162	ND	0	160	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
n-Tetradecane	153.5385	ND	77	162	ND	0	160	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
C14 as tetradecane	153.5385	ND	77	162	ND	0	160	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
n-Pentadecane	154.3077	ND	77	163	ND	0	160	ND	0	77	0.08	9	39	3.92E-08	3.92E-08
C15 as Pentadecane	154.3077	ND	77	163	ND	0	160	ND	0	77	0.08	9	39	3.92E-08	3.92E-08
n-Hexadecane	153.4769	ND	77	162	ND	0	160	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C16 as Hexadecane	153.4769	ND	77	162	ND	0	160	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Heptadecane	151.6923	ND	76	160	ND	0	158	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
C17 as Heptadecane	151.6923	ND	76	160	ND	0	158	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
n-Octadecane	153.3846	ND	77	162	ND	0	159	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C18 as Octodecane	153.3846	ND	77	162	ND	0	159	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Nonadecane	153.6923	ND	77	162	ND	0	160	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
C19 as Nonadecane	153.6923	ND	77	162	ND	0	160	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
n-Eicosane	153.3231	ND	77	162	ND	0	159	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C20 as Eicosane	153.3231	ND	77	162	ND	0	159	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Heneicosane	154.7692	ND	77	164	ND	0	161	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
C21 as Heneicosane	154.7692	ND	77	164	ND	0	161	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
n-Docosane	153.0154	ND	77	162	ND	0	159	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
C22 as Docosane	153.0154	ND	77	162	ND	0	159	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
n-Tricosane	153.8462	ND	77	163	ND	0	160	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
C23 as Tricosane	153.8462	ND	77	163	ND	0	160	ND	0	77	0.08	8	39	3.91E-08	3.91E-08
n-Tetracosane	154.0615	ND	77	163	ND	0	160	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
C24 as Tetracosane	154.0615	ND	77	163	ND	0	160	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
Total Hydrocarbon			3,248,585			0			0		3248.58	358056	#######	1.65E-03	1.65E-03

Bagging Data Form	Vacuum Method		Sample Id	D034
Equipment type:	Connector		Component ID:	D-596
Equipment Subtype:	Swagelok Nut		Plant ID:	Refinery D
Line Size:	1/2 inches		Date:	2-Apr-18
Phase (G, LL, HL):	HL		Analysis team:	EG/DR/MD
Barometric pressure	29.79 inHg	756.7 mmHg	Sample Pump A	LP52979
			Sample Pump B	LP52975
Ambient Temp:	80.5 °F	26.9 °C	TVA ID	36502
Component Temp:	75.1 °F	23.9 °C	Stream Pressure/Temp:	psig °F
Stream Description:	Jet A Stab btms to Jet/1 Jet Blend			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
14:30	Background	30 ppmv	8-sec Dwell	2110 ppmv	Total Dwell	1:30 min:sec	Final M21	3352 ppm
14:52	Initial Bag Vacuum	0.05 inches H2O	DGM Vac.	1.8 inches H2O	Bag Temp	78.1 °F	Leak @	tube connector

Bag Concentrations (ppmv)

Time	14:54	14:57	15:00	15:03	15:04	15:06	15:11	15:17						
ppmv	495	581	496	495	505	505	479	517						

Sorbent Tube Sample Collection Parameters

D034A							
Time							
15:06	Volume Start	254.5 Liters		Design Sample Flow Rate = 1 liter/min			
15:19	Volume Stop	267.0 Liters	Total Vol	12.5 Liters			
	Sample Run Time	13 Minutes		Sorbent Flow	0.962 L/min	Sorbent Flow$_{STP}$	0.959 L/min
D034B							
15:06	Volume Start	220.0 Liters		Design Sample Flow Rate = 1 liter/min			
15:19	Volume Stop	232.6 Liters	Total Vol	12.6 Liters			
	Sample Run Time	13 Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	0.966 L/min
	Total ST Vol$_{STP}$	25.03 Liters	DGM Vol$_{STP}$	86.41 Liters	Total Run Vol$_{STP}$	111.44 Liters	

Bagging Parameters

Time								
15:10	Vacuum check	0.035 inches H2O			DGM$_P$	1.75 inches H2O vacuum	753.4 mmHg	
15:09	DGM$_{10L}$ Time	01:30.1 min:sec.frac	DGM Time	1.500	DGM Flow	6.67	DGM Flow$_{STP}$	6.65 liters/minute
15:10	Bag Temp.	76.5 °F	24.7 °C		Sample$_T$	67 °F	19.4 °C	

Post-Sample Data

15:29	Post Test M21	Background	8 ppmv	8-sec Dwell	1106 ppmv	Total Dwell	3:00 min:sec	Final M21 4417 ppm @ tube connector
Condensate accumulation: starting time			N/A hour:min	Final time	N/A hour:min		0:00 hours:min	
Organic condensate collected			N/A ml					
Density of organic condensate			N/A g/ml					

Average THC emissions =	5.69E-04	kg/hr
Percent difference THC ER =	30%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.95E-08
C5 as Pentane	2.95E-08
n-Hexane	4.23E-08
C6 as Hexane	4.23E-08
n-Heptane	3.51E-08
C7 as Heptane	3.51E-08
n-Octane	4.47E-06
C8 as Octane	1.53E-04
n-Nonane	1.61E-05
C9 as Nonane	1.71E-04
n-Decane	1.43E-05
C10 as Decane	1.33E-04
n-Undecane	6.98E-06
C11 as Undecane	5.23E-05
n-Dodecane	2.80E-06
C12 as Dodecane	1.10E-05
n-Tridecane	8.70E-07
C13 as Tridecane	1.99E-06
n-Tetradecane	1.01E-07
C14 as tetradecane	6.21E-08
n-Pentadecane	3.08E-08
C15 as Pentadecane	3.08E-08
n-Hexadecane	3.06E-08
C16 as Hexadecane	3.06E-08
n-Heptadecane	3.03E-08
C17 as Heptadecane	3.03E-08
n-Octadecane	3.06E-08
C18 as Octodecane	3.06E-08
n-Nonadecane	3.07E-08
C19 as Nonadecane	3.07E-08
n-Eicosane	3.06E-08
C20 as Eicosane	3.06E-08
n-Heneicosane	3.09E-08
C21 as Heneicosane	3.09E-08
n-Docosane	3.05E-08
C22 as Docosane	3.05E-08
n-Tricosane	3.07E-08
C23 as Tricosane	3.07E-08
n-Tetracosane	3.07E-08
C24 as Tetracosane	3.07E-08
Total Hydrocarbon	5.69E-04

THC:	3.01E-02	lbs/day	5.49E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D034A	D034A		ND Adj	#D035A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	146.66	ND	0	150	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C5 as Pentane	76.8512	ND	38	146.66	ND	0	150	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Hexane	110.1248	ND	55	210.16	ND	0	156	ND	0	55	0.06	6	28	2.83E-08	0	0	0.00E+00	2.83E-08
C6 as Hexane	110.1248	ND	55	210.16	ND	0	156	ND	0	55	0.06	6	28	2.83E-08	0	0	0.00E+00	2.83E-08
n-Heptane	91.488	ND	46	87.298	ND	0	163	ND	0	46	0.05	5	24	2.35E-08	0	0	0.00E+00	2.35E-08
C7 as Heptane	91.488	ND	46	87.298	ND	0	163	ND	0	46	0.05	5	24	2.35E-08	0	0	0.00E+00	2.35E-08
n-Octane	7381.751		7,382	151.08	ND	0	158	ND	0	7,382	7.38	823	3797	3.80E-06	0	0	0.00E+00	3.80E-06
C8 as Octane	266886.2		266,886	151.08	ND	0	158	ND	0	266,886	266.89	29742	137272	1.37E-04	0	0	0.00E+00	1.37E-04
n-Nonane	29661.62		29,662	152.21	ND	0	159	ND	0	29,662	29.66	3306	15256	1.53E-05	0	0	0.00E+00	1.53E-05
C9 as Nonane	268431.1		268,431	152.21	ND	0	159	ND	0	268,431	268.43	29914	138067	1.38E-04	0	0	0.00E+00	1.38E-04
n-Decane	27918.47		27,918	153.59	ND	0	161	ND	0	27,918	27.92	3111	14360	1.44E-05	0	0	0.00E+00	1.44E-05
C10 as Decane	214427		214,427	153.59	ND	0	161	ND	0	214,427	214.43	23896	110290	1.10E-04	0	0	0.00E+00	1.10E-04
n-Undecane	9320.547		9,321	153.19	ND	0	161	ND	0	9,321	9.32	1039	4794	4.79E-06	0	0	0.00E+00	4.79E-06
C11 as Undecane	85284.21		85,284	153.19	ND	0	161	ND	0	85,284	85.28	9504	43866	4.39E-05	0	0	0.00E+00	4.39E-05
n-Dodecane	3784.49		3,784	152.15	ND	0	159	ND	0	3,784	3.78	422	1947	1.95E-06	0	0	0.00E+00	1.95E-06
C12 as Dodecane	18204.48		18,204	152.15	ND	0	159	ND	0	18,204	18.20	2029	9363	9.36E-06	0	0	0.00E+00	9.36E-06
n-Tridecane	1422.602		1,423	152.52	ND	0	160	ND	0	1,423	1.42	159	732	7.32E-07	0	0	0.00E+00	7.32E-07
C13 as Tridecane	3589.225		3,589	152.52	ND	0	160	ND	0	3,589	3.59	400	1846	1.85E-06	0	0	0.00E+00	1.85E-06
n-Tetradecane	196.5819	J	197	152.37	ND	0	160	ND	0	197	0.20	22	101	1.01E-07	0	0	0.00E+00	1.01E-07
C14 as tetradecane	162.2169	J	162	152.37	ND	0	160	ND	0	162	0.16	18	83	8.34E-08	0	0	0.00E+00	8.34E-08
n-Pentadecane	80.24	ND	40	153.13	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C15 as Pentadecane	80.24	ND	40	153.13	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Hexadecane	79.808	ND	40	152.31	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C16 as Hexadecane	79.808	ND	40	152.31	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Heptadecane	78.88	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C17 as Heptadecane	78.88	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Octadecane	79.76	ND	40	152.21	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C18 as Octodecane	79.76	ND	40	152.21	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Nonadecane	79.92	ND	40	152.52	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C19 as Nonadecane	79.92	ND	40	152.52	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Eicosane	79.728	ND	40	152.15	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C20 as Eicosane	79.728	ND	40	152.15	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Heneicosane	80.48	ND	40	153.59	ND	0	161	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C21 as Heneicosane	80.48	ND	40	153.59	ND	0	161	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Docosane	79.568	ND	40	151.85	ND	0	159	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C22 as Docosane	79.568	ND	40	151.85	ND	0	159	ND	0	40	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Tricosane	80	ND	40	152.67	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C23 as Tricosane	80	ND	40	152.67	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Tetracosane	80.112	ND	40	152.89	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C24 as Tetracosane	80.112	ND	40	152.89	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
Total Hydrocarbon			937,747			0			0		937.75	104504	482,327	4.82E-04	0	0	0.00E+00	4.82E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D034B	D034B		ND Adj	#D035A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	147	ND	0	150	ND	0	76	0.08	8	39	3.92E-08	3.92E-08
C5 as Pentane	152.4825	ND	76	147	ND	0	150	ND	0	76	0.08	8	39	3.92E-08	3.92E-08
n-Hexane	218.5016	ND	109	210	ND	0	156	ND	0	109	0.11	12	56	5.62E-08	5.62E-08
C6 as Hexane	218.5016	ND	109	210	ND	0	156	ND	0	109	0.11	12	56	5.62E-08	5.62E-08
n-Heptane	181.5238	ND	91	87	ND	0	163	ND	0	91	0.09	10	47	4.67E-08	4.67E-08
C7 as Heptane	181.5238	ND	91	87	ND	0	163	ND	0	91	0.09	10	47	4.67E-08	4.67E-08
n-Octane	9987.918		9,988	151	ND	0	158	ND	0	9,988	9.99	1113	5137	5.14E-06	5.14E-06
C8 as Octane	327104.9		327,105	151	ND	0	158	ND	0	327,105	327.10	36453	168245	1.68E-04	1.68E-04
n-Nonane	32842.98		32,843	152	ND	0	159	ND	0	32,843	32.84	3660	16893	1.69E-05	1.69E-05
C9 as Nonane	395394.5		395,395	152	ND	0	159	ND	0	395,395	395.39	44063	203370	2.03E-04	2.03E-04
n-Decane	27806.82		27,807	154	ND	0	161	ND	0	27,807	27.81	3099	14302	1.43E-05	1.43E-05
C10 as Decane	304021.5		304,022	154	ND	0	161	ND	0	304,022	304.02	33881	156372	1.56E-04	1.56E-04
n-Undecane	17817.44		17,817	153	ND	0	161	ND	0	17,817	17.82	1986	9164	9.16E-06	9.16E-06
C11 as Undecane	118060.8		118,061	153	ND	0	161	ND	0	118,061	118.06	13157	60724	6.07E-05	6.07E-05
n-Dodecane	7106.42		7,106	152	ND	0	159	ND	0	7,106	7.11	792	3655	3.66E-06	3.66E-06
C12 as Dodecane	24629.44		24,629	152	ND	0	159	ND	0	24,629	24.63	2745	12668	1.27E-05	1.27E-05
n-Tridecane	1961.025		1,961	153	ND	0	160	ND	0	1,961	1.96	219	1009	1.01E-06	1.01E-06
C13 as Tridecane	4135.357		4,135	153	ND	0	160	ND	0	4,135	4.14	461	2127	2.13E-06	2.13E-06
n-Tetradecane	196.6775	J	197	152	ND	0	160	ND	0	197	0.20	22	101	1.01E-07	1.01E-07
C14 as tetradecane	158.4127	ND	79	152	ND	0	160	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
n-Pentadecane	159.2063	ND	80	153	ND	0	160	ND	0	80	0.08	9	41	4.09E-08	4.09E-08
C15 as Pentadecane	159.2063	ND	80	153	ND	0	160	ND	0	80	0.08	9	41	4.09E-08	4.09E-08
n-Hexadecane	158.3492	ND	79	152	ND	0	160	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
C16 as Hexadecane	158.3492	ND	79	152	ND	0	160	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
n-Heptadecane	156.5079	ND	78	151	ND	0	158	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
C17 as Heptadecane	156.5079	ND	78	151	ND	0	158	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
n-Octadecane	158.254	ND	79	152	ND	0	159	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
C18 as Octodecane	158.254	ND	79	152	ND	0	159	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
n-Nonadecane	158.5714	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
C19 as Nonadecane	158.5714	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
n-Eicosane	158.1905	ND	79	152	ND	0	159	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
C20 as Eicosane	158.1905	ND	79	152	ND	0	159	ND	0	79	0.08	9	41	4.07E-08	4.07E-08
n-Heneicosane	159.6825	ND	80	154	ND	0	161	ND	0	80	0.08	9	41	4.11E-08	4.11E-08
C21 as Heneicosane	159.6825	ND	80	154	ND	0	161	ND	0	80	0.08	9	41	4.11E-08	4.11E-08
n-Docosane	157.873	ND	79	152	ND	0	159	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
C22 as Docosane	157.873	ND	79	152	ND	0	159	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
n-Tricosane	158.7302	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
C23 as Tricosane	158.7302	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
n-Tetracosane	158.9524	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
C24 as Tetracosane	158.9524	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
Total Hydrocarbon			1,273,282			0			0		1273.28	141897	654,908	6.55E-04	6.55E-04

Bagging Data Form — Vacuum Method

Sample Id: D036

WSPA — Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	D-856		
Equipment Subtype:	Flange			**Plant ID:**	Refinery D		
Line Size:	2	*inches*		**Date:**	3-Apr-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.9	*inHg*	759.5 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	75.9	*°F*	24.4 *°C*	**TVA ID**	37887		
Component Temp:	323	*°F*	161.7 *°C*	**Stream Pressure/Temp:**		*psig*	*°F*
Stream Description:	*Jet to V-16217 RX4*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:27	Background	-7	*ppmv*	8-sec Dwell	10	*ppmv*	Total Dwell	1:45	*min:sec*	Final M21	1346 *ppm*
12:50	Initial Bag Vacuum	0.02	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	173	*°F*	Leak @	1 oclock at Flange

Bag Concentrations (ppmv)

Time	12:55	12:57	13:00	13:01	13:03	13:08	13:14						
ppmv	1045	1546	1545	1576	1537	1542	1494						

Sorbent Tube Sample Collection Parameters

D036A

Time									
13:04	Volume Start	269.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:17	Volume Stop	282.9	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent $Flow_{STP}$	0.961	*L/min*

D036B

Time									
13:04	Volume Start	234.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:17	Volume Stop	247.6	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent $Flow_{STP}$	0.961	*L/min*
	Total ST Vol_{STP}	24.97	*Liters*	DGM Vol_{STP}	84.18	*Liters*	Total Run Vol_{STP}	109.15	*Liters*

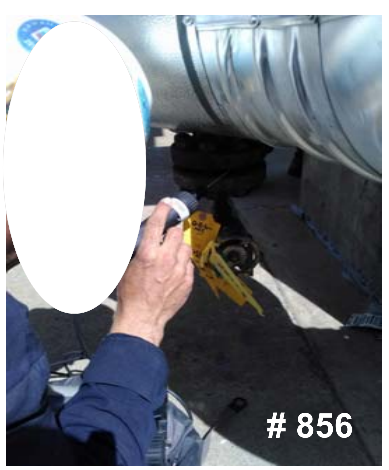
Bagging Parameters

Time											
13:05	Vacuum check	0.015	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*		756.1	*mmHg*
13:07	DGM_{10L} Time	01:28.7	*min:sec.frac*	DGM Time	1.483	DGM Flow	6.74	DGM $Flow_{STP}$		6.48	*liters/minute*
13:06	Bag Temp.	199	*°F*	92.8	*°C*	$Sample_T$	89	*°F*		31.7	*°C*

Post-Sample Data

13:25	Post Test M21	Background	24	*ppmv*	8-sec Dwell	577	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	1620 *ppm*
										@	1 oclock at Flange
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*			
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	1.58E-03 kg/hr
Percent difference THC ER =	23%
Acceptable?	No



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.79E-08
C5 as Pentane	2.79E-08
n-Hexane	4.00E-08
C6 as Hexane	4.00E-08
n-Heptane	3.32E-08
C7 as Heptane	3.32E-08
n-Octane	3.43E-06
C8 as Octane	1.53E-04
n-Nonane	1.97E-05
C9 as Nonane	3.34E-04
n-Decane	3.51E-05
C10 as Decane	4.66E-04
n-Undecane	3.73E-05
C11 as Undecane	3.44E-04
n-Dodecane	2.59E-05
C12 as Dodecane	1.35E-04
n-Tridecane	8.44E-06
C13 as Tridecane	1.81E-05
n-Tetradecane	4.37E-07
C14 as tetradecane	4.22E-07
n-Pentadecane	2.92E-08
C15 as Pentadecane	2.92E-08
n-Hexadecane	2.90E-08
C16 as Hexadecane	2.90E-08
n-Heptadecane	2.87E-08
C17 as Heptadecane	2.87E-08
n-Octadecane	2.90E-08
C18 as Octodecane	2.90E-08
n-Nonadecane	2.90E-08
C19 as Nonadecane	2.90E-08
n-Eicosane	2.90E-08
C20 as Eicosane	2.90E-08
n-Heneicosane	2.92E-08
C21 as Heneicosane	2.92E-08
n-Docosane	2.89E-08
C22 as Docosane	2.89E-08
n-Tricosane	2.91E-08
C23 as Tricosane	2.91E-08
n-Tetracosane	2.91E-08
C24 as Tetracosane	2.91E-08
Total Hydrocarbon	1.58E-03

THC:	8.36E-02	lbs/day	1.53E-02	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D036A	D036A		ND Adj	#D037A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.89538	ND	37	146.66	ND	0	150	ND	0	37	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C5 as Pentane	73.89538	ND	37	146.66	ND	0	150	ND	0	37	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Hexane	105.8892	ND	53	210.16	ND	0	156	ND	0	53	0.05	6	27	2.67E-08	0	0	0.00E+00	2.67E-08
C6 as Hexane	105.8892	ND	53	210.16	ND	0	156	ND	0	53	0.05	6	27	2.67E-08	0	0	0.00E+00	2.67E-08
n-Heptane	87.96923	ND	44	174.6	ND	0	163	ND	0	44	0.04	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
C7 as Heptane	87.96923	ND	44	174.6	ND	0	163	ND	0	44	0.04	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Octane	6170.219		6,170	151.08	ND	0	158	ND	0	6,170	6.17	674	3108	3.11E-06	0	0	0.00E+00	3.11E-06
C8 as Octane	282370		282,370	151.08	ND	0	158	ND	0	282,370	282.37	30822	142255	1.42E-04	0	0	0.00E+00	1.42E-04
n-Nonane	36661.51		36,662	152.21	ND	0	159	ND	0	36,662	36.66	4002	18470	1.85E-05	0	0	0.00E+00	1.85E-05
C9 as Nonane	577442.8		577,443	152.21	ND	0	159	ND	0	577,443	577.44	63030	290909	2.91E-04	0	0	0.00E+00	2.91E-04
n-Decane	66025.61		66,026	153.59	ND	0	161	ND	0	66,026	66.03	7207	33263	3.33E-05	0	0	0.00E+00	3.33E-05
C10 as Decane	814323.3		814,323	153.59	ND	0	161	ND	0	814,323	814.32	88887	410247	4.10E-04	0	0	0.00E+00	4.10E-04
n-Undecane	58627.28		58,627	153.19	ND	0	161	ND	0	58,627	58.63	6399	29536	2.95E-05	0	0	0.00E+00	2.95E-05
C11 as Undecane	603773.2		603,773	153.19	ND	0	161	ND	0	603,773	603.77	65904	304174	3.04E-04	0	0	0.00E+00	3.04E-04
n-Dodecane	36105.31		36,105	152.15	ND	0	159	ND	0	36,105	36.11	3941	18189	1.82E-05	0	0	0.00E+00	1.82E-05
C12 as Dodecane	245327.6		245,328	152.15	ND	0	159	ND	0	245,328	245.33	26779	123593	1.24E-04	0	0	0.00E+00	1.24E-04
n-Tridecane	16757.26		16,757	152.52	ND	0	160	ND	0	16,757	16.76	1829	8442	8.44E-06	0	0	0.00E+00	8.44E-06
C13 as Tridecane	33792.12		33,792	152.52	ND	0	160	ND	0	33,792	33.79	3689	17024	1.70E-05	0	0	0.00E+00	1.70E-05
n-Tetradecane	934.5488		935	152.37	ND	0	160	ND	0	935	0.93	102	471	4.71E-07	0	0	0.00E+00	4.71E-07
C14 as tetradecane	1052.747		1,053	152.37	ND	0	160	ND	0	1,053	1.05	115	530	5.30E-07	0	0	0.00E+00	5.30E-07
n-Pentadecane	77.15385	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C15 as Pentadecane	77.15385	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexadecane	76.73846	ND	38	152.31	ND	0	160	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C16 as Hexadecane	76.73846	ND	38	152.31	ND	0	160	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heptadecane	75.84615	ND	38	150.53	ND	0	158	ND	0	38	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C17 as Heptadecane	75.84615	ND	38	150.53	ND	0	158	ND	0	38	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Octadecane	76.69231	ND	38	152.21	ND	0	159	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C18 as Octodecane	76.69231	ND	38	152.21	ND	0	159	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Nonadecane	76.84615	ND	38	152.52	ND	0	160	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	76.84615	ND	38	152.52	ND	0	160	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	76.66154	ND	38	152.15	ND	0	159	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C20 as Eicosane	76.66154	ND	38	152.15	ND	0	159	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heneicosane	77.38462	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C21 as Heneicosane	77.38462	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Docosane	76.50769	ND	38	151.85	ND	0	159	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C22 as Docosane	76.50769	ND	38	151.85	ND	0	159	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tricosane	76.92308	ND	38	152.67	ND	0	160	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C23 as Tricosane	76.92308	ND	38	152.67	ND	0	160	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tetracosane	77.03077	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C24 as Tetracosane	77.03077	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
Total Hydrocarbon			2,780,399			0			0		2780.40	303492	#######	1.40E-03	0	0	0.00E+00	1.40E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D036B	D036B		ND Adj	#D037A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.7908	ND	74	147	ND	0	150	ND	0	74	0.07	8	37	3.72E-08	3.72E-08
C5 as Pentane	147.7908	ND	74	147	ND	0	150	ND	0	74	0.07	8	37	3.72E-08	3.72E-08
n-Hexane	211.7785	ND	106	210	ND	0	156	ND	0	106	0.11	12	53	5.33E-08	5.33E-08
C6 as Hexane	211.7785	ND	106	210	ND	0	156	ND	0	106	0.11	12	53	5.33E-08	5.33E-08
n-Heptane	175.9385	ND	88	175	ND	0	163	ND	0	88	0.09	10	44	4.43E-08	4.43E-08
C7 as Heptane	175.9385	ND	88	175	ND	0	163	ND	0	88	0.09	10	44	4.43E-08	4.43E-08
n-Octane	7444.369		7,444	151	ND	0	158	ND	0	7,444	7.44	813	3750	3.75E-06	3.75E-06
C8 as Octane	325265.2		325,265	151	ND	0	158	ND	0	325,265	325.27	35504	163865	1.64E-04	1.64E-04
n-Nonane	41369.03		41,369	152	ND	0	159	ND	0	41,369	41.37	4516	20841	2.08E-05	2.08E-05
C9 as Nonane	747227.8		747,228	152	ND	0	159	ND	0	747,228	747.23	81563	376445	3.76E-04	3.76E-04
n-Decane	73449.97		73,450	154	ND	0	161	ND	0	73,450	73.45	8017	37003	3.70E-05	3.70E-05
C10 as Decane	1033698		1,033,698	154	ND	0	161	ND	0	1,033,698	1033.70	112833	520765	5.21E-04	5.21E-04
n-Undecane	89444.81		89,445	153	ND	0	161	ND	0	89,445	89.44	9763	45061	4.51E-05	4.51E-05
C11 as Undecane	760930.7		760,931	153	ND	0	161	ND	0	760,931	760.93	83059	383349	3.83E-04	3.83E-04
n-Dodecane	66702.93		66,703	152	ND	0	159	ND	0	66,703	66.70	7281	33604	3.36E-05	3.36E-05
C12 as Dodecane	290150.1		290,150	152	ND	0	159	ND	0	290,150	290.15	31671	146174	1.46E-04	1.46E-04
n-Tridecane	16741.18		16,741	153	ND	0	160	ND	0	16,741	16.74	1827	8434	8.43E-06	8.43E-06
C13 as Tridecane	38083.16		38,083	153	ND	0	160	ND	0	38,083	38.08	4157	19186	1.92E-05	1.92E-05
n-Tetradecane	799.2705	J	799	152	ND	0	160	ND	0	799	0.80	87	403	4.03E-07	4.03E-07
C14 as tetradecane	620.9656	J	621	152	ND	0	160	ND	0	621	0.62	68	313	3.13E-07	3.13E-07
n-Pentadecane	154.3077	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
C15 as Pentadecane	154.3077	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
n-Hexadecane	153.4769	ND	77	152	ND	0	160	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
C16 as Hexadecane	153.4769	ND	77	152	ND	0	160	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
n-Heptadecane	151.6923	ND	76	151	ND	0	158	ND	0	76	0.08	8	38	3.82E-08	3.82E-08
C17 as Heptadecane	151.6923	ND	76	151	ND	0	158	ND	0	76	0.08	8	38	3.82E-08	3.82E-08
n-Octadecane	153.3846	ND	77	152	ND	0	159	ND	0	77	0.08	8	39	3.86E-08	3.86E-08
C18 as Octodecane	153.3846	ND	77	152	ND	0	159	ND	0	77	0.08	8	39	3.86E-08	3.86E-08
n-Nonadecane	153.6923	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
C19 as Nonadecane	153.6923	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
n-Eicosane	153.3231	ND	77	152	ND	0	159	ND	0	77	0.08	8	39	3.86E-08	3.86E-08
C20 as Eicosane	153.3231	ND	77	152	ND	0	159	ND	0	77	0.08	8	39	3.86E-08	3.86E-08
n-Heneicosane	154.7692	ND	77	154	ND	0	161	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C21 as Heneicosane	154.7692	ND	77	154	ND	0	161	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Docosane	153.0154	ND	77	152	ND	0	159	ND	0	77	0.08	8	39	3.85E-08	3.85E-08
C22 as Docosane	153.0154	ND	77	152	ND	0	159	ND	0	77	0.08	8	39	3.85E-08	3.85E-08
n-Tricosane	153.8462	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
C23 as Tricosane	153.8462	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
n-Tetracosane	154.0615	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
C24 as Tetracosane	154.0615	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
Total Hydrocarbon			3,493,998			0			0		3494.00	381385	#######	1.76E-03	1.76E-03

Bagging Data Form — Vacuum Method

Sample Id D038

Equipment type:	Valve	**Component ID:**	D-899
Equipment Subtype:	Gate	**Plant ID:**	Refinery D
Line Size:	3 *inches*	**Date:**	3-Apr-18
Phase (G, LL, HL):	HL	**Analysis team:**	DR/EG/RS
Barometric pressure	29.89 *inHg* 759.2 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	79.4 *°F* 26.3 *°C*	**TVA ID**	37887
Component Temp:	107 *°F* 41.7 *°C*	**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*Reboiler Htr Jet*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:32	Background	16	*ppmv*	8-sec Dwell	698	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	1170 *ppm*
14:20	Initial Bag Vacuum	0.05	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	109	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	14:21	14:22	14:25	14:27	14:29	14:31	14:33	14:35	14:37	14:39	14:40	14:47	14:52	
ppmv	275	322	305	299	315	324	335	342	364	381	375	379	396	

Sorbent Tube Sample Collection Parameters

D038A

Time									
14:40	Volume Start	283.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:53	Volume Stop	295.6	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.898	*L/min*

D038B

Time									
14:40	Volume Start	247.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:53	Volume Stop	260.3	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.898	*L/min*
	Total ST Vol$_{STP}$	23.34	*Liters*	DGM Vol$_{STP}$	80.28 *Liters*		Total Run Vol$_{STP}$	103.62	*Liters*

Bagging Parameters

Time										
14:45	Vacuum check	0.025	*inches H2O*			DGM$_P$	1.85	*inches H2O vacuum*	755.7	*mmHg*
14:44	DGM$_{10L}$ Time	01:30.1	*min:sec.frac*	DGM Time	1.500	DGM Flow	6.67	DGM Flow$_{STP}$	6.18	*liters/minute*
14:45	Bag Temp.	105.6	*°F*	40.9	*°C*	Sample$_T$	109	*°F*	42.8	*°C*

Post-Sample Data

15:02	Post Test M21	Background	1	*ppmv*	8-sec Dwell	1036 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21	1588 *ppm*
									@	Packing

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	3.92E-04	kg/hr
Percent difference THC ER =	45%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.73E-08
C5 as Pentane	2.73E-08
n-Hexane	3.92E-08
C6 as Hexane	3.92E-08
n-Heptane	3.26E-08
C7 as Heptane	3.26E-08
n-Octane	2.12E-06
C8 as Octane	7.50E-05
n-Nonane	8.10E-06
C9 as Nonane	9.82E-05
n-Decane	1.03E-05
C10 as Decane	1.05E-04
n-Undecane	6.62E-06
C11 as Undecane	5.77E-05
n-Dodecane	3.57E-06
C12 as Dodecane	1.70E-05
n-Tridecane	1.63E-06
C13 as Tridecane	5.13E-06
n-Tetradecane	5.05E-07
C14 as tetradecane	7.27E-07
n-Pentadecane	7.50E-08
C15 as Pentadecane	2.86E-08
n-Hexadecane	2.84E-08
C16 as Hexadecane	2.84E-08
n-Heptadecane	2.81E-08
C17 as Heptadecane	2.81E-08
n-Octadecane	2.84E-08
C18 as Octodecane	2.84E-08
n-Nonadecane	2.84E-08
C19 as Nonadecane	2.84E-08
n-Eicosane	2.84E-08
C20 as Eicosane	2.84E-08
n-Heneicosane	2.86E-08
C21 as Heneicosane	2.86E-08
n-Docosane	2.83E-08
C22 as Docosane	2.83E-08
n-Tricosane	2.85E-08
C23 as Tricosane	2.85E-08
n-Tetracosane	2.85E-08
C24 as Tetracosane	2.85E-08
Total Hydrocarbon	3.92E-04

THC:	2.08E-02	lbs/day	3.79E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D038A	D038A		ND Adj	#D039A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.24127	ND	38	146.66	ND	0	150	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	76.24127	ND	38	146.66	ND	0	150	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	109.2508	ND	55	210.16	ND	0	156	ND	0	55	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
C6 as Hexane	109.2508	ND	55	210.16	ND	0	156	ND	0	55	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
n-Heptane	90.7619	ND	45	174.6	ND	0	163	ND	0	45	0.05	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
C7 as Heptane	90.7619	ND	45	174.6	ND	0	163	ND	0	45	0.05	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
n-Octane	5639.697		5,640	151.08	ND	0	158	ND	0	5,640	5.64	584	2697	2.70E-06	0	0	0.00E+00	2.70E-06
C8 as Octane	200787.3		200,787	151.08	ND	0	158	ND	0	200,787	200.79	20806	96028	9.60E-05	0	0	0.00E+00	9.60E-05
n-Nonane	21922.22		21,922	152.21	ND	0	159	ND	0	21,922	21.92	2272	10484	1.05E-05	0	0	0.00E+00	1.05E-05
C9 as Nonane	245986.9		245,987	152.21	ND	0	159	ND	0	245,987	245.99	25490	117645	1.18E-04	0	0	0.00E+00	1.18E-04
n-Decane	28965.71		28,966	153.59	ND	0	161	ND	0	28,966	28.97	3001	13853	1.39E-05	0	0	0.00E+00	1.39E-05
C10 as Decane	266721.4		266,721	153.59	ND	0	161	ND	0	266,721	266.72	27638	127561	1.28E-04	0	0	0.00E+00	1.28E-04
n-Undecane	14823.7		14,824	153.19	ND	0	161	ND	0	14,824	14.82	1536	7090	7.09E-06	0	0	0.00E+00	7.09E-06
C11 as Undecane	148069.6		148,070	153.19	ND	0	161	ND	0	148,070	148.07	15343	70815	7.08E-05	0	0	0.00E+00	7.08E-05
n-Dodecane	7921.802		7,922	152.15	ND	0	159	ND	0	7,922	7.92	821	3789	3.79E-06	0	0	0.00E+00	3.79E-06
C12 as Dodecane	45288.76		45,289	152.15	ND	0	159	ND	0	45,289	45.29	4693	21660	2.17E-05	0	0	0.00E+00	2.17E-05
n-Tridecane	3544.313		3,544	152.52	ND	0	160	ND	0	3,544	3.54	367	1695	1.70E-06	0	0	0.00E+00	1.70E-06
C13 as Tridecane	11397.95		11,398	152.52	ND	0	160	ND	0	11,398	11.40	1181	5451	5.45E-06	0	0	0.00E+00	5.45E-06
n-Tetradecane	780.6559	J	781	152.37	ND	0	160	ND	0	781	0.78	81	373	3.73E-07	0	0	0.00E+00	3.73E-07
C14 as tetradecane	1375.002		1,375	152.37	ND	0	160	ND	0	1,375	1.38	142	658	6.58E-07	0	0	0.00E+00	6.58E-07
n-Pentadecane	143.5825	J	144	153.13	ND	0	160	ND	0	144	0.14	15	69	6.87E-08	0	0	0.00E+00	6.87E-08
C15 as Pentadecane	79.60317	ND	40	153.13	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexadecane	79.1746	ND	40	152.31	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C16 as Hexadecane	79.1746	ND	40	152.31	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptadecane	78.25397	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C17 as Heptadecane	78.25397	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Octadecane	79.12698	ND	40	152.21	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C18 as Octodecane	79.12698	ND	40	152.21	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Nonadecane	79.28571	ND	40	152.52	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C19 as Nonadecane	79.28571	ND	40	152.52	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Eicosane	79.09524	ND	40	152.15	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C20 as Eicosane	79.09524	ND	40	152.15	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heneicosane	79.84127	ND	40	153.59	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane	79.84127	ND	40	153.59	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane	78.93651	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	78.93651	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	79.36508	ND	40	152.67	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	79.36508	ND	40	152.67	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Tetracosane	79.47619	ND	40	152.89	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C24 as Tetracosane	79.47619	ND	40	152.89	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
Total Hydrocarbon			1,004,397			0			0		1004.40	104078	480,359	4.80E-04	0	0	0.00E+00	4.80E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D038B	D038B		ND Adj	#D039A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	147	ND	0	150	ND	0	76	0.08	8	36	3.65E-08	3.65E-08
C5 as Pentane	152.4825	ND	76	147	ND	0	150	ND	0	76	0.08	8	36	3.65E-08	3.65E-08
n-Hexane	218.5016	ND	109	210	ND	0	156	ND	0	109	0.11	11	52	5.22E-08	5.22E-08
C6 as Hexane	218.5016	ND	109	210	ND	0	156	ND	0	109	0.11	11	52	5.22E-08	5.22E-08
n-Heptane	181.5238	ND	91	175	ND	0	163	ND	0	91	0.09	9	43	4.34E-08	4.34E-08
C7 as Heptane	181.5238	ND	91	175	ND	0	163	ND	0	91	0.09	9	43	4.34E-08	4.34E-08
n-Octane	3238.617		3,239	151	ND	0	158	ND	0	3,239	3.24	336	1549	1.55E-06	1.55E-06
C8 as Octane	112889.9		112,890	151	ND	0	158	ND	0	112,890	112.89	11698	53990	5.40E-05	5.40E-05
n-Nonane	11963.13		11,963	152	ND	0	159	ND	0	11,963	11.96	1240	5721	5.72E-06	5.72E-06
C9 as Nonane	164593.3		164,593	152	ND	0	159	ND	0	164,593	164.59	17055	78718	7.87E-05	7.87E-05
n-Decane	14041.49		14,041	154	ND	0	161	ND	0	14,041	14.04	1455	6715	6.72E-06	6.72E-06
C10 as Decane	172228.5		172,229	154	ND	0	161	ND	0	172,229	172.23	17847	82369	8.24E-05	8.24E-05
n-Undecane	12859.31		12,859	153	ND	0	161	ND	0	12,859	12.86	1333	6150	6.15E-06	6.15E-06
C11 as Undecane	93029.87		93,030	153	ND	0	161	ND	0	93,030	93.03	9640	44492	4.45E-05	4.45E-05
n-Dodecane	6994.455		6,994	152	ND	0	159	ND	0	6,994	6.99	725	3345	3.35E-06	3.35E-06
C12 as Dodecane	26000.31		26,000	152	ND	0	159	ND	0	26,000	26.00	2694	12435	1.24E-05	1.24E-05
n-Tridecane	3251.256		3,251	153	ND	0	160	ND	0	3,251	3.25	337	1555	1.55E-06	1.55E-06
C13 as Tridecane	10061.28		10,061	153	ND	0	160	ND	0	10,061	10.06	1043	4812	4.81E-06	4.81E-06
n-Tetradecane	1330.621	J	1,331	152	ND	0	160	ND	0	1,331	1.33	138	636	6.36E-07	6.36E-07
C14 as tetradecane	1664.791		1,665	152	ND	0	160	ND	0	1,665	1.66	173	796	7.96E-07	7.96E-07
n-Pentadecane	170.0497	J	170	153	ND	0	160	ND	0	170	0.17	18	81	8.13E-08	8.13E-08
C15 as Pentadecane	159.2063	ND	80	153	ND	0	160	ND	0	80	0.08	8	38	3.81E-08	3.81E-08
n-Hexadecane	158.3492	ND	79	152	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C16 as Hexadecane	158.3492	ND	79	152	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Heptadecane	156.5079	ND	78	151	ND	0	158	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
C17 as Heptadecane	156.5079	ND	78	151	ND	0	158	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
n-Octadecane	158.254	ND	79	152	ND	0	159	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
C18 as Octodecane	158.254	ND	79	152	ND	0	159	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
n-Nonadecane	158.5714	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C19 as Nonadecane	158.5714	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Eicosane	158.1905	ND	79	152	ND	0	159	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
C20 as Eicosane	158.1905	ND	79	152	ND	0	159	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
n-Heneicosane	159.6825	ND	80	154	ND	0	161	ND	0	80	0.08	8	38	3.82E-08	3.82E-08
C21 as Heneicosane	159.6825	ND	80	154	ND	0	161	ND	0	80	0.08	8	38	3.82E-08	3.82E-08
n-Docosane	157.873	ND	79	152	ND	0	159	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
C22 as Docosane	157.873	ND	79	152	ND	0	159	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
n-Tricosane	158.7302	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
C23 as Tricosane	158.7302	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
n-Tetracosane	158.9524	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
C24 as Tetracosane	158.9524	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
Total Hydrocarbon			636,374			0			0		636.37	65942	304,350	3.04E-04	3.04E-04

Bagging Data Form	Vacuum Method		Sample Id	D040
Equipment type:	Pump		Component ID:	D-1017
Equipment Subtype:	Seal		Plant ID:	Refinery D
Line Size:	4 *inches*		Date:	4-Apr-18
Phase (G, LL, HL):	HL		Analysis team:	EG/DR/RS
Barometric pressure	29.98 *inHg*	761.5 *mmHg*	Sample Pump A	LP52979
			Sample Pump B	LP52975
Ambient Temp:	66.1 °F	18.9 °C	TVA ID	34251
Component Temp:	160 °F	71.1 °C	Stream Pressure/Temp:	*psig* °F
Stream Description:	*V-752 Inventory to Product to Unit/Stab btms Product (Pump off)*			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:20	Background	4	*ppmv*	8-sec Dwell	847	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	1772 *ppm*
9:23	Initial Bag Vacuum	0.015	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	114.3	°F	Leak @	Seal

Bag Concentrations (ppmv)

Time	9:27	9:29	9:31	9:33	9:35	9:37	9:39	9:41	9:43	9:45	9:47	9:55	9:58
ppmv	294	675	1734	2041	2347	2620	2789	2992	3142	3195	3171	2988	2736

Sorbent Tube Sample Collection Parameters

D040A

Time										
9:47	Volume Start	298.1	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:00	Volume Stop	310.7	*Liters*	Total Vol	12.6	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969	*L/min*	$\text{Sorbent Flow}_{STP}$	0.961	*L/min*

D040B

9:47	Volume Start	262.9	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:00	Volume Stop	275.7	*Liters*	Total Vol	12.8	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985	*L/min*	$\text{Sorbent Flow}_{STP}$	0.977	*L/min*
	$\text{Total ST Vol}_{STP}$	25.19	*Liters*	DGM Vol_{STP}	79.75	*Liters*	$\text{Total Run Vol}_{STP}$	104.95	*Liters*	

Bagging Parameters

Time											
9:51	Vacuum check	0.01	*inches H2O*			DGM_P	1.9	*inches H2O vacuum*	757.9	*mmHg*
9:51	DGM_{10L} Time	01:37.3	*min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM Flow_{STP}	6.13	*liters/minute*
9:52	Bag Temp.	120.4	°F	49.1	°C	Sample_T	73	°F	22.8	°C

Post-Sample Data

11:00	Post Test M21	Background	28 *ppmv*	8-sec Dwell	1407	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	2014 *ppm*
									@	Seal
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A *ml*							
Density of organic condensate			N/A *g/ml*							

Average THC emissions =	2.88E-03 kg/hr
Percent difference THC ER =	24%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.74E-08
C5 as Pentane	2.74E-08
n-Hexane	3.93E-08
C6 as Hexane	3.93E-08
n-Heptane	3.26E-08
C7 as Heptane	3.26E-08
n-Octane	5.99E-06
C8 as Octane	3.72E-04
n-Nonane	4.71E-05
C9 as Nonane	7.73E-04
n-Decane	8.24E-05
C10 as Decane	9.48E-04
n-Undecane	6.04E-05
C11 as Undecane	4.94E-04
n-Dodecane	2.13E-05
C12 as Dodecane	6.83E-05
n-Tridecane	2.01E-06
C13 as Tridecane	4.11E-06
n-Tetradecane	3.87E-08
C14 as tetradecane	2.85E-08
n-Pentadecane	2.86E-08
C15 as Pentadecane	2.86E-08
n-Hexadecane	2.85E-08
C16 as Hexadecane	2.85E-08
n-Heptadecane	2.81E-08
C17 as Heptadecane	2.81E-08
n-Octadecane	2.84E-08
C18 as Octodecane	2.84E-08
n-Nonadecane	2.85E-08
C19 as Nonadecane	2.85E-08
n-Eicosane	2.84E-08
C20 as Eicosane	2.84E-08
n-Heneicosane	2.87E-08
C21 as Heneicosane	2.87E-08
n-Docosane	2.84E-08
C22 as Docosane	2.84E-08
n-Tricosane	2.85E-08
C23 as Tricosane	2.85E-08
n-Tetracosane	2.86E-08
C24 as Tetracosane	2.86E-08
Total Hydrocarbon	2.88E-03

THC:	1.52E-01	lbs/day	2.78E-02	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D040A	D040A		ND Adj	#D041A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.24127	ND	38	151.28	ND	0	150	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C5 as Pentane	76.24127	ND	38	151.28	ND	0	150	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Hexane	109.2508	ND	55	216.78	ND	0	156	ND	0	55	0.05	6	26	2.65E-08	0	0	0.00E+00	2.65E-08
C6 as Hexane	109.2508	ND	55	216.78	ND	0	156	ND	0	55	0.05	6	26	2.65E-08	0	0	0.00E+00	2.65E-08
n-Heptane	90.7619	ND	45	180.1	ND	0	163	ND	0	45	0.05	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C7 as Heptane	90.7619	ND	45	180.1	ND	0	163	ND	0	45	0.05	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Octane	11366.76		11,367	155.84	ND	0	158	ND	0	11,367	11.37	1193	5506	5.51E-06	0	0	0.00E+00	5.51E-06
C8 as Octane	676892.2		676,892	277.76	J	278	158	ND	0	676,614	676.61	71007	327726	3.28E-04	0	0	0.00E+00	3.28E-04
n-Nonane	93011.63		93,012	157.01	ND	0	159	ND	0	93,012	93.01	9761	45051	4.51E-05	0	0	0.00E+00	4.51E-05
C9 as Nonane	1415372		1,415,372	157.01	ND	0	159	ND	0	1,415,372	1415.37	148536	685553	6.86E-04	0	0	0.00E+00	6.86E-04
n-Decane	168851.7		168,852	158.43	ND	0	161	ND	0	168,852	168.85	17720	81785	8.18E-05	0	0	0.00E+00	8.18E-05
C10 as Decane	1668192		1,668,192	158.43	ND	0	161	ND	0	1,668,192	1668.19	175069	808009	8.08E-04	0	0	0.00E+00	8.08E-04
n-Undecane	89598.83		89,599	158.02	ND	0	161	ND	0	89,599	89.60	9403	43398	4.34E-05	0	0	0.00E+00	4.34E-05
C11 as Undecane	946135.4		946,135	158.02	ND	0	161	ND	0	946,135	946.14	99292	458272	4.58E-04	0	0	0.00E+00	4.58E-04
n-Dodecane	31879.86		31,880	156.95	ND	0	159	ND	0	31,880	31.88	3346	15441	1.54E-05	0	0	0.00E+00	1.54E-05
C12 as Dodecane	125929.6		125,930	156.95	ND	0	159	ND	0	125,930	125.93	13216	60996	6.10E-05	0	0	0.00E+00	6.10E-05
n-Tridecane	3605.693		3,606	157.32	ND	0	160	ND	0	3,606	3.61	378	1746	1.75E-06	0	0	0.00E+00	1.75E-06
C13 as Tridecane	7693.237		7,693	157.32	ND	0	160	ND	0	7,693	7.69	807	3726	3.73E-06	0	0	0.00E+00	3.73E-06
n-Tetradecane	81.91094	J	82	157.17	ND	0	160	ND	0	82	0.08	9	40	3.97E-08	0	0	0.00E+00	3.97E-08
C14 as tetradecane	79.20635	ND	40	157.17	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Pentadecane	79.60317	ND	40	157.95	ND	0	160	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C15 as Pentadecane	79.60317	ND	40	157.95	ND	0	160	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Hexadecane	79.1746	ND	40	157.1	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C16 as Hexadecane	79.1746	ND	40	157.1	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heptadecane	78.25397	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C17 as Heptadecane	78.25397	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Octadecane	79.12698	ND	40	157.01	ND	0	159	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C18 as Octodecane	79.12698	ND	40	157.01	ND	0	159	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Nonadecane	79.28571	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C19 as Nonadecane	79.28571	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Eicosane	79.09524	ND	40	156.95	ND	0	159	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C20 as Eicosane	79.09524	ND	40	156.95	ND	0	159	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heneicosane	79.84127	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C21 as Heneicosane	79.84127	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Docosane	78.93651	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C22 as Docosane	78.93651	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Tricosane	79.36508	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C23 as Tricosane	79.36508	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Tetracosane	79.47619	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C24 as Tetracosane	79.47619	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
Total Hydrocarbon			5,239,719			278			0		5239.44	549854	2,537,786	2.54E-03	0	0	0.00E+00	2.54E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D040B	D040B		ND Adj	#D041A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	151	ND	0	150	ND	0	75	0.08	8	36	3.64E-08	3.64E-08
C5 as Pentane	150.1	ND	75	151	ND	0	150	ND	0	75	0.08	8	36	3.64E-08	3.64E-08
n-Hexane	215.0875	ND	108	217	ND	0	156	ND	0	108	0.11	11	52	5.21E-08	5.21E-08
C6 as Hexane	215.0875	ND	108	217	ND	0	156	ND	0	108	0.11	11	52	5.21E-08	5.21E-08
n-Heptane	178.6875	ND	89	180	ND	0	163	ND	0	89	0.09	9	43	4.33E-08	4.33E-08
C7 as Heptane	178.6875	ND	89	180	ND	0	163	ND	0	89	0.09	9	43	4.33E-08	4.33E-08
n-Octane	13363.31		13,363	156	ND	0	158	ND	0	13,363	13.36	1402	6473	6.47E-06	6.47E-06
C8 as Octane	859921.8		859,922	278	J	278	158	ND	0	859,644	859.64	90215	416379	4.16E-04	4.16E-04
n-Nonane	101536		101,536	157	ND	0	159	ND	0	101,536	101.54	10656	49180	4.92E-05	4.92E-05
C9 as Nonane	1774928		1,774,928	157	ND	0	159	ND	0	1,774,928	1774.93	186270	859708	8.60E-04	8.60E-04
n-Decane	171553.2		171,553	158	ND	0	161	ND	0	171,553	171.55	18004	83094	8.31E-05	8.31E-05
C10 as Decane	2246189		2,246,189	158	ND	0	161	ND	0	2,246,189	2246.19	235727	1087969	1.09E-03	1.09E-03
n-Undecane	159747.2		159,747	158	ND	0	161	ND	0	159,747	159.75	16765	77375	7.74E-05	7.74E-05
C11 as Undecane	1092465		1,092,465	158	ND	0	161	ND	0	1,092,465	1092.46	114649	529148	5.29E-04	5.29E-04
n-Dodecane	56193.72		56,194	157	ND	0	159	ND	0	56,194	56.19	5897	27218	2.72E-05	2.72E-05
C12 as Dodecane	155967		155,967	157	ND	0	159	ND	0	155,967	155.97	16368	75544	7.55E-05	7.55E-05
n-Tridecane	4700.674		4,701	157	ND	0	160	ND	0	4,701	4.70	493	2277	2.28E-06	2.28E-06
C13 as Tridecane	9277.225		9,277	157	ND	0	160	ND	0	9,277	9.28	974	4494	4.49E-06	4.49E-06
n-Tetradecane	155.9375	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C14 as tetradecane	155.9375	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Pentadecane	156.7188	ND	78	158	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C15 as Pentadecane	156.7188	ND	78	158	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Hexadecane	155.875	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C16 as Hexadecane	155.875	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Heptadecane	154.0625	ND	77	155	ND	0	158	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C17 as Heptadecane	154.0625	ND	77	155	ND	0	158	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Octadecane	155.7813	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C18 as Octodecane	155.7813	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Nonadecane	156.0938	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C19 as Nonadecane	156.0938	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Eicosane	155.7188	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C20 as Eicosane	155.7188	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Heneicosane	157.1875	ND	79	158	ND	0	161	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C21 as Heneicosane	157.1875	ND	79	158	ND	0	161	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
n-Docosane	155.4063	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C22 as Docosane	155.4063	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Tricosane	156.25	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C23 as Tricosane	156.25	ND	78	157	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Tetracosane	156.4688	ND	78	158	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C24 as Tetracosane	156.4688	ND	78	158	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
Total Hydrocarbon			6,648,101			278			0		6647.82	697657	3,219,953	3.22E-03	3.22E-03

Bagging Data Form — Vacuum Method

Sample Id: D043

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	D-952	
Equipment Subtype:	Gate			**Plant ID:**	Refinery D	
Line Size:	3/4	*inches*		**Date:**	4-Apr-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS	
Barometric pressure	29.97 *inHg*	761.2	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	72.8 *°F*	22.7	*°C*	**TVA ID**	34251	
Component Temp:	157 *°F*	69.4	*°C*	**Stream Pressure/Temp:**	13 *psig*	*°F*
Stream Description:	*Stab Reboil Circ @ P-2946*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
13:34	Background	0 *ppmv*	8-sec Dwell	1407 *ppmv*	Total Dwell	2:30 *min:sec*	Final M21	3522 *ppm*
14:08	Initial Bag Vacuum	0.01 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	136.8 *°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	14:09	14:12	14:19	14:21	14:23	14:25	14:27	14:28	14:33	14:36	14:38			
ppmv	421	491	667	689	699	691	717	701	623	627	649			

Sorbent Tube Sample Collection Parameters

D043A

Time								
14:28	Volume Start	323.4	*Liters*		Design Sample Flow Rate = 1 liter/min			
14:41	Volume Stop	335.9	*Liters*	Total Vol	12.5 *Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.943 *L/min*

D043B

14:28	Volume Start	275.8	*Liters*		Design Sample Flow Rate = 1 liter/min			
14:41	Volume Stop	288.4	*Liters*	Total Vol	12.6 *Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.950 *L/min*
	Total ST Vol$_{STP}$	24.61	*Liters*	DGM Vol$_{STP}$	82.25 *Liters*	Total Run Vol$_{STP}$	106.86 *Liters*	

Bagging Parameters

Time									
14:32	Vacuum check	0.01 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*		757.9	*mmHg*
14:31	DGM$_{10L}$ Time	01:32.6 *min:sec.frac*	DGM Time	1.550	DGM Flow	6.45	DGM Flow$_{STP}$	6.33	*liters/minute*
14:33	Bag Temp.	139.6 *°F*	59.8	*°C*	Sample$_T$	79 *°F*		26.1	*°C*

Post-Sample Data

14:52	Post Test M21	Background	15 *ppmv*	8-sec Dwell	3102 *ppmv*	Total Dwell	1:40 *min:sec*	Final M21 3722 *ppm* @ Stem

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	6.70E-04 kg/hr
Percent difference THC ER =	44%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.83E-08
C5 as Pentane	2.83E-08
n-Hexane	4.05E-08
C6 as Hexane	4.05E-08
n-Heptane	3.37E-08
C7 as Heptane	3.37E-08
n-Octane	1.96E-06
C8 as Octane	9.51E-05
n-Nonane	1.12E-05
C9 as Nonane	1.52E-04
n-Decane	1.73E-05
C10 as Decane	1.88E-04
n-Undecane	1.54E-05
C11 as Undecane	1.19E-04
n-Dodecane	1.03E-05
C12 as Dodecane	4.28E-05
n-Tridecane	3.74E-06
C13 as Tridecane	1.04E-05
n-Tetradecane	6.26E-07
C14 as tetradecane	1.79E-06
n-Pentadecane	1.95E-07
C15 as Pentadecane	2.36E-07
n-Hexadecane	5.17E-08
C16 as Hexadecane	2.94E-08
n-Heptadecane	2.90E-08
C17 as Heptadecane	2.90E-08
n-Octadecane	2.93E-08
C18 as Octodecane	2.93E-08
n-Nonadecane	2.94E-08
C19 as Nonadecane	2.94E-08
n-Eicosane	2.93E-08
C20 as Eicosane	2.93E-08
n-Heneicosane	2.96E-08
C21 as Heneicosane	2.96E-08
n-Docosane	2.93E-08
C22 as Docosane	2.93E-08
n-Tricosane	2.94E-08
C23 as Tricosane	2.94E-08
n-Tetracosane	2.95E-08
C24 as Tetracosane	2.95E-08
Total Hydrocarbon	6.70E-04

THC:	3.55E-02	lbs/day	6.47E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D043A	D043A		ND Adj	#D044A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C5 as Pentane	76.8512	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexane	110.1248	ND	55	211.78	ND	0	156	ND	0	55	0.06	6	27	2.72E-08	0	0	0.00E+00	2.72E-08
C6 as Hexane	110.1248	ND	55	211.78	ND	0	156	ND	0	55	0.06	6	27	2.72E-08	0	0	0.00E+00	2.72E-08
n-Heptane	91.488	ND	46	175.94	ND	0	163	ND	0	46	0.05	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
C7 as Heptane	91.488	ND	46	175.94	ND	0	163	ND	0	46	0.05	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
n-Octane	3198.085		3,198	152.25	ND	0	158	ND	0	3,198	3.20	342	1577	1.58E-06	0	0	0.00E+00	1.58E-06
C8 as Octane	162517.2		162,517	152.25	ND	0	158	ND	0	162,517	162.52	17367	80156	8.02E-05	0	0	0.00E+00	8.02E-05
n-Nonane	19177.31		19,177	153.38	ND	0	159	ND	0	19,177	19.18	2049	9459	9.46E-06	0	0	0.00E+00	9.46E-06
C9 as Nonane	233157.3		233,157	153.38	ND	0	159	ND	0	233,157	233.16	24916	114997	1.15E-04	0	0	0.00E+00	1.15E-04
n-Decane	31610.42		31,610	154.77	ND	0	161	ND	0	31,610	31.61	3378	15591	1.56E-05	0	0	0.00E+00	1.56E-05
C10 as Decane	293963.9		293,964	154.77	ND	0	161	ND	0	293,964	293.96	31414	144988	1.45E-04	0	0	0.00E+00	1.45E-04
n-Undecane	20244		20,244	154.37	ND	0	161	ND	0	20,244	20.24	2163	9985	9.98E-06	0	0	0.00E+00	9.98E-06
C11 as Undecane	186725		186,725	154.37	ND	0	161	ND	0	186,725	186.72	19954	92096	9.21E-05	0	0	0.00E+00	9.21E-05
n-Dodecane	13310.41		13,310	153.32	ND	0	159	ND	0	13,310	13.31	1422	6565	6.56E-06	0	0	0.00E+00	6.56E-06
C12 as Dodecane	67282.93		67,283	153.32	ND	0	159	ND	0	67,283	67.28	7190	33185	3.32E-05	0	0	0.00E+00	3.32E-05
n-Tridecane	5662.251		5,662	153.69	ND	0	160	ND	0	5,662	5.66	605	2793	2.79E-06	0	0	0.00E+00	2.79E-06
C13 as Tridecane	16439.07		16,439	153.69	ND	0	160	ND	0	16,439	16.44	1757	8108	8.11E-06	0	0	0.00E+00	8.11E-06
n-Tetradecane	994.1573		994	153.54	ND	0	160	ND	0	994	0.99	106	490	4.90E-07	0	0	0.00E+00	4.90E-07
C14 as tetradecane	3296.17		3,296	153.54	ND	0	160	ND	0	3,296	3.30	352	1626	1.63E-06	0	0	0.00E+00	1.63E-06
n-Pentadecane	406.3999	J	406	154.31	ND	0	160	ND	0	406	0.41	43	200	2.00E-07	0	0	0.00E+00	2.00E-07
C15 as Pentadecane	725.5792	J	726	154.31	ND	0	160	ND	0	726	0.73	78	358	3.58E-07	0	0	0.00E+00	3.58E-07
n-Hexadecane	130.5537	J	131	153.48	ND	0	160	ND	0	131	0.13	14	64	6.44E-08	0	0	0.00E+00	6.44E-08
C16 as Hexadecane	79.808	ND	40	153.48	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptadecane	78.88	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C17 as Heptadecane	78.88	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Octadecane	79.76	ND	40	153.38	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C18 as Octodecane	79.76	ND	40	153.38	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonadecane	79.92	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C19 as Nonadecane	79.92	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Eicosane	79.728	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C20 as Eicosane	79.728	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heneicosane	80.48	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C21 as Heneicosane	80.48	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Docosane	79.568	ND	40	153.02	ND	0	159	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	79.568	ND	40	153.02	ND	0	159	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	80	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C23 as Tricosane	80	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetracosane	80.112	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C24 as Tetracosane	80.112	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
Total Hydrocarbon			1,059,797			0			0		1059.80	113254	522,711	5.23E-04	0	0	0.00E+00	5.23E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D043B	D043B		ND Adj	#D044A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	148	ND	0	150	ND	0	76	0.08	8	38	3.76E-08	3.76E-08
C5 as Pentane	152.4825	ND	76	148	ND	0	150	ND	0	76	0.08	8	38	3.76E-08	3.76E-08
n-Hexane	218.5016	ND	109	212	ND	0	156	ND	0	109	0.11	12	54	5.39E-08	5.39E-08
C6 as Hexane	218.5016	ND	109	212	ND	0	156	ND	0	109	0.11	12	54	5.39E-08	5.39E-08
n-Heptane	181.5238	ND	91	176	ND	0	163	ND	0	91	0.09	10	45	4.48E-08	4.48E-08
C7 as Heptane	181.5238	ND	91	176	ND	0	163	ND	0	91	0.09	10	45	4.48E-08	4.48E-08
n-Octane	4749.347		4,749	152	ND	0	158	ND	0	4,749	4.75	508	2342	2.34E-06	2.34E-06
C8 as Octane	223236.1		223,236	152	ND	0	158	ND	0	223,236	223.24	23856	110104	1.10E-04	1.10E-04
n-Nonane	26277.25		26,277	153	ND	0	159	ND	0	26,277	26.28	2808	12960	1.30E-05	1.30E-05
C9 as Nonane	381642.9		381,643	153	ND	0	159	ND	0	381,643	381.64	40784	188233	1.88E-04	1.88E-04
n-Decane	38731.45		38,731	155	ND	0	161	ND	0	38,731	38.73	4139	19103	1.91E-05	1.91E-05
C10 as Decane	466894.9		466,895	155	ND	0	161	ND	0	466,895	466.89	49894	230281	2.30E-04	2.30E-04
n-Undecane	42116.25		42,116	154	ND	0	161	ND	0	42,116	42.12	4501	20772	2.08E-05	2.08E-05
C11 as Undecane	295965.9		295,966	154	ND	0	161	ND	0	295,966	295.97	31628	145976	1.46E-04	1.46E-04
n-Dodecane	28651.53		28,652	153	ND	0	159	ND	0	28,652	28.65	3062	14131	1.41E-05	1.41E-05
C12 as Dodecane	106420		106,420	153	ND	0	159	ND	0	106,420	106.42	11372	52488	5.25E-05	5.25E-05
n-Tridecane	9497.35		9,497	154	ND	0	160	ND	0	9,497	9.50	1015	4684	4.68E-06	4.68E-06
C13 as Tridecane	25842.46		25,842	154	ND	0	160	ND	0	25,842	25.84	2762	12746	1.27E-05	1.27E-05
n-Tetradecane	1544.863	J	1,545	154	ND	0	160	ND	0	1,545	1.54	165	762	7.62E-07	7.62E-07
C14 as tetradecane	3960.684		3,961	154	ND	0	160	ND	0	3,961	3.96	423	1953	1.95E-06	1.95E-06
n-Pentadecane	384.36	J	384	154	ND	0	160	ND	0	384	0.38	41	190	1.90E-07	1.90E-07
C15 as Pentadecane	231.7136	J	232	154	ND	0	160	ND	0	232	0.23	25	114	1.14E-07	1.14E-07
n-Hexadecane	158.3492	ND	79	153	ND	0	160	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C16 as Hexadecane	158.3492	ND	79	153	ND	0	160	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Heptadecane	156.5079	ND	78	152	ND	0	158	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C17 as Heptadecane	156.5079	ND	78	152	ND	0	158	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
n-Octadecane	158.254	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
C18 as Octodecane	158.254	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
n-Nonadecane	158.5714	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C19 as Nonadecane	158.5714	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Eicosane	158.1905	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
C20 as Eicosane	158.1905	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
n-Heneicosane	159.6825	ND	80	155	ND	0	161	ND	0	80	0.08	9	39	3.94E-08	3.94E-08
C21 as Heneicosane	159.6825	ND	80	155	ND	0	161	ND	0	80	0.08	9	39	3.94E-08	3.94E-08
n-Docosane	157.873	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C22 as Docosane	157.873	ND	79	153	ND	0	159	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Tricosane	158.7302	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
C23 as Tricosane	158.7302	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.91E-08	3.91E-08
n-Tetracosane	158.9524	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
C24 as Tetracosane	158.9524	ND	79	154	ND	0	160	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
Total Hydrocarbon			1,658,125			0			0		1658.12	177194	817,817	8.18E-04	8.18E-04

Bagging Data Form — Vacuum Method

Sample Id: D045

WSPA Western States Petroleum Association

Equipment type:	Pump		**Component ID:**	D-1016	
Equipment Subtype:	Seal		**Plant ID:**	Refinery D	
Line Size:	3 inches		**Date:**	5-Apr-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/RS	
Barometric pressure	30.01 inHg	762.3 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	61.8 °F	16.6 °C	**TVA ID**	36502	
Component Temp:	252 °F	122.2 °C	**Stream Pressure/Temp:**	14 psig	°F
Stream Description:	P2946 Stab Reboil Circ/ P-2946 Reb Htr Chg (Pump On)				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds
STP = 294.15 K & 760 mmHg

Pre-Sample Data

Time								
8:27	Background	9 ppmv	8-sec Dwell	1916 ppmv	Total Dwell	2:00 min:sec	Final M21	3622 ppm
9:10	Initial Bag Vacuum	0.015 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	193.8 °F	Leak @	Seal

Bag Concentrations (ppmv)

Time	9:13	9:15	9:20	9:22	9:25	9:27	9:29	9:31	9:35	9:38	9:41	9:49	9:54	
ppmv	3496	5163	5389	5527	5143	5499	5835	5933	5916	6082	6023	5419	5334	

Sorbent Tube Sample Collection Parameters

D045A

Time						
9:42	Volume Start	339.7 Liters		Design Sample Flow Rate = 1 liter/min		
9:55	Volume Stop	353.0 Liters	Total Vol	13.3 Liters		
	Sample Run Time	13 Minutes	Sorbent Flow	1.023 L/min	$\text{Sorbent Flow}_{STP}$	1.023 L/min

D045B

Time						
9:42	Volume Start	290.4 Liters		Design Sample Flow Rate = 1 liter/min		
9:55	Volume Stop	303.8 Liters	Total Vol	13.4 Liters		
	Sample Run Time	13 Minutes	Sorbent Flow	1.031 L/min	$\text{Sorbent Flow}_{STP}$	1.031 L/min
	$\text{Total ST Vol}_{STP}$	26.70 Liters	DGM Vol_{STP}	34.52 Liters	$\text{Total Run Vol}_{STP}$	61.22 Liters

Bagging Parameters

Time								
9:48	Vacuum check	0.008 inches H2O			DGM_P	2 inches H2O vacuum		758.5 mmHg
9:47	DGM_{10L} Time	03:45.8 min:sec.frac	DGM Time	3.767	DGM Flow	2.65	DGM Flow_{STP}	2.66 liters/minute
9:49	Bag Temp.	200.5 °F	93.6 °C		Sample_T	69 °F		20.6 °C

Post-Sample Data

10:18	Post Test M21	Background	13 ppmv	8-sec Dwell	2015 ppmv	Total Dwell	3:00 min:sec	Final M21 3940 ppm @ Seal

Condensate accumulation: starting time	9:31 hour:min	Final time	10:00 hour:min	0:29 hours:min
Organic condensate collected	5 ml			
Density of organic condensate	N/A g/ml			

Average THC emissions =	2.30E-02 kg/hr
Percent difference THC ER =	5%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	7.18E-08
C5 as Pentane	1.13E-07
n-Hexane	1.03E-07
C6 as Hexane	1.78E-07
n-Heptane	1.15E-07
C7 as Heptane	3.24E-06
n-Octane	4.63E-05
C8 as Octane	2.40E-03
n-Nonane	3.16E-04
C9 as Nonane	4.87E-03
n-Decane	5.35E-04
C10 as Decane	6.97E-03
n-Undecane	6.17E-04
C11 as Undecane	4.60E-03
n-Dodecane	4.01E-04
C12 as Dodecane	1.56E-03
n-Tridecane	1.59E-04
C13 as Tridecane	3.57E-04
n-Tetradecane	2.66E-05
C14 as tetradecane	2.15E-05
n-Pentadecane	2.97E-06
C15 as Pentadecane	2.97E-06
n-Hexadecane	2.96E-06
C16 as Hexadecane	2.96E-06
n-Heptadecane	2.92E-06
C17 as Heptadecane	2.92E-06
n-Octadecane	2.96E-06
C18 as Octodecane	2.96E-06
n-Nonadecane	2.96E-06
C19 as Nonadecane	2.96E-06
n-Eicosane	2.95E-06
C20 as Eicosane	2.95E-06
n-Heneicosane	2.98E-06
C21 as Heneicosane	2.98E-06
n-Docosane	2.95E-06
C22 as Docosane	2.95E-06
n-Tricosane	2.97E-06
C23 as Tricosane	2.97E-06
n-Tetracosane	2.97E-06
C24 as Tetracosane	2.97E-06
C25 (n-Pentacosane)	2.96E-06
Other C25 as n-Pentacosane	2.96E-06
C26 (n-Hexacosane)	2.93E-06
Other C26 as n-Hexacosane	2.93E-06
C27 (n-Heptacosane)	2.97E-06
Other C27 as n-Heptacosane	2.97E-06
C28 (n-Octacosane)	2.92E-06
Other C28 as n-Octacosane	2.92E-06
C29 (n-Nonacosane)	2.92E-06
Other C29 as n-Nonacosane	2.92E-06
C30 (n-Triacontane)	2.95E-06
Other C30 as n-Triacontane	6.32E-06
Total Hydrocarbon	2.30E-02

THC:	1.22E+00	lbs/day	2.22E-01	tons/yr

ANALYTICAL RESULTS — D045A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS				COMBINED EMISSION RATE
D045A	D045A		ND Adj	#D046A		ND Adj	#D013		ND Adj						Capture		#D045		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	72.22857	ND	36	142.32	ND	0	150	ND	0	36	0.04	2	10	1.02E-08	25	ND	0.94	5.65E-08	6.67E-08
C5 as Pentane	113.4416	J	113	142.32	ND	0	150	ND	0	113	0.11	7	32	3.21E-08	25	ND	0.94	5.65E-08	8.86E-08
n-Hexane	103.5008	ND	52	203.93	ND	0	156	ND	0	52	0.05	3	15	1.46E-08	35	ND	1.35	8.10E-08	9.56E-08
C6 as Hexane	580.626	J	581	203.93	ND	0	156	ND	0	581	0.58	36	164	1.64E-07	35	ND	1.35	8.10E-08	2.45E-07
n-Heptane	248.6361	J	249	169.42	ND	0	163	ND	0	249	0.25	15	70	7.03E-08	29	ND	1.12	6.74E-08	1.38E-07
C7 as Heptane	6867.333		6,867	169.42	ND	0	163	ND	0	6,867	6.87	420	1940	1.94E-06	187	J	14.38	8.63E-07	2.80E-06
n-Octane	81121.7		81,122	146.61	ND	0	158	ND	0	81,122	81.12	4966	22920	2.29E-05	3,685	J	283.46	1.70E-05	3.99E-05
C8 as Octane	3032786		3,032,786	146.61	ND	0	158	ND	0	3,032,786	3032.79	185660	856891	8.57E-04	288,670		22,205.38	1.33E-03	2.19E-03
n-Nonane	354522.5		354,522	147.7	ND	0	159	ND	0	354,522	354.52	21703	100168	1.00E-04	40,743		3,134.08	1.88E-04	2.88E-04
C9 as Nonane	3125238		3,125,238	147.7	ND	0	159	ND	0	3,125,238	3125.24	191319	883013	8.83E-04	815,278		62,713.69	3.76E-03	4.65E-03
n-Decane	269083.5		269,084	149.04	ND	0	161	ND	0	269,084	269.08	16473	76028	7.60E-05	95,148		7,319.08	4.39E-04	5.15E-04
C10 as Decane	2111660		2,111,660	149.04	ND	0	161	ND	0	2,111,660	2111.66	129271	596634	5.97E-04	1,359,517		104,578.23	6.27E-03	6.87E-03
n-Undecane	58500.35		58,500	148.65	ND	0	161	ND	0	58,500	58.50	3581	16529	1.65E-05	129,343		9,949.46	5.97E-04	6.13E-04
C11 as Undecane	522454.3		522,454	148.65	ND	0	161	ND	0	522,454	522.45	31983	147616	1.48E-04	962,348		74,026.77	4.44E-03	4.59E-03
n-Dodecane	10524.19		10,524	147.64	ND	0	159	ND	0	10,524	10.52	644	2974	2.97E-06	85,994		6,614.92	3.97E-04	4.00E-04
C12 as Dodecane	41905.85		41,906	147.64	ND	0	159	ND	0	41,906	41.91	2565	11840	1.18E-05	335,898		25,838.31	1.55E-03	1.56E-03
n-Tridecane	1613.495		1,613	148	ND	0	160	ND	0	1,613	1.61	99	456	4.56E-07	34,329		2,640.69	1.58E-04	1.59E-04
C13 as Tridecane	3129.07		3,129	148	ND	0	160	ND	0	3,129	3.13	192	884	8.84E-07	77,024		5,924.92	3.55E-04	3.56E-04
n-Tetradecane	132.8552	J	133	147.85	ND	0	160	ND	0	133	0.13	8	38	3.75E-08	5,748	J	442.15	2.65E-05	2.66E-05
C14 as tetradecane	75.03759	ND	38	147.85	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	4,654	J	358.00	2.15E-05	2.15E-05
n-Pentadecane	75.41353	ND	38	148.59	ND	0	160	ND	0	38	0.04	2	11	1.07E-08	1,281	ND	49.27	2.96E-06	2.97E-06
C15 as Pentadecane	75.41353	ND	38	148.59	ND	0	160	ND	0	38	0.04	2	11	1.07E-08	1,281	ND	49.27	2.96E-06	2.97E-06
n-Hexadecane	75.00752	ND	38	147.79	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,274	ND	49.00	2.94E-06	2.95E-06
C16 as Hexadecane	75.00752	ND	38	147.79	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,274	ND	49.00	2.94E-06	2.95E-06
n-Heptadecane	74.13534	ND	37	146.07	ND	0	158	ND	0	37	0.04	2	10	1.05E-08	1,260	ND	48.46	2.91E-06	2.92E-06
C17 as Heptadecane	74.13534	ND	37	146.07	ND	0	158	ND	0	37	0.04	2	10	1.05E-08	1,260	ND	48.46	2.91E-06	2.92E-06
n-Octadecane	74.96241	ND	37	147.7	ND	0	159	ND	0	37	0.04	2	11	1.06E-08	1,274	ND	49.00	2.94E-06	2.95E-06
C18 as Octodecane	74.96241	ND	37	147.7	ND	0	159	ND	0	37	0.04	2	11	1.06E-08	1,274	ND	49.00	2.94E-06	2.95E-06
n-Nonadecane	75.11278	ND	38	148	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,276	ND	49.08	2.94E-06	2.96E-06
C19 as Nonadecane	75.11278	ND	38	148	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,276	ND	49.08	2.94E-06	2.96E-06
n-Eicosane	74.93233	ND	37	147.64	ND	0	159	ND	0	37	0.04	2	11	1.06E-08	1,273	ND	48.96	2.94E-06	2.95E-06
C20 as Eicosane	74.93233	ND	37	147.64	ND	0	159	ND	0	37	0.04	2	11	1.06E-08	1,273	ND	48.96	2.94E-06	2.95E-06
n-Heneicosane	75.6391	ND	38	149.04	ND	0	161	ND	0	38	0.04	2	11	1.07E-08	1,285	ND	49.42	2.97E-06	2.98E-06
C21 as Heneicosane	75.6391	ND	38	149.04	ND	0	161	ND	0	38	0.04	2	11	1.07E-08	1,285	ND	49.42	2.97E-06	2.98E-06
n-Docosane	74.78195	ND	37	147.35	ND	0	159	ND	0	37	0.04	2	11	1.06E-08	1,271	ND	48.88	2.93E-06	2.94E-06
C22 as Docosane	74.78195	ND	37	147.35	ND	0	159	ND	0	37	0.04	2	11	1.06E-08	1,271	ND	48.88	2.93E-06	2.94E-06
n-Tricosane	75.18797	ND	38	148.15	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,278	ND	49.15	2.95E-06	2.96E-06
C23 as Tricosane	75.18797	ND	38	148.15	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,278	ND	49.15	2.95E-06	2.96E-06
n-Tetracosane	75.29323	ND	38	148.36	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,279	ND	49.19	2.95E-06	2.96E-06
C24 as Tetracosane	75.29323	ND	38	148.36	ND	0	160	ND	0	38	0.04	2	11	1.06E-08	1,279	ND	49.19	2.95E-06	2.96E-06
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	1,281	ND	49.27	2.96E-06	2.96E-06
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	1,281	ND	49.27	2.96E-06	2.96E-06
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	1,271	ND	48.88	2.93E-06	2.93E-06
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	1,271	ND	48.88	2.93E-06	2.93E-06
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	1,286	ND	49.46	2.97E-06	2.97E-06
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	1,286	ND	49.46	2.97E-06	2.97E-06
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	1,266	ND	48.69	2.92E-06	2.92E-06
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	1,266	ND	48.69	2.92E-06	2.92E-06
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	1,265	ND	48.65	2.92E-06	2.92E-06
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	1,265	ND	48.65	2.92E-06	2.92E-06
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	1,278	ND	49.15	2.95E-06	2.95E-06
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	1,370	J	105.38	6.32E-06	6.32E-06
Total Hydrocarbon			9,621,358			0			0		9621.36	588996	2,718,444	2.72E-03	4,279,602		327,675	1.97E-02	2.24E-02

ANALYTICAL RESULTS — D045B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS				COMBINED EMISSION RATE
D045B	D045B		ND Adj	#D046A		ND Adj	#D013		ND Adj						Capture		#S045		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	143.3791	ND	72	142	ND	0	150	ND	0	72	0.07	4	20	2.03E-08	25	ND	1	5.65E-08	7.68E-08
C5 as Pentane	287.5606	J	288	142	ND	0	150	ND	0	288	0.29	18	81	8.12E-08	25	ND	1	5.65E-08	1.38E-07
n-Hexane	205.4567	ND	103	204	ND	0	156	ND	0	103	0.10	6	29	2.90E-08	35	ND	1	8.10E-08	1.10E-07
C6 as Hexane	205.4567	ND	103	204	ND	0	156	ND	0	103	0.10	6	29	2.90E-08	35	ND	1	8.10E-08	1.10E-07
n-Heptane	170.6866	ND	85	169	ND	0	163	ND	0	85	0.09	5	24	2.41E-08	29	ND	1	6.74E-08	9.15E-08
C7 as Heptane	9942.475		9,942	169	ND	0	163	ND	0	9,942	9.94	609	2809	2.81E-06	187	J	14	8.63E-07	3.67E-06
n-Octane	126451.7		126,452	147	ND	0	158	ND	0	126,452	126.45	7741	35728	3.57E-05	3,685	J	283	1.70E-05	5.27E-05
C8 as Octane	4521550		4,521,550	147	ND	0	158	ND	0	4,521,550	4521.55	276798	1277531	1.28E-03	288,670	0	22,205	1.33E-03	2.61E-03
n-Nonane	547765.6		547,766	148	ND	0	159	ND	0	547,766	547.77	33533	154767	1.55E-04	40,743	0	3,134	1.88E-04	3.43E-04
C9 as Nonane	4726115		4,726,115	148	ND	0	159	ND	0	4,726,115	4726.12	289321	1335329	1.34E-03	815,278	0	62,714	3.76E-03	5.10E-03
n-Decane	407770.6		407,771	149	ND	0	161	ND	0	407,771	407.77	24963	115213	1.15E-04	95,148	0	7,319	4.39E-04	5.54E-04
C10 as Decane	2802752		2,802,752	149	ND	0	161	ND	0	2,802,752	2802.75	171578	791897	7.92E-04	1,359,517	0	104,578	6.27E-03	7.07E-03
n-Undecane	81821.94		81,822	149	ND	0	161	ND	0	81,822	81.82	5009	23118	2.31E-05	129,343	0	9,949	5.97E-04	6.20E-04
C11 as Undecane	629055.8		629,056	149	ND	0	161	ND	0	629,056	629.06	38509	177735	1.78E-04	962,348	0	74,027	4.44E-03	4.62E-03
n-Dodecane	21308.19		21,308	148	ND	0	159	ND	0	21,308	21.31	1304	6020	6.02E-06	85,994	0	6,615	3.97E-04	4.03E-04
C12 as Dodecane	52273.95		52,274	148	ND	0	159	ND	0	52,274	52.27	3200	14770	1.48E-05	335,898	0	25,838	1.55E-03	1.57E-03
n-Tridecane	2168.079		2,168	148	ND	0	160	ND	0	2,168	2.17	133	613	6.13E-07	34,329	0	2,641	1.58E-04	1.59E-04
C13 as Tridecane	4016.099		4,016	148	ND	0	160	ND	0	4,016	4.02	246	1135	1.13E-06	77,024	0	5,925	3.55E-04	3.57E-04
n-Tetradecane	212.2231	J	212	148	ND	0	160	ND	0	212	0.21	13	60	6.00E-08	5,748	J	442	2.65E-05	2.66E-05
C14 as tetradecane	148.9552	ND	74	148	ND	0	160	ND	0	74	0.07	5	21	2.10E-08	4,654	J	358	2.15E-05	2.15E-05
n-Pentadecane	149.7015	ND	75	149	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,281	ND	49	2.96E-06	2.98E-06
C15 as Pentadecane	149.7015	ND	75	149	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,281	ND	49	2.96E-06	2.98E-06
n-Hexadecane	148.8955	ND	74	148	ND	0	160	ND	0	74	0.07	5	21	2.10E-08	1,274	ND	49	2.94E-06	2.96E-06
C16 as Hexadecane	148.8955	ND	74	148	ND	0	160	ND	0	74	0.07	5	21	2.10E-08	1,274	ND	49	2.94E-06	2.96E-06
n-Heptadecane	147.1642	ND	74	146	ND	0	158	ND	0	74	0.07	5	21	2.08E-08	1,260	ND	48	2.91E-06	2.93E-06
C17 as Heptadecane	147.1642	ND	74	146	ND	0	158	ND	0	74	0.07	5	21	2.08E-08	1,260	ND	48	2.91E-06	2.93E-06
n-Octadecane	148.806	ND	74	148	ND	0	159	ND	0	74	0.07	5	21	2.10E-08	1,274	ND	49	2.94E-06	2.96E-06
C18 as Octodecane	148.806	ND	74	148	ND	0	159	ND	0	74	0.07	5	21	2.10E-08	1,274	ND	49	2.94E-06	2.96E-06
n-Nonadecane	149.1045	ND	75	148	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,276	ND	49	2.94E-06	2.97E-06
C19 as Nonadecane	149.1045	ND	75	148	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,276	ND	49	2.94E-06	2.97E-06
n-Eicosane	148.7463	ND	74	148	ND	0	159	ND	0	74	0.07	5	21	2.10E-08	1,273	ND	49	2.94E-06	2.96E-06
C20 as Eicosane	148.7463	ND	74	148	ND	0	159	ND	0	74	0.07	5	21	2.10E-08	1,273	ND	49	2.94E-06	2.96E-06
n-Heneicosane	150.1493	ND	75	149	ND	0	161	ND	0	75	0.08	5	21	2.12E-08	1,285	ND	49	2.97E-06	2.99E-06
C21 as Heneicosane	150.1493	ND	75	149	ND	0	161	ND	0	75	0.08	5	21	2.12E-08	1,285	ND	49	2.97E-06	2.99E-06
n-Docosane	148.4478	ND	74	147	ND	0	159	ND	0	74	0.07	5	21	2.10E-08	1,271	ND	49	2.93E-06	2.95E-06
C22 as Docosane	148.4478	ND	74	147	ND	0	159	ND	0	74	0.07	5	21	2.10E-08	1,271	ND	49	2.93E-06	2.95E-06
n-Tricosane	149.2537	ND	75	148	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,278	ND	49	2.95E-06	2.97E-06
C23 as Tricosane	149.2537	ND	75	148	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,278	ND	49	2.95E-06	2.97E-06
n-Tetracosane	149.4627	ND	75	148	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,279	ND	49	2.95E-06	2.97E-06
C24 as Tetracosane	149.4627	ND	75	148	ND	0	160	ND	0	75	0.07	5	21	2.11E-08	1,279	ND	49	2.95E-06	2.97E-06
C25 (n-Pentacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,281	ND	49	2.96E-06	2.96E-06
Other C25 as n-Pentacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,281	ND	49	2.96E-06	2.96E-06
C26 (n-Hexacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,271	ND	49	2.93E-06	2.93E-06
Other C26 as n-Hexacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,271	ND	49	2.93E-06	2.93E-06
C27 (n-Heptacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,286	ND	49	2.97E-06	2.97E-06
Other C27 as n-Heptacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,286	ND	49	2.97E-06	2.97E-06
C28 (n-Octacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,266	ND	49	2.92E-06	2.92E-06
Other C28 as n-Octacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,266	ND	49	2.92E-06	2.92E-06
C29 (n-Nonacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,265	ND	49	2.92E-06	2.92E-06
Other C29 as n-Nonacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,265	ND	49	2.92E-06	2.92E-06
C30 (n-Triacontane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,278	ND	49	2.95E-06	2.95E-06
Other C30 as n-Triacontane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	1,370	J	105	6.32E-06	6.32E-06
Total Hydrocarbon			########			0			0		13935.42	0	3,937,350	3.94E-03	4,279,602	0	327,675	1.97E-02	2.36E-02

Bagging Data Form	Vacuum Method	Sample Id	D047
Equipment type:	Valve	Component ID:	D-872
Equipment Subtype:	Gate	Plant ID:	Refinery D
Line Size:	2 inches	Date:	5-Apr-18
Phase (G, LL, HL):	HL	Analysis team:	EG/DR/RS
Barometric pressure	29.98 inHg / 761.5 mmHg	Sample Pump A	LP52979
		Sample Pump B	LP52975
Ambient Temp:	82.8 °F / 28.2 °C	TVA ID	36502
Component Temp:	175 °F / 79.4 °C	Stream Pressure/Temp:	psig °F
Stream Description:	Jet		

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:07	Background	-1	ppmv	8-sec Dwell	655	ppmv	Total Dwell	3:15	min:sec	Final M21	3383 ppm
13:39	Initial Bag Vacuum	0.01	inches H2O	DGM Vac.	2	inches H2O	Bag Temp	119.1	°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:42	13:45	13:47	13:49	13:51	13:53	13:59	14:01						
ppmv	846	1043	1054	1081	1088	1085	947	919						

Sorbent Tube Sample Collection Parameters

D047A

Time									
13:53	Volume Start	353.1	Liters		Design Sample Flow Rate = 1 liter/min				
14:06	Volume Stop	365.6	Liters	Total Vol	12.5	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.962 L/min	Sorbent Flow$_{STP}$	0.924	L/min

D047B

13:53	Volume Start	303.8	Liters		Design Sample Flow Rate = 1 liter/min				
14:06	Volume Stop	316.4	Liters	Total Vol	12.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	0.932	L/min
	Total ST Vol$_{STP}$	24.13	Liters	DGM Vol$_{STP}$	85.21	Liters	Total Run Vol$_{STP}$	109.34	Liters

Bagging Parameters

Time										
13:57	Vacuum check	0.01	inches H2O			DGM$_P$	1.8	inches H2O vacuum	758.1	mmHg
13:56	DGM$_{10L}$ Time	01:28.1	min:sec.frac	DGM Time	1.467	DGM Flow	6.82	DGM Flow$_{STP}$	6.55	liters/minute
13:57	Bag Temp.	130	°F	54.4	°C	Sample$_T$	90	°F	32.2	°C

Post-Sample Data

14:40	Post Test M21	Background	11 ppmv	8-sec Dwell	2566 ppmv	Total Dwell	2:00 min:sec	Final M21	5205 ppm @ Stem
Condensate accumulation: starting time			N/A hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected			N/A ml						
Density of organic condensate			N/A g/ml						

Average THC emissions =	8.53E-04 kg/hr
Percent difference THC ER =	29%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.89E-08
C5 as Pentane	2.89E-08
n-Hexane	4.15E-08
C6 as Hexane	4.15E-08
n-Heptane	3.44E-08
C7 as Heptane	3.04E-07
n-Octane	3.09E-06
C8 as Octane	1.42E-04
n-Nonane	1.65E-05
C9 as Nonane	2.11E-04
n-Decane	2.35E-05
C10 as Decane	2.37E-04
n-Undecane	1.66E-05
C11 as Undecane	1.34E-04
n-Dodecane	9.63E-06
C12 as Dodecane	4.25E-05
n-Tridecane	3.73E-06
C13 as Tridecane	1.00E-05
n-Tetradecane	6.53E-07
C14 as tetradecane	1.55E-06
n-Pentadecane	2.32E-07
C15 as Pentadecane	3.06E-07
n-Hexadecane	7.26E-08
C16 as Hexadecane	5.12E-08
n-Heptadecane	4.04E-08
C17 as Heptadecane	2.97E-08
n-Octadecane	3.00E-08
C18 as Octodecane	3.00E-08
n-Nonadecane	3.01E-08
C19 as Nonadecane	3.01E-08
n-Eicosane	3.00E-08
C20 as Eicosane	3.00E-08
n-Heneicosane	3.03E-08
C21 as Heneicosane	3.03E-08
n-Docosane	3.00E-08
C22 as Docosane	3.00E-08
n-Tricosane	3.01E-08
C23 as Tricosane	3.01E-08
n-Tetracosane	3.02E-08
C24 as Tetracosane	3.02E-08
Total Hydrocarbon	8.53E-04

THC:	4.51E-02	lbs/day	8.23E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D047A	D047A		ND Adj	#D048A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	148.94	ND	0	150	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C5 as Pentane	76.8512	ND	38	148.94	ND	0	150	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexane	110.1248	ND	55	213.42	ND	0	156	ND	0	55	0.06	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
C6 as Hexane	110.1248	ND	55	213.42	ND	0	156	ND	0	55	0.06	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
n-Heptane	91.488	ND	46	177.3	ND	0	163	ND	0	46	0.05	5	23	2.31E-08	0	0	0.00E+00	2.31E-08
C7 as Heptane	748.7479	J	749	177.3	ND	0	163	ND	0	749	0.75	82	378	3.78E-07	0	0	0.00E+00	3.78E-07
n-Octane	6998.53		6,999	153.43	ND	0	158	ND	0	6,999	7.00	765	3532	3.53E-06	0	0	0.00E+00	3.53E-06
C8 as Octane	335739.2		335,739	153.43	ND	0	158	ND	0	335,739	335.74	36710	169430	1.69E-04	0	0	0.00E+00	1.69E-04
n-Nonane	39685.37		39,685	154.57	ND	0	159	ND	0	39,685	39.69	4339	20027	2.00E-05	0	0	0.00E+00	2.00E-05
C9 as Nonane	464634.3		464,634	154.57	ND	0	159	ND	0	464,634	464.63	50803	234477	2.34E-04	0	0	0.00E+00	2.34E-04
n-Decane	58642.24		58,642	155.97	ND	0	161	ND	0	58,642	58.64	6412	29594	2.96E-05	0	0	0.00E+00	2.96E-05
C10 as Decane	531246.7		531,247	155.97	ND	0	161	ND	0	531,247	531.25	58087	268093	2.68E-04	0	0	0.00E+00	2.68E-04
n-Undecane	32696.38		32,696	155.57	ND	0	161	ND	0	32,696	32.70	3575	16500	1.65E-05	0	0	0.00E+00	1.65E-05
C11 as Undecane	303322.6		303,323	155.57	ND	0	161	ND	0	303,323	303.32	33165	153071	1.53E-04	0	0	0.00E+00	1.53E-04
n-Dodecane	18956.92		18,957	154.51	ND	0	159	ND	0	18,957	18.96	2073	9567	9.57E-06	0	0	0.00E+00	9.57E-06
C12 as Dodecane	97129.24		97,129	154.51	ND	0	159	ND	0	97,129	97.13	10620	49016	4.90E-05	0	0	0.00E+00	4.90E-05
n-Tridecane	8357.434		8,357	154.88	ND	0	160	ND	0	8,357	8.36	914	4218	4.22E-06	0	0	0.00E+00	4.22E-06
C13 as Tridecane	24403.27		24,403	154.88	ND	0	160	ND	0	24,403	24.40	2668	12315	1.23E-05	0	0	0.00E+00	1.23E-05
n-Tetradecane	1619.189		1,619	154.73	ND	0	160	ND	0	1,619	1.62	177	817	8.17E-07	0	0	0.00E+00	8.17E-07
C14 as tetradecane	4964.783		4,965	154.73	ND	0	160	ND	0	4,965	4.96	543	2505	2.51E-06	0	0	0.00E+00	2.51E-06
n-Pentadecane	608.5617	J	609	155.5	ND	0	160	ND	0	609	0.61	67	307	3.07E-07	0	0	0.00E+00	3.07E-07
C15 as Pentadecane	1132.246		1,132	155.5	ND	0	160	ND	0	1,132	1.13	124	571	5.71E-07	0	0	0.00E+00	5.71E-07
n-Hexadecane	208.6448	J	209	154.67	ND	0	160	ND	0	209	0.21	23	105	1.05E-07	0	0	0.00E+00	1.05E-07
C16 as Hexadecane	123.8814	J	124	154.67	ND	0	160	ND	0	124	0.12	14	63	6.25E-08	0	0	0.00E+00	6.25E-08
n-Heptadecane	81.81508	J	82	152.87	ND	0	158	ND	0	82	0.08	9	41	4.13E-08	0	0	0.00E+00	4.13E-08
C17 as Heptadecane	78.88	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Octadecane	79.76	ND	40	154.57	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C18 as Octodecane	79.76	ND	40	154.57	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Nonadecane	79.92	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C19 as Nonadecane	79.92	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Eicosane	79.728	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C20 as Eicosane	79.728	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Heneicosane	80.48	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C21 as Heneicosane	80.48	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Docosane	79.568	ND	40	154.2	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C22 as Docosane	79.568	ND	40	154.2	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Tricosane	80	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C23 as Tricosane	80	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tetracosane	80.112	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C24 as Tetracosane	80.112	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
Total Hydrocarbon			1,932,132			0			0		1932.13	211260	975,048	9.75E-04	0	0	0.00E+00	9.75E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D047B	D047B		ND Adj	#D048A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	149	ND	0	150	ND	0	76	0.08	8	38	3.85E-08	3.85E-08
C5 as Pentane	152.4825	ND	76	149	ND	0	150	ND	0	76	0.08	8	38	3.85E-08	3.85E-08
n-Hexane	218.5016	ND	109	213	ND	0	156	ND	0	109	0.11	12	55	5.51E-08	5.51E-08
C6 as Hexane	218.5016	ND	109	213	ND	0	156	ND	0	109	0.11	12	55	5.51E-08	5.51E-08
n-Heptane	181.5238	ND	91	177	ND	0	163	ND	0	91	0.09	10	46	4.58E-08	4.58E-08
C7 as Heptane	456.1003	J	456	177	ND	0	163	ND	0	456	0.46	50	230	2.30E-07	2.30E-07
n-Octane	5248.132		5,248	153	ND	0	158	ND	0	5,248	5.25	574	2648	2.65E-06	2.65E-06
C8 as Octane	226581.8		226,582	153	ND	0	158	ND	0	226,582	226.58	24775	114344	1.14E-04	1.14E-04
n-Nonane	25832.09		25,832	155	ND	0	159	ND	0	25,832	25.83	2824	13036	1.30E-05	1.30E-05
C9 as Nonane	370172.5		370,172	155	ND	0	159	ND	0	370,172	370.17	40475	186807	1.87E-04	1.87E-04
n-Decane	34494.15		34,494	156	ND	0	161	ND	0	34,494	34.49	3772	17407	1.74E-05	1.74E-05
C10 as Decane	406821.2		406,821	156	ND	0	161	ND	0	406,821	406.82	44482	205302	2.05E-04	2.05E-04
n-Undecane	32942.08		32,942	156	ND	0	161	ND	0	32,942	32.94	3602	16624	1.66E-05	1.66E-05
C11 as Undecane	228164.9		228,165	156	ND	0	161	ND	0	228,165	228.16	24948	115143	1.15E-04	1.15E-04
n-Dodecane	19202.81		19,203	155	ND	0	159	ND	0	19,203	19.20	2100	9691	9.69E-06	9.69E-06
C12 as Dodecane	71344.6		71,345	155	ND	0	159	ND	0	71,345	71.34	7801	36004	3.60E-05	3.60E-05
n-Tridecane	6435.081		6,435	155	ND	0	160	ND	0	6,435	6.44	704	3247	3.25E-06	3.25E-06
C13 as Tridecane	15374.61		15,375	155	ND	0	160	ND	0	15,375	15.37	1681	7759	7.76E-06	7.76E-06
n-Tetradecane	970.5456	J	971	155	ND	0	160	ND	0	971	0.97	106	490	4.90E-07	4.90E-07
C14 as tetradecane	1176.491	J	1,176	155	ND	0	160	ND	0	1,176	1.18	129	594	5.94E-07	5.94E-07
n-Pentadecane	312.0765	J	312	156	ND	0	160	ND	0	312	0.31	34	157	1.57E-07	1.57E-07
C15 as Pentadecane	159.2063	ND	80	156	ND	0	160	ND	0	80	0.08	9	40	4.02E-08	4.02E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
n-Heptadecane	156.5079	ND	78	153	ND	0	158	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C17 as Heptadecane	156.5079	ND	78	153	ND	0	158	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
n-Octadecane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
C18 as Octodecane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
n-Nonadecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
C19 as Nonadecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
n-Eicosane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
C20 as Eicosane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	9	40	3.99E-08	3.99E-08
n-Heneicosane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	9	40	4.03E-08	4.03E-08
C21 as Heneicosane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	9	40	4.03E-08	4.03E-08
n-Docosane	157.873	ND	79	154	ND	0	159	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
C22 as Docosane	157.873	ND	79	154	ND	0	159	ND	0	79	0.08	9	40	3.98E-08	3.98E-08
n-Tricosane	158.7302	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.01E-08	4.01E-08
C23 as Tricosane	158.7302	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.01E-08	4.01E-08
n-Tetracosane	158.9524	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.01E-08	4.01E-08
C24 as Tetracosane	158.9524	ND	79	155	ND	0	160	ND	0	79	0.08	9	40	4.01E-08	4.01E-08
Total Hydrocarbon			1,447,496			0			0		1447.50	158270	730,477	7.30E-04	7.30E-04

Bagging Data Form — Vacuum Method

Sample Id: D050

Equipment type:	Pump			**Component ID:**	D-1367		
Equipment Subtype:	Connector on Pump Housing			**Plant ID:**	Refinery D		
Line Size:	1	*inches*		**Date:**	6-Apr-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS		
Barometric pressure	29.88	*inHg*	759.0 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	73.8	°F	23.2 °C	**TVA ID**	37887		
Component Temp:	489	°F	253.9 °C	**Stream Pressure/Temp:**		*psig*	°F

Stream Description: *Intermediate Reflux Heavy Gas Oil (cleared area from heavy buildup)*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:22	Background	-1	*ppmv*	8-sec Dwell	190	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	711 *ppm*
10:27	Initial Bag Vacuum	0.03	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	109.2	°F	Leak @	Pump Housing

Bag Concentrations (ppmv)

Time	10:30	10:31	10:32	10:35	10:42	10:47								
ppmv	177	217	F.O	75	218	210								

Sorbent Tube Sample Collection Parameters

D050A

Time									
10:36	Volume Start	381.4	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:49	Volume Stop	393.9	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	$\text{Sorbent Flow}_{STP}$	0.963	*L/min*

D050B

10:36	Volume Start	318.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:49	Volume Stop	331.4	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	$\text{Sorbent Flow}_{STP}$	0.979	*L/min*
	$\text{Total ST Vol}_{STP}$	25.25	*Liters*	DGM Vol_{STP}	76.62	*Liters*	$\text{Total Run Vol}_{STP}$	101.86	*Liters*

Bagging Parameters

Time										
10:42	Vacuum check	0.04	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	755.6	*mmHg*
10:41	DGM_{10L} Time	01:42.1	*min:sec.frac*	DGM Time	1.700	DGM Flow	5.88	DGM Flow_{STP}	5.89	*liters/minute*
10:44	Bag Temp.	122.9	°F	50.5	°C	Sample_T	66	°F	18.9	°C

Post-Sample Data

10:58	Post Test M21	Background	21	*ppmv*	8-sec Dwell	117 *ppmv*	Total Dwell	1:00 *min:sec*	Final M21	171 *ppm*
									@	Pump Housing

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	1.37E-03 kg/hr
Percent difference THC ER =	3%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.68E-08
C5 as Pentane	1.94E-07
n-Hexane	9.55E-08
C6 as Hexane	1.14E-06
n-Heptane	6.52E-07
C7 as Heptane	5.73E-06
n-Octane	1.36E-06
C8 as Octane	3.78E-05
n-Nonane	1.04E-06
C9 as Nonane	5.03E-05
n-Decane	9.30E-07
C10 as Decane	5.52E-05
n-Undecane	4.38E-06
C11 as Undecane	8.66E-05
n-Dodecane	7.78E-06
C12 as Dodecane	1.52E-04
n-Tridecane	1.46E-05
C13 as Tridecane	2.63E-04
n-Tetradecane	3.19E-05
C14 as tetradecane	1.88E-04
n-Pentadecane	1.34E-05
C15 as Pentadecane	1.36E-04
n-Hexadecane	1.38E-05
C16 as Hexadecane	7.67E-05
n-Heptadecane	1.08E-05
C17 as Heptadecane	5.09E-05
n-Octadecane	6.76E-06
C18 as Octodecane	3.85E-05
n-Nonadecane	7.30E-06
C19 as Nonadecane	2.59E-05
n-Eicosane	6.04E-06
C20 as Eicosane	2.00E-05
n-Heneicosane	4.28E-06
C21 as Heneicosane	1.70E-05
n-Docosane	3.57E-06
C22 as Docosane	1.25E-05
n-Tricosane	2.34E-06
C23 as Tricosane	8.66E-06
n-Tetracosane	1.89E-06
C24 as Tetracosane	8.21E-06
Total Hydrocarbon	1.37E-03

THC:	7.24E-02	lbs/day	1.32E-02	tons/yr

D050A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D050A	D050A		ND Adj	#D051A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	148.94	ND	0	150	ND	0	38	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C5 as Pentane	478.9601	J	479	148.94	ND	0	150	ND	0	479	0.48	49	225	2.25E-07	0	0	0.00E+00	2.25E-07
n-Hexane	297.8683	J	298	213.42	ND	0	156	ND	0	298	0.30	30	140	1.40E-07	0	0	0.00E+00	1.40E-07
C6 as Hexane	3124.83		3,125	213.42	ND	0	156	ND	0	3,125	3.12	318	1469	1.47E-06	0	0	0.00E+00	1.47E-06
n-Heptane	1251.304		1,251	177.3	ND	0	163	ND	0	1,251	1.25	127	588	5.88E-07	0	0	0.00E+00	5.88E-07
C7 as Heptane	10411.69		10,412	177.3	ND	0	163	ND	0	10,412	10.41	1061	4895	4.89E-06	0	0	0.00E+00	4.89E-06
n-Octane	2304.532		2,305	153.43	ND	0	158	ND	0	2,305	2.30	235	1083	1.08E-06	0	0	0.00E+00	1.08E-06
C8 as Octane	75118.11		75,118	153.43	ND	0	158	ND	0	75,118	75.12	7652	35316	3.53E-05	0	0	0.00E+00	3.53E-05
n-Nonane	2180.505		2,181	154.57	ND	0	159	ND	0	2,181	2.18	222	1025	1.03E-06	0	0	0.00E+00	1.03E-06
C9 as Nonane	101237.8		101,238	154.57	ND	0	159	ND	0	101,238	101.24	10312	47596	4.76E-05	0	0	0.00E+00	4.76E-05
n-Decane	1959.853		1,960	155.97	ND	0	161	ND	0	1,960	1.96	200	921	9.21E-07	0	0	0.00E+00	9.21E-07
C10 as Decane	113814.2		113,814	155.97	ND	0	161	ND	0	113,814	113.81	11594	53509	5.35E-05	0	0	0.00E+00	5.35E-05
n-Undecane	8960.321		8,960	155.57	ND	0	161	ND	0	8,960	8.96	913	4213	4.21E-06	0	0	0.00E+00	4.21E-06
C11 as Undecane	182085		182,085	155.57	ND	0	161	ND	0	182,085	182.08	18548	85605	8.56E-05	0	0	0.00E+00	8.56E-05
n-Dodecane	16690.84		16,691	154.51	ND	0	159	ND	0	16,691	16.69	1700	7847	7.85E-06	0	0	0.00E+00	7.85E-06
C12 as Dodecane	323855.2		323,855	154.51	ND	0	159	ND	0	323,855	323.86	32989	152257	1.52E-04	0	0	0.00E+00	1.52E-04
n-Tridecane	31953.99		31,954	154.88	ND	0	160	ND	0	31,954	31.95	3255	15023	1.50E-05	0	0	0.00E+00	1.50E-05
C13 as Tridecane	566500.1		566,500	154.88	ND	0	160	ND	0	566,500	566.50	57706	266334	2.66E-04	0	0	0.00E+00	2.66E-04
n-Tetradecane	65242.35		65,242	154.73	ND	0	160	ND	0	65,242	65.24	6646	30673	3.07E-05	0	0	0.00E+00	3.07E-05
C14 as tetradecane	392900.1		392,900	154.73	ND	0	160	ND	0	392,900	392.90	40022	184718	1.85E-04	0	0	0.00E+00	1.85E-04
n-Pentadecane	37510.65		37,511	155.5	ND	0	160	ND	0	37,511	37.51	3821	17635	1.76E-05	0	0	0.00E+00	1.76E-05
C15 as Pentadecane	279408.7		279,409	155.5	ND	0	160	ND	0	279,409	279.41	28462	131361	1.31E-04	0	0	0.00E+00	1.31E-04
n-Hexadecane	27811.27		27,811	154.67	ND	0	160	ND	0	27,811	27.81	2833	13075	1.31E-05	0	0	0.00E+00	1.31E-05
C16 as Hexadecane	157015.6		157,016	154.67	ND	0	160	ND	0	157,016	157.02	15994	73819	7.38E-05	0	0	0.00E+00	7.38E-05
n-Heptadecane	21702.79		21,703	152.87	ND	0	158	ND	0	21,703	21.70	2211	10203	1.02E-05	0	0	0.00E+00	1.02E-05
C17 as Heptadecane	101071.7		101,072	152.87	ND	0	158	ND	0	101,072	101.07	10296	47518	4.75E-05	0	0	0.00E+00	4.75E-05
n-Octadecane	16788.83		16,789	154.57	ND	0	159	ND	0	16,789	16.79	1710	7893	7.89E-06	0	0	0.00E+00	7.89E-06
C18 as Octodecane	78360.02		78,360	154.57	ND	0	159	ND	0	78,360	78.36	7982	36840	3.68E-05	0	0	0.00E+00	3.68E-05
n-Nonadecane	15399.71		15,400	154.88	ND	0	160	ND	0	15,400	15.40	1569	7240	7.24E-06	0	0	0.00E+00	7.24E-06
C19 as Nonadecane	52313.1		52,313	154.88	ND	0	160	ND	0	52,313	52.31	5329	24594	2.46E-05	0	0	0.00E+00	2.46E-05
n-Eicosane	12136.78		12,137	154.51	ND	0	159	ND	0	12,137	12.14	1236	5706	5.71E-06	0	0	0.00E+00	5.71E-06
C20 as Eicosane	41685.88		41,686	154.51	ND	0	159	ND	0	41,686	41.69	4246	19598	1.96E-05	0	0	0.00E+00	1.96E-05
n-Heneicosane	8569.539		8,570	155.97	ND	0	161	ND	0	8,570	8.57	873	4029	4.03E-06	0	0	0.00E+00	4.03E-06
C21 as Heneicosane	35769.51		35,770	155.97	ND	0	161	ND	0	35,770	35.77	3644	16817	1.68E-05	0	0	0.00E+00	1.68E-05
n-Docosane	7259.935		7,260	154.2	ND	0	159	ND	0	7,260	7.26	740	3413	3.41E-06	0	0	0.00E+00	3.41E-06
C22 as Docosane	26820.53		26,821	154.2	ND	0	159	ND	0	26,821	26.82	2732	12609	1.26E-05	0	0	0.00E+00	1.26E-05
n-Tricosane	4371.275		4,371	155.04	ND	0	160	ND	0	4,371	4.37	445	2055	2.06E-06	0	0	0.00E+00	2.06E-06
C23 as Tricosane	19261.25		19,261	155.04	ND	0	160	ND	0	19,261	19.26	1962	9055	9.06E-06	0	0	0.00E+00	9.06E-06
n-Tetracosane	4215.586		4,216	155.26	ND	0	160	ND	0	4,216	4.22	429	1982	1.98E-06	0	0	0.00E+00	1.98E-06
C24 as Tetracosane	18483.39		18,483	155.26	ND	0	160	ND	0	18,483	18.48	1883	8690	8.69E-06	0	0	0.00E+00	8.69E-06
Total Hydrocarbon			2,866,362			0			0		2866.36	291978	#######	1.35E-03	0	0	0.00E+00	1.35E-03

D050B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D050B	D050B		ND Adj	#D051A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.2819	ND	76	149	ND	0	150	ND	0	76	0.08	8	36	3.56E-08	3.56E-08
C5 as Pentane	344.5674	J	345	149	ND	0	150	ND	0	345	0.34	35	162	1.62E-07	1.62E-07
n-Hexane	216.7811	ND	108	213	ND	0	156	ND	0	108	0.11	11	51	5.10E-08	5.10E-08
C6 as Hexane	1730.74		1,731	213	ND	0	156	ND	0	1,731	1.73	176	814	8.14E-07	8.14E-07
n-Heptane	1520.642	J	1,521	177	ND	0	163	ND	0	1,521	1.52	155	715	7.15E-07	7.15E-07
C7 as Heptane	13962.73		13,963	177	ND	0	163	ND	0	13,963	13.96	1422	6564	6.56E-06	6.56E-06
n-Octane	3494.564		3,495	153	ND	0	158	ND	0	3,495	3.49	356	1643	1.64E-06	1.64E-06
C8 as Octane	85620.9		85,621	153	ND	0	158	ND	0	85,621	85.62	8722	40254	4.03E-05	4.03E-05
n-Nonane	2224.65	J	2,225	155	ND	0	159	ND	0	2,225	2.22	227	1046	1.05E-06	1.05E-06
C9 as Nonane	112754.2		112,754	155	ND	0	159	ND	0	112,754	112.75	11486	53010	5.30E-05	5.30E-05
n-Decane	1994.816	J	1,995	156	ND	0	161	ND	0	1,995	1.99	203	938	9.38E-07	9.38E-07
C10 as Decane	121193.4		121,193	156	ND	0	161	ND	0	121,193	121.19	12345	56978	5.70E-05	5.70E-05
n-Undecane	9664.704		9,665	156	ND	0	161	ND	0	9,665	9.66	984	4544	4.54E-06	4.54E-06
C11 as Undecane	186424.5		186,425	156	ND	0	161	ND	0	186,425	186.42	18990	87645	8.76E-05	8.76E-05
n-Dodecane	16420.44		16,420	155	ND	0	159	ND	0	16,420	16.42	1673	7720	7.72E-06	7.72E-06
C12 as Dodecane	322466.9		322,467	155	ND	0	159	ND	0	322,467	322.47	32848	151604	1.52E-04	1.52E-04
n-Tridecane	30247.72		30,248	155	ND	0	160	ND	0	30,248	30.25	3081	14221	1.42E-05	1.42E-05
C13 as Tridecane	552055.2		552,055	155	ND	0	160	ND	0	552,055	552.06	56234	259543	2.60E-04	2.60E-04
n-Tetradecane	70294.76		70,295	155	ND	0	160	ND	0	70,295	70.29	7160	33048	3.30E-05	3.30E-05
C14 as tetradecane	408105.2		408,105	155	ND	0	160	ND	0	408,105	408.11	41571	191866	1.92E-04	1.92E-04
n-Pentadecane	19534.22		19,534	156	ND	0	160	ND	0	19,534	19.53	1990	9184	9.18E-06	9.18E-06
C15 as Pentadecane	299260.9		299,261	156	ND	0	160	ND	0	299,261	299.26	30484	140694	1.41E-04	1.41E-04
n-Hexadecane	30770.54		30,771	155	ND	0	160	ND	0	30,771	30.77	3134	14466	1.45E-05	1.45E-05
C16 as Hexadecane	169204.2		169,204	155	ND	0	160	ND	0	169,204	169.20	17236	79550	7.95E-05	7.95E-05
n-Heptadecane	24400.23		24,400	153	ND	0	158	ND	0	24,400	24.40	2485	11472	1.15E-05	1.15E-05
C17 as Heptadecane	115633.8		115,634	153	ND	0	158	ND	0	115,634	115.63	11779	54364	5.44E-05	5.44E-05
n-Octadecane	11977.84		11,978	155	ND	0	159	ND	0	11,978	11.98	1220	5631	5.63E-06	5.63E-06
C18 as Octodecane	85616.89		85,617	155	ND	0	159	ND	0	85,617	85.62	8721	40252	4.03E-05	4.03E-05
n-Nonadecane	15644.7		15,645	155	ND	0	160	ND	0	15,645	15.64	1594	7355	7.36E-06	7.36E-06
C19 as Nonadecane	57791.46		57,791	155	ND	0	160	ND	0	57,791	57.79	5887	27170	2.72E-05	2.72E-05
n-Eicosane	13560.76		13,561	155	ND	0	159	ND	0	13,561	13.56	1381	6375	6.38E-06	6.38E-06
C20 as Eicosane	43436.94		43,437	155	ND	0	159	ND	0	43,437	43.44	4425	20421	2.04E-05	2.04E-05
n-Heneicosane	9656.146		9,656	156	ND	0	161	ND	0	9,656	9.66	984	4540	4.54E-06	4.54E-06
C21 as Heneicosane	36365.39		36,365	156	ND	0	161	ND	0	36,365	36.37	3704	17097	1.71E-05	1.71E-05
n-Docosane	7930.809		7,931	154	ND	0	159	ND	0	7,931	7.93	808	3729	3.73E-06	3.73E-06
C22 as Docosane	26433.6		26,434	154	ND	0	159	ND	0	26,434	26.43	2693	12427	1.24E-05	1.24E-05
n-Tricosane	5586.521		5,587	155	ND	0	160	ND	0	5,587	5.59	569	2626	2.63E-06	2.63E-06
C23 as Tricosane	17597.93		17,598	155	ND	0	160	ND	0	17,598	17.60	1793	8273	8.27E-06	8.27E-06
n-Tetracosane	3804.619		3,805	155	ND	0	160	ND	0	3,805	3.80	388	1789	1.79E-06	1.79E-06
C24 as Tetracosane	16435.31		16,435	155	ND	0	160	ND	0	16,435	16.44	1674	7727	7.73E-06	7.73E-06
Total Hydrocarbon			2,951,348			0			0		2951.35	300635	#######	1.39E-03	1.39E-03

Bagging Data Form — Vacuum Method

Sample Id: D052

WSPA — Western States Petroleum Association

Equipment type:	Pump #12627			**Component ID:**	D-1334	
Equipment Subtype:	Housing			**Plant ID:**	Refinery D	
Line Size:	6	*inches*		**Date:**	9-Apr-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/MD	
Barometric pressure	30.02 *inHg*	762.5	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	80.2 *°F*	26.8	*°C*	**TVA ID**	36502	
Component Temp:	417 *°F*	213.9	*°C*	**Stream Pressure/Temp:**	90 *psig*	*°F*

Stream Description: *Slurry Under Flow from P12627 CV 1216*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
10:30	Background	0	*ppmv*	8-sec Dwell	4	*ppmv*	Total Dwell	3:00 *min:sec*	Final M21	21.1 *ppm*
12:58	Initial Bag Vacuum	0.01	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	472 *°F*	Leak @	Housing North Side

Bag Concentrations (ppmv)

Time	13:00	13:02	13:04	13:10	13:14									
ppmv	186	177	157	118	104									

Sorbent Tube Sample Collection Parameters

D052A

Time									
13:04	Volume Start	396.4	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:17	Volume Stop	409.1	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.956	*L/min*

D052B

13:04	Volume Start	333.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:17	Volume Stop	346.8	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.971	*L/min*
	Total ST Vol$_{STP}$	25.05	*Liters*	DGM Vol$_{STP}$	64.15	*Liters*	Total Run Vol$_{STP}$	89.20	*Liters*

Bagging Parameters

Time									
13:08	Vacuum check	0.01	*inches H2O*		DGM$_P$	1.8	*inches H2O vacuum*	759.1	*mmHg*
13:08	DGM$_{10L}$ Time	01:59.3	*min:sec.frac*	DGM Time 1.983	DGM Flow	5.04	DGM Flow$_{STP}$	4.93	*liters/minute*
13:08	Bag Temp.	473.2	*°F*	245.1 *°C*	Sample$_T$	81	*°F*	27.2	*°C*

Post-Sample Data

13:44	Post Test M21	Background	8 *ppmv*	8-sec Dwell	10.4 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	21.6 *ppm*
								@	Housing North Side

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	6.03E-05 kg/hr
Percent difference THC ER =	46%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.29E-08
C5 as Pentane	1.31E-06
n-Hexane	1.00E-07
C6 as Hexane	4.77E-06
n-Heptane	2.17E-07
C7 as Heptane	3.93E-06
n-Octane	4.80E-07
C8 as Octane	4.35E-06
n-Nonane	5.78E-08
C9 as Nonane	1.21E-05
n-Decane	1.15E-07
C10 as Decane	2.11E-05
n-Undecane	9.51E-08
C11 as Undecane	2.68E-06
n-Dodecane	4.97E-07
C12 as Dodecane	8.03E-07
n-Tridecane	7.97E-08
C13 as Tridecane	1.05E-06
n-Tetradecane	2.26E-07
C14 as tetradecane	1.44E-06
n-Pentadecane	1.43E-07
C15 as Pentadecane	2.10E-06
n-Hexadecane	1.15E-07
C16 as Hexadecane	9.05E-07
n-Heptadecane	3.04E-07
C17 as Heptadecane	2.24E-07
n-Octadecane	5.54E-08
C18 as Octodecane	1.95E-07
n-Nonadecane	2.40E-08
C19 as Nonadecane	2.40E-08
n-Eicosane	2.40E-08
C20 as Eicosane	1.16E-07
n-Heneicosane	2.42E-08
C21 as Heneicosane	1.23E-07
n-Docosane	2.39E-08
C22 as Docosane	2.18E-07
n-Tricosane	2.41E-08
C23 as Tricosane	5.82E-08
n-Tetracosane	2.41E-08
C24 as Tetracosane	1.34E-07
Total Hydrocarbon	6.03E-05

THC:	3.19E-03	lbs/day	5.83E-04	tons/yr

D052A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D052A	D052A		ND Adj	#D053A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.71654	ND	37	140.24	ND	0	150	ND	0	37	0.04	3	15	1.52E-08	0	0	0.00E+00	1.52E-08
C5 as Pentane	817.4956		817	140.24	ND	0	150	ND	0	817	0.82	73	337	3.37E-07	0	0	0.00E+00	3.37E-07
n-Hexane	381.3689	J	381	200.96	ND	0	156	ND	0	381	0.38	34	157	1.57E-07	0	0	0.00E+00	1.57E-07
C6 as Hexane	9745.579		9,746	200.96	ND	0	156	ND	0	9,746	9.75	869	4012	4.01E-06	0	0	0.00E+00	4.01E-06
n-Heptane	689.5788	J	690	166.95	ND	0	163	ND	0	690	0.69	62	284	2.84E-07	0	0	0.00E+00	2.84E-07
C7 as Heptane	7603.619		7,604	166.95	ND	0	163	ND	0	7,604	7.60	678	3130	3.13E-06	0	0	0.00E+00	3.13E-06
n-Octane	2051.831		2,052	144.47	ND	0	158	ND	0	2,052	2.05	183	845	8.45E-07	0	0	0.00E+00	8.45E-07
C8 as Octane	7539.626		7,540	144.47	ND	0	158	ND	0	7,540	7.54	673	3104	3.10E-06	0	0	0.00E+00	3.10E-06
n-Nonane	117.4484	J	117	145.55	ND	0	159	ND	0	117	0.12	10	48	4.84E-08	0	0	0.00E+00	4.84E-08
C9 as Nonane	23518.83		23,519	145.55	ND	0	159	ND	0	23,519	23.52	2098	9683	9.68E-06	0	0	0.00E+00	9.68E-06
n-Decane	336.2858	J	336	146.86	ND	0	161	ND	0	336	0.34	30	138	1.38E-07	0	0	0.00E+00	1.38E-07
C10 as Decane	39433.22		39,433	146.86	ND	0	161	ND	0	39,433	39.43	3518	16235	1.62E-05	0	0	0.00E+00	1.62E-05
n-Undecane	190.5725	J	191	146.48	ND	0	161	ND	0	191	0.19	17	78	7.85E-08	0	0	0.00E+00	7.85E-08
C11 as Undecane	5518.027		5,518	146.48	ND	0	161	ND	0	5,518	5.52	492	2272	2.27E-06	0	0	0.00E+00	2.27E-06
n-Dodecane	1024.952		1,025	145.49	ND	0	159	ND	0	1,025	1.02	91	422	4.22E-07	0	0	0.00E+00	4.22E-07
C12 as Dodecane	1459.016		1,459	145.49	ND	0	159	ND	0	1,459	1.46	130	601	6.01E-07	0	0	0.00E+00	6.01E-07
n-Tridecane	133.3213	J	133	145.84	ND	0	160	ND	0	133	0.13	12	55	5.49E-08	0	0	0.00E+00	5.49E-08
C13 as Tridecane	1689.59		1,690	145.84	ND	0	160	ND	0	1,690	1.69	151	696	6.96E-07	0	0	0.00E+00	6.96E-07
n-Tetradecane	230.0635	J	230	145.69	ND	0	160	ND	0	230	0.23	21	95	9.47E-08	0	0	0.00E+00	9.47E-08
C14 as tetradecane	1866.302		1,866	145.69	ND	0	160	ND	0	1,866	1.87	166	768	7.68E-07	0	0	0.00E+00	7.68E-07
n-Pentadecane	270.2376	J	270	146.42	ND	0	160	ND	0	270	0.27	24	111	1.11E-07	0	0	0.00E+00	1.11E-07
C15 as Pentadecane	3242.894		3,243	146.42	ND	0	160	ND	0	3,243	3.24	289	1335	1.34E-06	0	0	0.00E+00	1.34E-06
n-Hexadecane	383.0379	J	383	145.64	ND	0	160	ND	0	383	0.38	34	158	1.58E-07	0	0	0.00E+00	1.58E-07
C16 as Hexadecane	1173.652		1,174	145.64	ND	0	160	ND	0	1,174	1.17	105	483	4.83E-07	0	0	0.00E+00	4.83E-07
n-Heptadecane	1204.427		1,204	143.94	ND	0	158	ND	0	1,204	1.20	107	496	4.96E-07	0	0	0.00E+00	4.96E-07
C17 as Heptadecane	282.3919	J	282	143.94	ND	0	158	ND	0	282	0.28	25	116	1.16E-07	0	0	0.00E+00	1.16E-07
n-Octadecane	90.91975	J	91	145.55	ND	0	159	ND	0	91	0.09	8	37	3.74E-08	0	0	0.00E+00	3.74E-08
C18 as Octodecane	366.9792	J	367	145.55	ND	0	159	ND	0	367	0.37	33	151	1.51E-07	0	0	0.00E+00	1.51E-07
n-Nonadecane	78.66142	ND	39	145.84	ND	0	160	ND	0	39	0.04	4	16	1.62E-08	0	0	0.00E+00	1.62E-08
C19 as Nonadecane	78.66142	ND	39	145.84	ND	0	160	ND	0	39	0.04	4	16	1.62E-08	0	0	0.00E+00	1.62E-08
n-Eicosane	78.47244	ND	39	145.49	ND	0	159	ND	0	39	0.04	3	16	1.62E-08	0	0	0.00E+00	1.62E-08
C20 as Eicosane	259.257	J	259	145.49	ND	0	159	ND	0	259	0.26	23	107	1.07E-07	0	0	0.00E+00	1.07E-07
n-Heneicosane	79.2126	ND	40	146.86	ND	0	161	ND	0	40	0.04	4	16	1.63E-08	0	0	0.00E+00	1.63E-08
C21 as Heneicosane	274.6028	J	275	146.86	ND	0	161	ND	0	275	0.27	24	113	1.13E-07	0	0	0.00E+00	1.13E-07
n-Docosane	78.31496	ND	39	145.2	ND	0	159	ND	0	39	0.04	3	16	1.61E-08	0	0	0.00E+00	1.61E-08
C22 as Docosane	517.4818	J	517	145.2	ND	0	159	ND	0	517	0.52	46	213	2.13E-07	0	0	0.00E+00	2.13E-07
n-Tricosane	78.74016	ND	39	145.99	ND	0	160	ND	0	39	0.04	4	16	1.62E-08	0	0	0.00E+00	1.62E-08
C23 as Tricosane	119.1266	J	119	145.99	ND	0	160	ND	0	119	0.12	11	49	4.90E-08	0	0	0.00E+00	4.90E-08
n-Tetracosane	78.85039	ND	39	146.19	ND	0	160	ND	0	39	0.04	4	16	1.62E-08	0	0	0.00E+00	1.62E-08
C24 as Tetracosane	323.4466	J	323	146.19	ND	0	160	ND	0	323	0.32	29	133	1.33E-07	0	0	0.00E+00	1.33E-07
Total Hydrocarbon			113,167			0			0		113.17	10095	46,591	4.66E-05	0	0	0.00E+00	4.66E-05

D052B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D052B	D052B		ND Adj	#D053A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.9364	ND	74	140	ND	0	150	ND	0	74	0.07	7	31	3.07E-08	3.07E-08
C5 as Pentane	5533.363		5,533	140	ND	0	150	ND	0	5,533	5.53	494	2278	2.28E-06	2.28E-06
n-Hexane	213.4202	ND	107	201	ND	0	156	ND	0	107	0.11	10	44	4.39E-08	4.39E-08
C6 as Hexane	13443.58		13,444	201	ND	0	156	ND	0	13,444	13.44	1199	5535	5.53E-06	5.53E-06
n-Heptane	362.9631	J	363	167	ND	0	163	ND	0	363	0.36	32	149	1.49E-07	1.49E-07
C7 as Heptane	11506.76		11,507	167	ND	0	163	ND	0	11,507	11.51	1026	4737	4.74E-06	4.74E-06
n-Octane	280.1575	J	280	144	ND	0	158	ND	0	280	0.28	25	115	1.15E-07	1.15E-07
C8 as Octane	13581.61		13,582	144	ND	0	158	ND	0	13,582	13.58	1212	5592	5.59E-06	5.59E-06
n-Nonane	163.3126	J	163	146	ND	0	159	ND	0	163	0.16	15	67	6.72E-08	6.72E-08
C9 as Nonane	35353.83		35,354	146	ND	0	159	ND	0	35,354	35.35	3154	14555	1.46E-05	1.46E-05
n-Decane	224.3831	J	224	147	ND	0	161	ND	0	224	0.22	20	92	9.24E-08	9.24E-08
C10 as Decane	63180.65		63,181	147	ND	0	161	ND	0	63,181	63.18	5636	26012	2.60E-05	2.60E-05
n-Undecane	271.5951	J	272	146	ND	0	161	ND	0	272	0.27	24	112	1.12E-07	1.12E-07
C11 as Undecane	7497.446		7,497	146	ND	0	161	ND	0	7,497	7.50	669	3087	3.09E-06	3.09E-06
n-Dodecane	1391.747	J	1,392	145	ND	0	159	ND	0	1,392	1.39	124	573	5.73E-07	5.73E-07
C12 as Dodecane	2443.754		2,444	145	ND	0	159	ND	0	2,444	2.44	218	1006	1.01E-06	1.01E-06
n-Tridecane	254.0699	J	254	146	ND	0	160	ND	0	254	0.25	23	105	1.05E-07	1.05E-07
C13 as Tridecane	3429.655		3,430	146	ND	0	160	ND	0	3,430	3.43	306	1412	1.41E-06	1.41E-06
n-Tetradecane	865.9972	J	866	146	ND	0	160	ND	0	866	0.87	77	357	3.57E-07	3.57E-07
C14 as tetradecane	5139.783		5,140	146	ND	0	160	ND	0	5,140	5.14	458	2116	2.12E-06	2.12E-06
n-Pentadecane	425.9397	J	426	146	ND	0	160	ND	0	426	0.43	38	175	1.75E-07	1.75E-07
C15 as Pentadecane	6966.046		6,966	146	ND	0	160	ND	0	6,966	6.97	621	2868	2.87E-06	2.87E-06
n-Hexadecane	173.8518	J	174	146	ND	0	160	ND	0	174	0.17	16	72	7.16E-08	7.16E-08
C16 as Hexadecane	3223.956		3,224	146	ND	0	160	ND	0	3,224	3.22	288	1327	1.33E-06	1.33E-06
n-Heptadecane	274.6315	J	275	144	ND	0	158	ND	0	275	0.27	24	113	1.13E-07	1.13E-07
C17 as Heptadecane	804.6062	J	805	144	ND	0	158	ND	0	805	0.80	72	331	3.31E-07	3.31E-07
n-Octadecane	178.3761	J	178	146	ND	0	159	ND	0	178	0.18	16	73	7.34E-08	7.34E-08
C18 as Octodecane	582.4388	J	582	146	ND	0	159	ND	0	582	0.58	52	240	2.40E-07	2.40E-07
n-Nonadecane	154.8837	ND	77	146	ND	0	160	ND	0	77	0.08	7	32	3.19E-08	3.19E-08
C19 as Nonadecane	154.8837	ND	77	146	ND	0	160	ND	0	77	0.08	7	32	3.19E-08	3.19E-08
n-Eicosane	154.5116	ND	77	145	ND	0	159	ND	0	77	0.08	7	32	3.18E-08	3.18E-08
C20 as Eicosane	303.1322	J	303	145	ND	0	159	ND	0	303	0.30	27	125	1.25E-07	1.25E-07
n-Heneicosane	155.969	ND	78	147	ND	0	161	ND	0	78	0.08	7	32	3.21E-08	3.21E-08
C21 as Heneicosane	322.1632	J	322	147	ND	0	161	ND	0	322	0.32	29	133	1.33E-07	1.33E-07
n-Docosane	154.2016	ND	77	145	ND	0	159	ND	0	77	0.08	7	32	3.17E-08	3.17E-08
C22 as Docosane	540.0973	J	540	145	ND	0	159	ND	0	540	0.54	48	222	2.22E-07	2.22E-07
n-Tricosane	155.0388	ND	78	146	ND	0	160	ND	0	78	0.08	7	32	3.19E-08	3.19E-08
C23 as Tricosane	163.6926	J	164	146	ND	0	160	ND	0	164	0.16	15	67	6.74E-08	6.74E-08
n-Tetracosane	155.2558	ND	78	146	ND	0	160	ND	0	78	0.08	7	32	3.20E-08	3.20E-08
C24 as Tetracosane	328.1912	J	328	146	ND	0	160	ND	0	328	0.33	29	135	1.35E-07	1.35E-07
Total Hydrocarbon			179,935			0			0		179.94	16051	74,080	7.41E-05	7.41E-05

Bagging Data Form — Vacuum Method

Sample Id: D055

WSPA — Western States Petroleum Association

Equipment type:	Pump			**Component ID:**	D-1218		
Equipment Subtype:	Seal			**Plant ID:**	Refinery D		
Line Size:	2	*inches*		**Date:**	10-Apr-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS		
Barometric pressure	30	*inHg*	762.0 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	72.2	*°F*	22.3 *°C*	**TVA ID**	37887		
Component Temp:	75	*°F*	23.9 *°C*	**Stream Pressure/Temp:**	25	*psig*	*°F*

Stream Description: *P-14654 Reflux to Scot Stripper*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:15	Background	-7	*ppmv*	8-sec Dwell	-7	*ppmv*	Total Dwell	5:00	*min:sec*	Final M21	30.6 *ppm*
13:26	Initial Bag Vacuum	0.001	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	73.6	*°F*	Leak @	Seal East Side

Bag Concentrations (ppmv)

Time	13:28	13:30	13:34	13:39	13:42	13:54								
ppmv	0.5	5.7	2.2	10.1	4.7	3								

Sorbent Tube Sample Collection Parameters

D055A

Time									
13:45	Volume Start	411.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:58	Volume Stop	424.4	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.983	*L/min*

D055B

13:45	Volume Start	349.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:58	Volume Stop	361.3	*Liters*	Total Vol	12.2	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.938 *L/min*	Sorbent Flow$_{STP}$	0.944	*L/min*
	Total ST Vol$_{STP}$	25.05	*Liters*	DGM Vol$_{STP}$	81.73	*Liters*	Total Run Vol$_{STP}$	106.78	*Liters*

Bagging Parameters

Time									
13:52	Vacuum check	0.001	*inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	758.6	*mmHg*
13:51	DGM$_{10L}$ Time	01:36.1	*min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$ 6.29	*liters/minute*
13:53	Bag Temp.	72.3	*°F*	22.4	*°C*	Sample$_T$	66 *°F*	18.9	*°C*

Post-Sample Data

14:32	Post Test M21	Background	-3	*ppmv*	8-sec Dwell	14 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21	46 *ppm*
									@	Seal East Side

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	1.71E-06	kg/hr
Percent difference THC ER =	67%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.85E-08
C5 as Pentane	2.85E-08
n-Hexane	3.72E-08
C6 as Hexane	3.72E-08
n-Heptane	3.30E-08
C7 as Heptane	3.30E-08
n-Octane	2.96E-08
C8 as Octane	2.96E-08
n-Nonane	2.98E-08
C9 as Nonane	5.02E-08
n-Decane	3.01E-08
C10 as Decane	3.01E-08
n-Undecane	3.00E-08
C11 as Undecane	3.00E-08
n-Dodecane	2.98E-08
C12 as Dodecane	2.98E-08
n-Tridecane	2.99E-08
C13 as Tridecane	2.99E-08
n-Tetradecane	8.61E-08
C14 as tetradecane	1.33E-07
n-Pentadecane	9.68E-08
C15 as Pentadecane	1.29E-07
n-Hexadecane	1.15E-07
C16 as Hexadecane	4.19E-08
n-Heptadecane	8.64E-08
C17 as Heptadecane	2.95E-08
n-Octadecane	2.98E-08
C18 as Octodecane	2.98E-08
n-Nonadecane	2.99E-08
C19 as Nonadecane	2.99E-08
n-Eicosane	2.98E-08
C20 as Eicosane	2.98E-08
n-Heneicosane	3.01E-08
C21 as Heneicosane	3.01E-08
n-Docosane	2.97E-08
C22 as Docosane	2.97E-08
n-Tricosane	2.99E-08
C23 as Tricosane	2.99E-08
n-Tetracosane	2.99E-08
C24 as Tetracosane	2.99E-08
Total Hydrocarbon	1.71E-06

THC:	9.06E-05	lbs/day	1.65E-05	tons/yr

D055A

ANALYTICAL RESULTS	D055A		ND Adj	BACKGROUND #D056A		ND Adj	TRIP BLANK #D013		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#D0XX		COMBINED EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.71654	ND	37	150.1	ND	0	150	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	73.71654	ND	37	150.1	ND	0	150	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	76.58268	ND	38	215.09	ND	0	156	ND	0	38	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C6 as Hexane	76.58268	ND	38	215.09	ND	0	156	ND	0	38	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptane	80.0315	ND	40	178.69	ND	0	163	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C7 as Heptane	80.0315	ND	40	178.69	ND	0	163	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Octane	77.92126	ND	39	154.62	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C8 as Octane	77.92126	ND	39	154.62	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Nonane	78.50394	ND	39	155.78	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C9 as Nonane	122.1053	J	122	155.78	ND	0	159	ND	0	122	0.12	13	60	6.02E-08	0	0	0.00E+00	6.02E-08
n-Decane	79.2126	ND	40	157.19	ND	0	161	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C10 as Decane	79.2126	ND	40	157.19	ND	0	161	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Undecane	79.00788	ND	40	156.78	ND	0	161	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C11 as Undecane	79.00788	ND	40	156.78	ND	0	161	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Dodecane	78.47244	ND	39	155.72	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C12 as Dodecane	78.47244	ND	39	155.72	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tridecane	78.66142	ND	39	156.09	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C13 as Tridecane	78.66142	ND	39	156.09	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tetradecane	108.8262	J	109	155.94	ND	0	160	ND	0	109	0.11	12	54	5.36E-08	0	0	0.00E+00	5.36E-08
C14 as tetradecane	124.5984	J	125	155.94	ND	0	160	ND	0	125	0.12	13	61	6.14E-08	0	0	0.00E+00	6.14E-08
n-Pentadecane	195.5462	J	196	156.72	ND	0	160	ND	0	196	0.20	21	96	9.64E-08	0	0	0.00E+00	9.64E-08
C15 as Pentadecane	116.3313	J	116	156.72	ND	0	160	ND	0	116	0.12	12	57	5.73E-08	0	0	0.00E+00	5.73E-08
n-Hexadecane	171.8227	J	172	155.87	ND	0	160	ND	0	172	0.17	18	85	8.47E-08	0	0	0.00E+00	8.47E-08
C16 as Hexadecane	88.36061	J	88	155.87	ND	0	160	ND	0	88	0.09	9	44	4.35E-08	0	0	0.00E+00	4.35E-08
n-Heptadecane	124.2968	J	124	154.06	ND	0	158	ND	0	124	0.12	13	61	6.13E-08	0	0	0.00E+00	6.13E-08
C17 as Heptadecane	77.6378	ND	39	154.06	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Octadecane	78.50394	ND	39	155.78	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C18 as Octodecane	78.50394	ND	39	155.78	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Nonadecane	78.66142	ND	39	156.09	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	78.66142	ND	39	156.09	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	78.47244	ND	39	155.72	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C20 as Eicosane	78.47244	ND	39	155.72	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heneicosane	79.2126	ND	40	157.19	ND	0	161	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C21 as Heneicosane	79.2126	ND	40	157.19	ND	0	161	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Docosane	78.31496	ND	39	155.41	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C22 as Docosane	78.31496	ND	39	155.41	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tricosane	78.74016	ND	39	156.25	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C23 as Tricosane	78.74016	ND	39	156.25	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tetracosane	78.85039	ND	39	156.47	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C24 as Tetracosane	78.85039	ND	39	156.47	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
Total Hydrocarbon			2,304			0			0		2.30	246	1,136	1.14E-06	0	0	0.00E+00	1.14E-06

D055B

ANALYTICAL RESULTS	D055B		ND Adj	BACKGROUND #D056A		ND Adj	TRIP BLANK #D013		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	157.482	ND	79	150	ND	0	150	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C5 as Pentane	157.482	ND	79	150	ND	0	150	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Hexane	225.6656	ND	113	215	ND	0	156	ND	0	113	0.11	12	56	5.56E-08	5.56E-08
C6 as Hexane	225.6656	ND	113	215	ND	0	156	ND	0	113	0.11	12	56	5.56E-08	5.56E-08
n-Heptane	187.4754	ND	94	179	ND	0	163	ND	0	94	0.09	10	46	4.62E-08	4.62E-08
C7 as Heptane	187.4754	ND	94	179	ND	0	163	ND	0	94	0.09	10	46	4.62E-08	4.62E-08
n-Octane	162.2295	ND	81	155	ND	0	158	ND	0	81	0.08	9	40	4.00E-08	4.00E-08
C8 as Octane	162.2295	ND	81	155	ND	0	158	ND	0	81	0.08	9	40	4.00E-08	4.00E-08
n-Nonane	163.4426	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
C9 as Nonane	163.4426	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
n-Decane	164.918	ND	82	157	ND	0	161	ND	0	82	0.08	9	41	4.06E-08	4.06E-08
C10 as Decane	164.918	ND	82	157	ND	0	161	ND	0	82	0.08	9	41	4.06E-08	4.06E-08
n-Undecane	164.4918	ND	82	157	ND	0	161	ND	0	82	0.08	9	41	4.05E-08	4.05E-08
C11 as Undecane	164.4918	ND	82	157	ND	0	161	ND	0	82	0.08	9	41	4.05E-08	4.05E-08
n-Dodecane	163.3771	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
C12 as Dodecane	163.3771	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
n-Tridecane	163.7705	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.04E-08	4.04E-08
C13 as Tridecane	163.7705	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.04E-08	4.04E-08
n-Tetradecane	240.7611	J	241	156	ND	0	160	ND	0	241	0.24	26	119	1.19E-07	1.19E-07
C14 as tetradecane	414.1336	J	414	156	ND	0	160	ND	0	414	0.41	44	204	2.04E-07	2.04E-07
n-Pentadecane	197.453	J	197	157	ND	0	160	ND	0	197	0.20	21	97	9.73E-08	9.73E-08
C15 as Pentadecane	408.334	J	408	157	ND	0	160	ND	0	408	0.41	44	201	2.01E-07	2.01E-07
n-Hexadecane	296.1842	J	296	156	ND	0	160	ND	0	296	0.30	32	146	1.46E-07	1.46E-07
C16 as Hexadecane	163.541	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
n-Heptadecane	226.2887	J	226	154	ND	0	158	ND	0	226	0.23	24	112	1.12E-07	1.12E-07
C17 as Heptadecane	161.6393	ND	81	154	ND	0	158	ND	0	81	0.08	9	40	3.98E-08	3.98E-08
n-Octadecane	163.4426	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
C18 as Octodecane	163.4426	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
n-Nonadecane	163.7705	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.04E-08	4.04E-08
C19 as Nonadecane	163.7705	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.04E-08	4.04E-08
n-Eicosane	163.3771	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
C20 as Eicosane	163.3771	ND	82	156	ND	0	159	ND	0	82	0.08	9	40	4.03E-08	4.03E-08
n-Heneicosane	164.918	ND	82	157	ND	0	161	ND	0	82	0.08	9	41	4.06E-08	4.06E-08
C21 as Heneicosane	164.918	ND	82	157	ND	0	161	ND	0	82	0.08	9	41	4.06E-08	4.06E-08
n-Docosane	163.0492	ND	82	155	ND	0	159	ND	0	82	0.08	9	40	4.02E-08	4.02E-08
C22 as Docosane	163.0492	ND	82	155	ND	0	159	ND	0	82	0.08	9	40	4.02E-08	4.02E-08
n-Tricosane	163.9344	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.04E-08	4.04E-08
C23 as Tricosane	163.9344	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.04E-08	4.04E-08
n-Tetracosane	164.1639	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.05E-08	4.05E-08
C24 as Tetracosane	164.1639	ND	82	156	ND	0	160	ND	0	82	0.08	9	40	4.05E-08	4.05E-08
Total Hydrocarbon			4,645			0			0		4.65	496	2,289	2.29E-06	2.29E-06

Bagging Data Form — Vacuum Method

Sample Id: D058

Equipment type:	Pump	**Component ID:**	D-1919
Equipment Subtype:	Seal	**Plant ID:**	Refinery D
Line Size:	6 inches	**Date:**	11-Apr-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR/RS
Barometric pressure	29.86 inHg / 758.4 mmHg	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	67.9 °F / 19.9 °C	**TVA ID**	36502
Component Temp:	59 °F / 15.0 °C	**Stream Pressure/Temp:**	psig / °F
Stream Description:	P2576 310/375 Ex Tk 257		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
10:08	Background	0	ppmv	8-sec Dwell	40	ppmv	Total Dwell	3:00	min:sec	Final M21	45	ppm
11:22	Initial Bag Vacuum	0.005	inches H2O	DGM Vac.	2.1	inches H2O	Bag Temp	105.4	°F	Leak @	East Side of Seal	

Bag Concentrations (ppmv)

Time	11:24	11:28	11:30	11:32	11:36	11:39	11:41	11:42					
ppmv	9.3	9.1	8.1	8	7.2	7.3	7.1	7.2					

Sorbent Tube Sample Collection Parameters

D058A

Time										
11:32	Volume Start	427.2	Liters		Design Sample Flow Rate = 1 liter/min					
11:45	Volume Stop	440.1	Liters	Total Vol	12.9	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.992	L/min	Sorbent Flow$_{STP}$	0.973	L/min

D058B

Time										
11:32	Volume Start	363.9	Liters		Design Sample Flow Rate = 1 liter/min					
11:45	Volume Stop	377.0	Liters	Total Vol	13.1	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	1.008	L/min	Sorbent Flow$_{STP}$	0.988	L/min

Total ST Vol$_{STP}$ 25.49 Liters — DGM Vol$_{STP}$ 87.88 Liters — Total Run Vol$_{STP}$ 113.37 Liters

Bagging Parameters

Time											
11:36	Vacuum check	0.005	inches H2O				DGM$_P$	2	inches H2O vacuum	754.7	mmHg
11:35	DGM$_{10L}$ Time	01:26.6	min:sec.frac	DGM Time	1.450		DGM Flow	6.90	DGM Flow$_{STP}$	6.76	liters/minute
11:36	Bag Temp.	99.9	°F	37.7	°C		Sample$_T$	77	°F	25.0	°C

Post-Sample Data

11:55	Post Test M21	Background	0.1	ppmv	8-sec Dwell	47	ppmv	Total Dwell	1:30	min:sec	Final M21	62 ppm @ East Side of Seal

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00 hours:min
Organic condensate collected	N/A	ml				
Density of organic condensate	N/A	g/ml				

Average THC emissions =	1.31E-06 kg/hr
Percent difference THC ER =	56%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.87E-08
C5 as Pentane	2.87E-08
n-Hexane	3.74E-08
C6 as Hexane	3.74E-08
n-Heptane	3.31E-08
C7 as Heptane	3.31E-08
n-Octane	2.98E-08
C8 as Octane	1.04E-07
n-Nonane	3.00E-08
C9 as Nonane	7.94E-08
n-Decane	3.03E-08
C10 as Decane	3.03E-08
n-Undecane	3.02E-08
C11 as Undecane	3.02E-08
n-Dodecane	3.00E-08
C12 as Dodecane	3.00E-08
n-Tridecane	3.01E-08
C13 as Tridecane	3.01E-08
n-Tetradecane	0.00E+00
C14 as tetradecane	3.01E-08
n-Pentadecane	3.02E-08
C15 as Pentadecane	3.02E-08
n-Hexadecane	3.00E-08
C16 as Hexadecane	3.00E-08
n-Heptadecane	2.97E-08
C17 as Heptadecane	2.97E-08
n-Octadecane	3.00E-08
C18 as Octodecane	3.00E-08
n-Nonadecane	3.01E-08
C19 as Nonadecane	3.01E-08
n-Eicosane	3.00E-08
C20 as Eicosane	3.00E-08
n-Heneicosane	3.03E-08
C21 as Heneicosane	3.03E-08
n-Docosane	2.99E-08
C22 as Docosane	2.99E-08
n-Tricosane	3.01E-08
C23 as Tricosane	3.01E-08
n-Tetracosane	3.02E-08
C24 as Tetracosane	3.02E-08
Total Hydrocarbon	1.31E-06

THC: 6.95E-05 lbs/day 1.27E-05 tons/yr

D058A

ANALYTICAL RESULTS	D058A		ND Adj	BACKGROUND #D059A		ND Adj	TRIP BLANK #D013		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#D0XX		COMBINED EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	72.57365	ND	36	143.38	ND	0	150	ND	0	36	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C5 as Pentane	72.57365	ND	36	143.38	ND	0	150	ND	0	36	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexane	75.39535	ND	38	205.46	ND	0	156	ND	0	38	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C6 as Hexane	75.39535	ND	38	205.46	ND	0	156	ND	0	38	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptane	78.7907	ND	39	170.69	ND	0	163	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C7 as Heptane	78.7907	ND	39	170.69	ND	0	163	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Octane	76.71318	ND	38	147.7	ND	0	158	ND	0	38	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C8 as Octane	241.8761	J	242	147.7	ND	0	158	ND	0	242	0.24	27	127	1.27E-07	0	0	0.00E+00	1.27E-07
n-Nonane	77.28682	ND	39	148.81	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C9 as Nonane	145.8678	J	146	148.81	ND	0	159	ND	0	146	0.15	17	76	7.63E-08	0	0	0.00E+00	7.63E-08
n-Decane	77.9845	ND	39	150.15	ND	0	161	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C10 as Decane	77.9845	ND	39	150.15	ND	0	161	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Undecane	77.78295	ND	39	149.76	ND	0	161	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C11 as Undecane	77.78295	ND	39	149.76	ND	0	161	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Dodecane	77.25582	ND	39	148.75	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C12 as Dodecane	77.25582	ND	39	148.75	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tridecane	77.44186	ND	39	149.1	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C13 as Tridecane	77.44186	ND	39	149.1	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Tetradecane	77.36434	ND	39	161.42	J	161	160	ND	0	-123	0.00	0	0	0.00E+00	0	0	0.00E+00	0.00E+00
C14 as tetradecane	77.36434	ND	39	148.96	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Pentadecane	77.75194	ND	39	149.7	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C15 as Pentadecane	77.75194	ND	39	149.7	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Hexadecane	77.33334	ND	39	148.9	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C16 as Hexadecane	77.33334	ND	39	148.9	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heptadecane	76.43411	ND	38	147.16	ND	0	158	ND	0	38	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C17 as Heptadecane	76.43411	ND	38	147.16	ND	0	158	ND	0	38	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Octadecane	77.28682	ND	39	148.81	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C18 as Octodecane	77.28682	ND	39	148.81	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Nonadecane	77.44186	ND	39	149.1	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C19 as Nonadecane	77.44186	ND	39	149.1	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Eicosane	77.25582	ND	39	148.75	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C20 as Eicosane	77.25582	ND	39	148.75	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heneicosane	77.9845	ND	39	150.15	ND	0	161	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C21 as Heneicosane	77.9845	ND	39	150.15	ND	0	161	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Docosane	77.10078	ND	39	148.45	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C22 as Docosane	77.10078	ND	39	148.45	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tricosane	77.51938	ND	39	149.25	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C23 as Tricosane	77.51938	ND	39	149.25	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Tetracosane	77.62791	ND	39	149.46	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C24 as Tetracosane	77.62791	ND	39	149.46	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
Total Hydrocarbon			1,853			161			0		1.81	206	949	9.49E-07	0	0	0.00E+00	9.49E-07

D058B

ANALYTICAL RESULTS	D058B		ND Adj	BACKGROUND #D059A		ND Adj	TRIP BLANK #D013		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146.6626	ND	73	143	ND	0	150	ND	0	73	0.07	8	38	3.84E-08	3.84E-08
C5 as Pentane	146.6626	ND	73	143	ND	0	150	ND	0	73	0.07	8	38	3.84E-08	3.84E-08
n-Hexane	210.1618	ND	105	205	ND	0	156	ND	0	105	0.11	12	55	5.50E-08	5.50E-08
C6 as Hexane	210.1618	ND	105	205	ND	0	156	ND	0	105	0.11	12	55	5.50E-08	5.50E-08
n-Heptane	174.5954	ND	87	171	ND	0	163	ND	0	87	0.09	10	46	4.57E-08	4.57E-08
C7 as Heptane	174.5954	ND	87	171	ND	0	163	ND	0	87	0.09	10	46	4.57E-08	4.57E-08
n-Octane	151.084	ND	76	148	ND	0	158	ND	0	76	0.08	9	40	3.95E-08	3.95E-08
C8 as Octane	157.4301	J	157	148	ND	0	158	ND	0	157	0.16	18	82	8.24E-08	8.24E-08
n-Nonane	152.2137	ND	76	149	ND	0	159	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
C9 as Nonane	157.6097	J	158	149	ND	0	159	ND	0	158	0.16	18	82	8.25E-08	8.25E-08
n-Decane	153.5878	ND	77	150	ND	0	161	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
C10 as Decane	153.5878	ND	77	150	ND	0	161	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
n-Undecane	153.1908	ND	77	150	ND	0	161	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
C11 as Undecane	153.1908	ND	77	150	ND	0	161	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Dodecane	152.1527	ND	76	149	ND	0	159	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
C12 as Dodecane	152.1527	ND	76	149	ND	0	159	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
n-Tridecane	152.5191	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.99E-08	3.99E-08
C13 as Tridecane	152.5191	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.99E-08	3.99E-08
n-Tetradecane	152.3664	ND	76	161	J	161	160	ND	0	-85	0.00	0	0	0.00E+00	0.00E+00
C14 as tetradecane	152.3664	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.99E-08	3.99E-08
n-Pentadecane	153.1298	ND	77	150	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
C15 as Pentadecane	153.1298	ND	77	150	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Hexadecane	152.3053	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
C16 as Hexadecane	152.3053	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
n-Heptadecane	150.5343	ND	75	147	ND	0	158	ND	0	75	0.08	9	39	3.94E-08	3.94E-08
C17 as Heptadecane	150.5343	ND	75	147	ND	0	158	ND	0	75	0.08	9	39	3.94E-08	3.94E-08
n-Octadecane	152.2137	ND	76	149	ND	0	159	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
C18 as Octodecane	152.2137	ND	76	149	ND	0	159	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
n-Nonadecane	152.5191	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.99E-08	3.99E-08
C19 as Nonadecane	152.5191	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.99E-08	3.99E-08
n-Eicosane	152.1527	ND	76	149	ND	0	159	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
C20 as Eicosane	152.1527	ND	76	149	ND	0	159	ND	0	76	0.08	9	40	3.98E-08	3.98E-08
n-Heneicosane	153.5878	ND	77	150	ND	0	161	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
C21 as Heneicosane	153.5878	ND	77	150	ND	0	161	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
n-Docosane	151.8473	ND	76	148	ND	0	159	ND	0	76	0.08	9	40	3.97E-08	3.97E-08
C22 as Docosane	151.8473	ND	76	148	ND	0	159	ND	0	76	0.08	9	40	3.97E-08	3.97E-08
n-Tricosane	152.6718	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.99E-08	3.99E-08
C23 as Tricosane	152.6718	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	3.99E-08	3.99E-08
n-Tetracosane	152.8855	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	4.00E-08	4.00E-08
C24 as Tetracosane	152.8855	ND	76	149	ND	0	160	ND	0	76	0.08	9	40	4.00E-08	4.00E-08
Total Hydrocarbon			3,286			161			0		3.21	364	1,679	1.68E-06	1.68E-06

Bagging Data Form — Vacuum Method

Sample Id: D060

WSPA

Equipment type:	Pump			**Component ID:**	D-1925	
Equipment Subtype:	Seal			**Plant ID:**	Refinery D	
Line Size:	12	inches		**Date:**	11-Apr-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS	
Barometric pressure	30.01	inHg	762.3 mmHg	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	66.2	°F	19.0 °C	**TVA ID**	36502	
Component Temp:	63	°F	17.2 °C	**Stream Pressure/Temp:**	75 psig	°F
Stream Description:	P2709 BAPL #3 Diesel (Pump Off)					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
14:24	Background	6 ppmv	8-sec Dwell	30 ppmv	Total Dwell	1:30 min:sec	Final M21	44 ppm
14:59	Initial Bag Vacuum	0.2 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	75.4 °F	Leak @	South Side of Seal

Bag Concentrations (ppmv)

Time	15:02	15:03	15:06	15:08	15:10	15:12	15:19	15:26						
ppmv	9.8	8.5	14.3	15.3	16.1	16.6	17.9	18.5						

Sorbent Tube Sample Collection Parameters

D060A

Time						
15:12	Volume Start	440.3 Liters		Design Sample Flow Rate = 1 liter/min		
15:25	Volume Stop	452.9 Liters	Total Vol	12.6 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.969 L/min	Sorbent Flow$_{STP}$	0.975 L/min

D060B

15:12	Volume Start	377.1 Liters		Design Sample Flow Rate = 1 liter/min		
15:25	Volume Stop	389.7 Liters	Total Vol	12.6 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.969 L/min	Sorbent Flow$_{STP}$	0.975 L/min
	Total ST Vol$_{STP}$	25.35 Liters	DGM Vol$_{STP}$	80.90 Liters	Total Run Vol$_{STP}$	106.25 Liters

Bagging Parameters

Time							
15:17	Vacuum check	0.12 inches H2O			DGM$_P$	1.9 inches H2O vacuum	758.7 mmHg
15:16	DGM$_{10L}$ Time	01:36.6 min:sec.frac	DGM Time	1.617	DGM Flow	6.19	DGM Flow$_{STP}$ 6.22 liters/minute
15:17	Bag Temp.	69.8 °F	21.0 °C		Sample$_T$	66 °F	18.9 °C

Post-Sample Data

0:00	Post Test M21	Background	10 ppmv	8-sec Dwell	35 ppmv	Total Dwell	1:20 min:sec	Final M21 56 ppm @ South Side of Seal

Condensate accumulation: starting time	N/A hour:min	Final time	N/A hour:min	0:00 hours:min
Organic condensate collected	N/A ml			
Density of organic condensate	N/A g/ml			

Average THC emissions =	7.32E-06 kg/hr
Percent difference THC ER =	41%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.78E-08
C5 as Pentane	2.78E-08
n-Hexane	3.63E-08
C6 as Hexane	3.63E-08
n-Heptane	3.21E-08
C7 as Heptane	3.21E-08
n-Octane	2.89E-08
C8 as Octane	1.01E-06
n-Nonane	1.18E-07
C9 as Nonane	1.08E-06
n-Decane	1.13E-07
C10 as Decane	1.02E-06
n-Undecane	1.38E-07
C11 as Undecane	1.53E-06
n-Dodecane	2.28E-07
C12 as Dodecane	1.07E-06
n-Tridecane	9.09E-08
C13 as Tridecane	4.82E-08
n-Tetradecane	2.91E-08
C14 as tetradecane	2.91E-08
n-Pentadecane	2.93E-08
C15 as Pentadecane	2.93E-08
n-Hexadecane	2.91E-08
C16 as Hexadecane	2.91E-08
n-Heptadecane	2.88E-08
C17 as Heptadecane	2.88E-08
n-Octadecane	2.91E-08
C18 as Octodecane	2.91E-08
n-Nonadecane	2.92E-08
C19 as Nonadecane	2.92E-08
n-Eicosane	2.91E-08
C20 as Eicosane	2.91E-08
n-Heneicosane	2.94E-08
C21 as Heneicosane	2.94E-08
n-Docosane	2.90E-08
C22 as Docosane	2.90E-08
n-Tricosane	2.92E-08
C23 as Tricosane	2.92E-08
n-Tetracosane	2.92E-08
C24 as Tetracosane	2.92E-08
Total Hydrocarbon	7.32E-06

THC:	3.87E-04	lbs/day	7.06E-05	tons/yr

D060A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D060A	D060A		ND Adj	#D061A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	148.94	ND	0	150	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	74.30159	ND	37	148.94	ND	0	150	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	77.19047	ND	39	213.42	ND	0	156	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C6 as Hexane	77.19047	ND	39	213.42	ND	0	156	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptane	80.66666	ND	40	177.3	ND	0	163	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C7 as Heptane	80.66666	ND	40	177.3	ND	0	163	ND	0	40	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Octane	78.53968	ND	39	153.43	ND	0	158	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C8 as Octane	2683.388		2,683	153.43	ND	0	158	ND	0	2,683	2.68	285	1316	1.32E-06	0	0	0.00E+00	1.32E-06
n-Nonane	288.36	J	288	154.57	ND	0	159	ND	0	288	0.29	31	141	1.41E-07	0	0	0.00E+00	1.41E-07
C9 as Nonane	2836.337		2,836	154.57	ND	0	159	ND	0	2,836	2.84	301	1391	1.39E-06	0	0	0.00E+00	1.39E-06
n-Decane	279.8503	J	280	155.97	ND	0	161	ND	0	280	0.28	30	137	1.37E-07	0	0	0.00E+00	1.37E-07
C10 as Decane	2866.76		2,867	155.97	ND	0	161	ND	0	2,867	2.87	305	1406	1.41E-06	0	0	0.00E+00	1.41E-06
n-Undecane	268.7268	J	269	155.57	ND	0	161	ND	0	269	0.27	29	132	1.32E-07	0	0	0.00E+00	1.32E-07
C11 as Undecane	4098.676		4,099	155.57	ND	0	161	ND	0	4,099	4.10	435	2010	2.01E-06	0	0	0.00E+00	2.01E-06
n-Dodecane	511.37	J	511	154.51	ND	0	159	ND	0	511	0.51	54	251	2.51E-07	0	0	0.00E+00	2.51E-07
C12 as Dodecane	2675.83		2,676	154.51	ND	0	159	ND	0	2,676	2.68	284	1312	1.31E-06	0	0	0.00E+00	1.31E-06
n-Tridecane	193.0764	J	193	154.88	ND	0	160	ND	0	193	0.19	21	95	9.47E-08	0	0	0.00E+00	9.47E-08
C13 as Tridecane	117.1577	J	117	154.88	ND	0	160	ND	0	117	0.12	12	57	5.75E-08	0	0	0.00E+00	5.75E-08
n-Tetradecane	79.20635	ND	40	154.73	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C14 as tetradecane	79.20635	ND	40	154.73	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Pentadecane	79.60317	ND	40	155.5	ND	0	160	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C15 as Pentadecane	79.60317	ND	40	155.5	ND	0	160	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C16 as Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heptadecane	78.25397	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C17 as Heptadecane	78.25397	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Octadecane	79.12698	ND	40	154.57	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C18 as Octodecane	79.12698	ND	40	154.57	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Nonadecane	79.28571	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	79.28571	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	79.09524	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C20 as Eicosane	79.09524	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heneicosane	79.84127	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C21 as Heneicosane	79.84127	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Docosane	78.93651	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C22 as Docosane	78.93651	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tricosane	79.36508	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C23 as Tricosane	79.36508	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tetracosane	79.47619	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C24 as Tetracosane	79.47619	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
Total Hydrocarbon			17,962			0			0		17.96	1908	8,808	8.81E-06	0	0	0.00E+00	8.81E-06

D060B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D060B	D060B		ND Adj	#D061A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	149	ND	0	150	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
C5 as Pentane	152.4825	ND	76	149	ND	0	150	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
n-Hexane	218.5016	ND	109	213	ND	0	156	ND	0	109	0.11	12	54	5.36E-08	5.36E-08
C6 as Hexane	218.5016	ND	109	213	ND	0	156	ND	0	109	0.11	12	54	5.36E-08	5.36E-08
n-Heptane	181.5238	ND	91	177	ND	0	163	ND	0	91	0.09	10	45	4.45E-08	4.45E-08
C7 as Heptane	181.5238	ND	91	177	ND	0	163	ND	0	91	0.09	10	45	4.45E-08	4.45E-08
n-Octane	157.0794	ND	79	153	ND	0	158	ND	0	79	0.08	8	39	3.85E-08	3.85E-08
C8 as Octane	1456.068	J	1,456	153	ND	0	158	ND	0	1,456	1.46	155	714	7.14E-07	7.14E-07
n-Nonane	192.5138	J	193	155	ND	0	159	ND	0	193	0.19	20	94	9.44E-08	9.44E-08
C9 as Nonane	1577.61	J	1,578	155	ND	0	159	ND	0	1,578	1.58	168	774	7.74E-07	7.74E-07
n-Decane	179.8033	J	180	156	ND	0	161	ND	0	180	0.18	19	88	8.82E-08	8.82E-08
C10 as Decane	1300.542	J	1,301	156	ND	0	161	ND	0	1,301	1.30	138	638	6.38E-07	6.38E-07
n-Undecane	293.27	J	293	156	ND	0	161	ND	0	293	0.29	31	144	1.44E-07	1.44E-07
C11 as Undecane	2152.681		2,153	156	ND	0	161	ND	0	2,153	2.15	229	1056	1.06E-06	1.06E-06
n-Dodecane	418.3723	J	418	155	ND	0	159	ND	0	418	0.42	44	205	2.05E-07	2.05E-07
C12 as Dodecane	1673.528		1,674	155	ND	0	159	ND	0	1,674	1.67	178	821	8.21E-07	8.21E-07
n-Tridecane	177.4959	J	177	155	ND	0	160	ND	0	177	0.18	19	87	8.70E-08	8.70E-08
C13 as Tridecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Tetradecane	158.4127	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C14 as tetradecane	158.4127	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Pentadecane	159.2063	ND	80	156	ND	0	160	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C15 as Pentadecane	159.2063	ND	80	156	ND	0	160	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Heptadecane	156.5079	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C17 as Heptadecane	156.5079	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Octadecane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C18 as Octodecane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Nonadecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C19 as Nonadecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Eicosane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C20 as Eicosane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Heneicosane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
C21 as Heneicosane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
n-Docosane	157.873	ND	79	154	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C22 as Docosane	157.873	ND	79	154	ND	0	159	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Tricosane	158.7302	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C23 as Tricosane	158.7302	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Tetracosane	158.9524	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
C24 as Tetracosane	158.9524	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
Total Hydrocarbon			11,875			0			0		11.87	1262	5,823	5.82E-06	5.82E-06

Bagging Data Form — Vacuum Method

Sample Id D062

Equipment type:	Pump	**Component ID:**	D-1915
Equipment Subtype:	Seal	**Plant ID:**	Refinery D
Line Size:	6 *inches*	**Date:**	12-Apr-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR/RS
Barometric pressure	30.13 *inHg* 765.3 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	69 °F 20.6 °C	**TVA ID**	37887
Component Temp:	49 °F 9.4 °C	**Stream Pressure/Temp:**	*psig* °F
Stream Description:	*P2577 Gas Oil*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:24	Background	3	*ppmv*	8-sec Dwell	8	*ppmv*	Total Dwell	5:00	*min:sec*	Final M21	14 *ppm*
10:37	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	66.2	°F	Leak @	North Side of Seal

Bag Concentrations (ppmv)

Time	10:38	10:40	10:42	10:44	10:46	10:51	10:55						
ppmv	6.4	7.2	7.7	8.1	8.5	9.1	9.4						

Sorbent Tube Sample Collection Parameters

D062A

Time									
10:46	Volume Start	456.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:59	Volume Stop	469.2	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.956	*L/min*

D062B

10:46	Volume Start	392.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:59	Volume Stop	404.9	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.972	*L/min*
	Total ST Vol$_{STP}$	25.07	*Liters*	DGM Vol$_{STP}$	89.18	*Liters*	Total Run Vol$_{STP}$	114.24	*Liters*

Bagging Parameters

Time											
10:51	Vacuum check	0.005	*inches H2O*			DGM$_P$	2	*inches H2O vacuum*		761.6	*mmHg*
10:49	DGM$_{10L}$ Time	01:27.1	*min:sec.frac*	DGM Time	1.450	DGM Flow	6.90		DGM Flow$_{STP}$	6.86	*liters/minute*
10:50	Bag Temp.	95	°F	35.0	°C	Sample$_T$	74	°F		23.3	°C

Post-Sample Data

11:12 Post Test M21	Background	4	*ppmv*	8-sec Dwell	12	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21 15 *ppm* @ North Side of Seal
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00	*hours:min*	
Organic condensate collected		N/A	*ml*							
Density of organic condensate		N/A	*g/ml*							

Average THC emissions =	1.28E-06 kg/hr
Percent difference THC ER =	65%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.01E-08
C5 as Pentane	3.01E-08
n-Hexane	4.31E-08
C6 as Hexane	4.31E-08
n-Heptane	3.58E-08
C7 as Heptane	3.58E-08
n-Octane	3.10E-08
C8 as Octane	3.10E-08
n-Nonane	3.12E-08
C9 as Nonane	3.12E-08
n-Decane	3.15E-08
C10 as Decane	3.15E-08
n-Undecane	3.14E-08
C11 as Undecane	3.14E-08
n-Dodecane	3.12E-08
C12 as Dodecane	3.12E-08
n-Tridecane	3.13E-08
C13 as Tridecane	3.13E-08
n-Tetradecane	3.12E-08
C14 as tetradecane	3.12E-08
n-Pentadecane	3.14E-08
C15 as Pentadecane	3.14E-08
n-Hexadecane	3.12E-08
C16 as Hexadecane	3.12E-08
n-Heptadecane	3.09E-08
C17 as Heptadecane	3.09E-08
n-Octadecane	3.12E-08
C18 as Octodecane	3.12E-08
n-Nonadecane	3.13E-08
C19 as Nonadecane	3.13E-08
n-Eicosane	3.12E-08
C20 as Eicosane	3.12E-08
n-Heneicosane	3.15E-08
C21 as Heneicosane	3.15E-08
n-Docosane	3.11E-08
C22 as Docosane	3.11E-08
n-Tricosane	3.13E-08
C23 as Tricosane	3.13E-08
n-Tetracosane	3.13E-08
C24 as Tetracosane	3.13E-08
Total Hydrocarbon	1.28E-06

THC:	**6.78E-05**	**lbs/day**	**1.24E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D062A	D062A		ND Adj	#D063A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	148.94	ND	0	150	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C5 as Pentane	76.8512	ND	38	148.94	ND	0	150	ND	0	38	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Hexane	110.1248	ND	55	213.42	ND	0	156	ND	0	55	0.06	6	29	2.90E-08	0	0	0.00E+00	2.90E-08
C6 as Hexane	110.1248	ND	55	213.42	ND	0	156	ND	0	55	0.06	6	29	2.90E-08	0	0	0.00E+00	2.90E-08
n-Heptane	91.488	ND	46	177.3	ND	0	163	ND	0	46	0.05	5	24	2.41E-08	0	0	0.00E+00	2.41E-08
C7 as Heptane	91.488	ND	46	177.3	ND	0	163	ND	0	46	0.05	5	24	2.41E-08	0	0	0.00E+00	2.41E-08
n-Octane	79.168	ND	40	153.43	ND	0	158	ND	0	40	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
C8 as Octane	79.168	ND	40	153.43	ND	0	158	ND	0	40	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
n-Nonane	79.76	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C9 as Nonane	79.76	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Decane	80.48	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C10 as Decane	80.48	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Undecane	80.272	ND	40	155.57	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C11 as Undecane	80.272	ND	40	155.57	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Dodecane	79.728	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C12 as Dodecane	79.728	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Tridecane	79.92	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C13 as Tridecane	79.92	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Tetradecane	79.84	ND	40	154.73	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C14 as tetradecane	79.84	ND	40	154.73	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Pentadecane	80.24	ND	40	155.5	ND	0	160	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C15 as Pentadecane	80.24	ND	40	155.5	ND	0	160	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Hexadecane	79.808	ND	40	154.67	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C16 as Hexadecane	79.808	ND	40	154.67	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Heptadecane	78.88	ND	39	152.87	ND	0	158	ND	0	39	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C17 as Heptadecane	78.88	ND	39	152.87	ND	0	158	ND	0	39	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Octadecane	79.76	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C18 as Octodecane	79.76	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Nonadecane	79.92	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C19 as Nonadecane	79.92	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Eicosane	79.728	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C20 as Eicosane	79.728	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Heneicosane	80.48	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C21 as Heneicosane	80.48	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Docosane	79.568	ND	40	154.2	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C22 as Docosane	79.568	ND	40	154.2	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Tricosane	80	ND	40	155.04	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C23 as Tricosane	80	ND	40	155.04	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Tetracosane	80.112	ND	40	155.26	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C24 as Tetracosane	80.112	ND	40	155.26	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
Total Hydrocarbon			1,636			0			0		1.64	187	863	8.63E-07	0	0	0.00E+00	8.63E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
D062B	D062B		ND Adj	#D063A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	151.2819	ND	76	149	ND	0	150	ND	0	76	0.08	9	40	3.99E-08		3.99E-08
C5 as Pentane	151.2819	ND	76	149	ND	0	150	ND	0	76	0.08	9	40	3.99E-08		3.99E-08
n-Hexane	216.7811	ND	108	213	ND	0	156	ND	0	108	0.11	12	57	5.72E-08		5.72E-08
C6 as Hexane	216.7811	ND	108	213	ND	0	156	ND	0	108	0.11	12	57	5.72E-08		5.72E-08
n-Heptane	180.0945	ND	90	177	ND	0	163	ND	0	90	0.09	10	47	4.75E-08		4.75E-08
C7 as Heptane	180.0945	ND	90	177	ND	0	163	ND	0	90	0.09	10	47	4.75E-08		4.75E-08
n-Octane	155.8425	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.11E-08		4.11E-08
C8 as Octane	155.8425	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.11E-08		4.11E-08
n-Nonane	157.0079	ND	79	155	ND	0	159	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
C9 as Nonane	157.0079	ND	79	155	ND	0	159	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
n-Decane	158.4252	ND	79	156	ND	0	161	ND	0	79	0.08	9	42	4.18E-08		4.18E-08
C10 as Decane	158.4252	ND	79	156	ND	0	161	ND	0	79	0.08	9	42	4.18E-08		4.18E-08
n-Undecane	158.0158	ND	79	156	ND	0	161	ND	0	79	0.08	9	42	4.17E-08		4.17E-08
C11 as Undecane	158.0158	ND	79	156	ND	0	161	ND	0	79	0.08	9	42	4.17E-08		4.17E-08
n-Dodecane	156.9449	ND	78	155	ND	0	159	ND	0	78	0.08	9	41	4.14E-08		4.14E-08
C12 as Dodecane	156.9449	ND	78	155	ND	0	159	ND	0	78	0.08	9	41	4.14E-08		4.14E-08
n-Tridecane	157.3228	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.15E-08		4.15E-08
C13 as Tridecane	157.3228	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.15E-08		4.15E-08
n-Tetradecane	157.1654	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
C14 as tetradecane	157.1654	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
n-Pentadecane	157.9528	ND	79	156	ND	0	160	ND	0	79	0.08	9	42	4.16E-08		4.16E-08
C15 as Pentadecane	157.9528	ND	79	156	ND	0	160	ND	0	79	0.08	9	42	4.16E-08		4.16E-08
n-Hexadecane	157.1024	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
C16 as Hexadecane	157.1024	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
n-Heptadecane	155.2756	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.09E-08		4.09E-08
C17 as Heptadecane	155.2756	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.09E-08		4.09E-08
n-Octadecane	157.0079	ND	79	155	ND	0	159	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
C18 as Octodecane	157.0079	ND	79	155	ND	0	159	ND	0	79	0.08	9	41	4.14E-08		4.14E-08
n-Nonadecane	157.3228	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.15E-08		4.15E-08
C19 as Nonadecane	157.3228	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.15E-08		4.15E-08
n-Eicosane	156.9449	ND	78	155	ND	0	159	ND	0	78	0.08	9	41	4.14E-08		4.14E-08
C20 as Eicosane	156.9449	ND	78	155	ND	0	159	ND	0	78	0.08	9	41	4.14E-08		4.14E-08
n-Heneicosane	158.4252	ND	79	156	ND	0	161	ND	0	79	0.08	9	42	4.18E-08		4.18E-08
C21 as Heneicosane	158.4252	ND	79	156	ND	0	161	ND	0	79	0.08	9	42	4.18E-08		4.18E-08
n-Docosane	156.6299	ND	78	154	ND	0	159	ND	0	78	0.08	9	41	4.13E-08		4.13E-08
C22 as Docosane	156.6299	ND	78	154	ND	0	159	ND	0	78	0.08	9	41	4.13E-08		4.13E-08
n-Tricosane	157.4803	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.15E-08		4.15E-08
C23 as Tricosane	157.4803	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.15E-08		4.15E-08
n-Tetracosane	157.7008	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.16E-08		4.16E-08
C24 as Tetracosane	157.7008	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.16E-08		4.16E-08
Total Hydrocarbon			3,221			0			0		3.22	368	1,698	1.70E-06		1.70E-06

Bagging Data Form — Vacuum Method

Sample Id: D064

WSPA — Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	D-680	
Equipment Subtype:	Plug		**Plant ID:**	Refinery D	
Line Size:	1 *inches*		**Date:**	13-Apr-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/RS	
Barometric pressure	30.33 *inHg*	770.4 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	63.7 *°F*	17.6 *°C*	**TVA ID**	37887	
Component Temp:	69.6 *°F*	20.9 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Circ Line @ CV 284-B-Jet*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
9:55	Background	4 *ppmv*	8-sec Dwell	6 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	34 *ppm*
10:24	Initial Bag Vacuum	0.005 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	71.5 *°F*	Leak @	West side of Plug

Bag Concentrations (ppmv)

Time	10:31	10:32	10:33	10:34	10:37	10:41	10:46							
ppmv	7	7.5	7.3	7.5	7.1	6.9	6.1							

Sorbent Tube Sample Collection Parameters

D064A

Time								
10:34	Volume Start	471.9 *Liters*		Design Sample Flow Rate = 1 liter/min				
10:47	Volume Stop	484.5 *Liters*	Total Vol	12.6 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.969 *L/min*	$\text{Sorbent Flow}_{STP}$	0.980 *L/min*	

D064B

10:34	Volume Start	408.3 *Liters*		Design Sample Flow Rate = 1 liter/min			
10:47	Volume Stop	420.9 *Liters*	Total Vol	12.6 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.969 *L/min*	$\text{Sorbent Flow}_{STP}$	0.980 *L/min*
	$\text{Total ST Vol}_{STP}$	25.47 *Liters*	DGM Vol_{STP}	89.59 *Liters*	$\text{Total Run Vol}_{STP}$	115.06 *Liters*	

Bagging Parameters

Time							
10:40	Vacuum check	0.005 *inches H2O*			DGM_P	2 *inches H2O vacuum*	766.6 *mmHg*
10:39	DGM_{10L} Time	01:28.1 *min:sec.frac*	DGM Time	1.467	DGM Flow	6.82	DGM Flow_{STP} 6.89 *liters/minute*
10:40	Bag Temp.	71.8 *°F*	22.1 *°C*		Sample_T	69 *°F*	20.6 *°C*

Post-Sample Data

10:59	Post Test M21	Background	2 *ppmv*	8-sec Dwell	22 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21 45 *ppm* @ West side of Plug
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected			N/A *ml*					
Density of organic condensate			N/A *g/ml*					

Average THC emissions =	1.29E-06 kg/hr
Percent difference THC ER =	67%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.04E-08
C5 as Pentane	3.04E-08
n-Hexane	4.35E-08
C6 as Hexane	4.35E-08
n-Heptane	3.62E-08
C7 as Heptane	3.62E-08
n-Octane	3.13E-08
C8 as Octane	3.13E-08
n-Nonane	3.15E-08
C9 as Nonane	3.15E-08
n-Decane	3.18E-08
C10 as Decane	3.18E-08
n-Undecane	3.17E-08
C11 as Undecane	3.17E-08
n-Dodecane	3.15E-08
C12 as Dodecane	3.15E-08
n-Tridecane	3.16E-08
C13 as Tridecane	3.16E-08
n-Tetradecane	3.15E-08
C14 as tetradecane	3.15E-08
n-Pentadecane	3.17E-08
C15 as Pentadecane	3.17E-08
n-Hexadecane	3.15E-08
C16 as Hexadecane	3.15E-08
n-Heptadecane	3.12E-08
C17 as Heptadecane	3.12E-08
n-Octadecane	3.15E-08
C18 as Octodecane	3.15E-08
n-Nonadecane	3.16E-08
C19 as Nonadecane	3.16E-08
n-Eicosane	3.15E-08
C20 as Eicosane	3.15E-08
n-Heneicosane	3.18E-08
C21 as Heneicosane	3.18E-08
n-Docosane	3.14E-08
C22 as Docosane	3.14E-08
n-Tricosane	3.16E-08
C23 as Tricosane	3.16E-08
n-Tetracosane	3.17E-08
C24 as Tetracosane	3.17E-08
Total Hydrocarbon	1.29E-06

THC:	**6.84E-05**	**lbs/day**	**1.25E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D064A	D064A		ND Adj	#D065A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.24127	ND	38	148.94	ND	0	150	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C5 as Pentane	76.24127	ND	38	148.94	ND	0	150	ND	0	38	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Hexane	109.2508	ND	55	213.42	ND	0	156	ND	0	55	0.05	6	29	2.90E-08	0	0	0.00E+00	2.90E-08
C6 as Hexane	109.2508	ND	55	213.42	ND	0	156	ND	0	55	0.05	6	29	2.90E-08	0	0	0.00E+00	2.90E-08
n-Heptane	90.7619	ND	45	177.3	ND	0	163	ND	0	45	0.05	5	24	2.41E-08	0	0	0.00E+00	2.41E-08
C7 as Heptane	90.7619	ND	45	177.3	ND	0	163	ND	0	45	0.05	5	24	2.41E-08	0	0	0.00E+00	2.41E-08
n-Octane	78.53968	ND	39	153.43	ND	0	158	ND	0	39	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
C8 as Octane	78.53968	ND	39	153.43	ND	0	158	ND	0	39	0.04	5	21	2.09E-08	0	0	0.00E+00	2.09E-08
n-Nonane	79.12698	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C9 as Nonane	79.12698	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Decane	79.84127	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C10 as Decane	79.84127	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Undecane	79.63492	ND	40	155.57	ND	0	161	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C11 as Undecane	79.63492	ND	40	155.57	ND	0	161	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Dodecane	79.09524	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C12 as Dodecane	79.09524	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Tridecane	79.28571	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C13 as Tridecane	79.28571	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Tetradecane	79.20635	ND	40	154.73	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C14 as tetradecane	79.20635	ND	40	154.73	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Pentadecane	79.60317	ND	40	155.5	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C15 as Pentadecane	79.60317	ND	40	155.5	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C16 as Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Heptadecane	78.25397	ND	39	152.87	ND	0	158	ND	0	39	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C17 as Heptadecane	78.25397	ND	39	152.87	ND	0	158	ND	0	39	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Octadecane	79.12698	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C18 as Octodecane	79.12698	ND	40	154.57	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Nonadecane	79.28571	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C19 as Nonadecane	79.28571	ND	40	154.88	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Eicosane	79.09524	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C20 as Eicosane	79.09524	ND	40	154.51	ND	0	159	ND	0	40	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Heneicosane	79.84127	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C21 as Heneicosane	79.84127	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Docosane	78.93651	ND	39	154.2	ND	0	159	ND	0	39	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C22 as Docosane	78.93651	ND	39	154.2	ND	0	159	ND	0	39	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Tricosane	79.36508	ND	40	155.04	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C23 as Tricosane	79.36508	ND	40	155.04	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Tetracosane	79.47619	ND	40	155.26	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C24 as Tetracosane	79.47619	ND	40	155.26	ND	0	160	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
Total Hydrocarbon			1,623			0			0		1.62	187	862	8.62E-07	0	0	0.00E+00	8.62E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D064B	D064B		ND Adj	#D065A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	149	ND	0	150	ND	0	76	0.08	9	40	4.05E-08	4.05E-08
C5 as Pentane	152.4825	ND	76	149	ND	0	150	ND	0	76	0.08	9	40	4.05E-08	4.05E-08
n-Hexane	218.5016	ND	109	213	ND	0	156	ND	0	109	0.11	13	58	5.80E-08	5.80E-08
C6 as Hexane	218.5016	ND	109	213	ND	0	156	ND	0	109	0.11	13	58	5.80E-08	5.80E-08
n-Heptane	181.5238	ND	91	177	ND	0	163	ND	0	91	0.09	10	48	4.82E-08	4.82E-08
C7 as Heptane	181.5238	ND	91	177	ND	0	163	ND	0	91	0.09	10	48	4.82E-08	4.82E-08
n-Octane	157.0794	ND	79	153	ND	0	158	ND	0	79	0.08	9	42	4.17E-08	4.17E-08
C8 as Octane	157.0794	ND	79	153	ND	0	158	ND	0	79	0.08	9	42	4.17E-08	4.17E-08
n-Nonane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
C9 as Nonane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
n-Decane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
C10 as Decane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
n-Undecane	159.2698	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.23E-08	4.23E-08
C11 as Undecane	159.2698	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.23E-08	4.23E-08
n-Dodecane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
C12 as Dodecane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
n-Tridecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
C13 as Tridecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
n-Tetradecane	158.4127	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
C14 as tetradecane	158.4127	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
n-Pentadecane	159.2063	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.23E-08	4.23E-08
C15 as Pentadecane	159.2063	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.23E-08	4.23E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
n-Heptadecane	156.5079	ND	78	153	ND	0	158	ND	0	78	0.08	9	42	4.16E-08	4.16E-08
C17 as Heptadecane	156.5079	ND	78	153	ND	0	158	ND	0	78	0.08	9	42	4.16E-08	4.16E-08
n-Octadecane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
C18 as Octodecane	158.254	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
n-Nonadecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
C19 as Nonadecane	158.5714	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
n-Eicosane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
C20 as Eicosane	158.1905	ND	79	155	ND	0	159	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
n-Heneicosane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
C21 as Heneicosane	159.6825	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
n-Docosane	157.873	ND	79	154	ND	0	159	ND	0	79	0.08	9	42	4.19E-08	4.19E-08
C22 as Docosane	157.873	ND	79	154	ND	0	159	ND	0	79	0.08	9	42	4.19E-08	4.19E-08
n-Tricosane	158.7302	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
C23 as Tricosane	158.7302	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
n-Tetracosane	158.9524	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.22E-08	4.22E-08
C24 as Tetracosane	158.9524	ND	79	155	ND	0	160	ND	0	79	0.08	9	42	4.22E-08	4.22E-08
Total Hydrocarbon			3,246			0			0		3.25	374	1,724	1.72E-06	1.72E-06

Bagging Data Form — Vacuum Method

Sample Id: D066

Equipment type:	Pump			**Component ID:**	D-1013	
Equipment Subtype:	Outboard Seal			**Plant ID:**	Refinery D	
Line Size:	8 inches			**Date:**	13-Apr-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS	
Barometric pressure	30.3 inHg	769.6 mmHg		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	85.8 °F	29.9 °C		**TVA ID**	37887	
Component Temp:	96 °F	35.6 °C		**Stream Pressure/Temp:**	50 psig	800 °F
Stream Description:	*P-2944 Aux Lube Oil (Pump Off)*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
12:09	Background	0 ppmv	8-sec Dwell	13 ppmv	Total Dwell	3:00 min:sec	Final M21	65 ppm
13:29	Initial Bag Vacuum	0.005 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	62.4 °F	Leak @	West Side of Seal

Bag Concentrations (ppmv)

Time	13:33	13:36	13:38	13:40	13:43	13:47	13:50	13:57						
ppmv	26.2	33.1	37.5	37.8	39.4	37.2	37.8	43.1						

Sorbent Tube Sample Collection Parameters

D066A

Time						
13:49	Volume Start	484.6 Liters		Design Sample Flow Rate = 1 liter/min		
14:02	Volume Stop	497.1 Liters	Total Vol	12.5 Liters		
	Sample Run Time	13 Minutes	Sorbent Flow	0.962 L/min	Sorbent Flow$_{STP}$	0.906 L/min

D066B

13:49	Volume Start	420.9 Liters		Design Sample Flow Rate = 1 liter/min		
14:02	Volume Stop	433.5 Liters	Total Vol	12.6 Liters		
	Sample Run Time	13 Minutes	Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	0.913 L/min
	Total ST Vol$_{STP}$	23.66 Liters	DGM Vol$_{STP}$	79.05 Liters	Total Run Vol$_{STP}$	102.70 Liters

Bagging Parameters

Time								
13:53	Vacuum check	0.005 inches H2O			DGM$_P$	1.8 inches H2O vacuum		766.3 mmHg
13:53	DGM$_{10L}$ Time	01:33.3 min:sec.frac	DGM Time	1.550	DGM Flow	6.45	DGM Flow$_{STP}$	6.08 liters/minute
13:54	Bag Temp.	94.3 °F		34.6 °C	Sample$_T$	107 °F		41.7 °C

Post-Sample Data

14:14	Post Test M21	Background -8 ppmv	8-sec Dwell	64 ppmv	Total Dwell	1:30 min:sec	Final M21	122 ppm
							@	West Side of Seal
Condensate accumulation: starting time		N/A hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected		N/A ml						
Density of organic condensate		N/A g/ml						

Average THC emissions =	4.84E-05 kg/hr
Percent difference THC ER =	6%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.72E-08
C5 as Pentane	2.72E-08
n-Hexane	3.89E-08
C6 as Hexane	3.89E-08
n-Heptane	3.24E-08
C7 as Heptane	3.24E-08
n-Octane	1.76E-07
C8 as Octane	4.75E-06
n-Nonane	5.20E-07
C9 as Nonane	1.41E-05
n-Decane	1.14E-06
C10 as Decane	1.46E-05
n-Undecane	7.84E-07
C11 as Undecane	8.80E-06
n-Dodecane	3.45E-07
C12 as Dodecane	2.17E-06
n-Tridecane	8.87E-08
C13 as Tridecane	1.24E-07
n-Tetradecane	2.82E-08
C14 as tetradecane	2.82E-08
n-Pentadecane	2.84E-08
C15 as Pentadecane	2.84E-08
n-Hexadecane	2.82E-08
C16 as Hexadecane	2.82E-08
n-Heptadecane	2.79E-08
C17 as Heptadecane	2.79E-08
n-Octadecane	2.82E-08
C18 as Octodecane	2.82E-08
n-Nonadecane	2.83E-08
C19 as Nonadecane	2.83E-08
n-Eicosane	2.82E-08
C20 as Eicosane	2.82E-08
n-Heneicosane	2.85E-08
C21 as Heneicosane	2.85E-08
n-Docosane	2.81E-08
C22 as Docosane	2.81E-08
n-Tricosane	2.83E-08
C23 as Tricosane	2.83E-08
n-Tetracosane	2.83E-08
C24 as Tetracosane	2.83E-08
Total Hydrocarbon	4.84E-05

THC:	**2.56E-03**	**lbs/day**	**4.67E-04**	**tons/yr**

D066A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D066A	D066A		ND Adj	#D067A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	151.28	ND	0	150	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	76.8512	ND	38	151.28	ND	0	150	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	110.1248	ND	55	216.78	ND	0	156	ND	0	55	0.06	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
C6 as Hexane	110.1248	ND	55	216.78	ND	0	156	ND	0	55	0.06	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
n-Heptane	91.488	ND	46	180.09	ND	0	163	ND	0	46	0.05	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
C7 as Heptane	91.488	ND	46	180.09	ND	0	163	ND	0	46	0.05	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
n-Octane	373.5919	J	374	155.84	ND	0	158	ND	0	374	0.37	38	177	1.77E-07	0	0	0.00E+00	1.77E-07
C8 as Octane	10685.11		10,685	155.84	ND	0	158	ND	0	10,685	10.69	1097	5065	5.06E-06	0	0	0.00E+00	5.06E-06
n-Nonane	748.4608	J	748	157.01	ND	0	159	ND	0	748	0.75	77	355	3.55E-07	0	0	0.00E+00	3.55E-07
C9 as Nonane	29149.67		29,150	157.01	ND	0	159	ND	0	29,150	29.15	2994	13818	1.38E-05	0	0	0.00E+00	1.38E-05
n-Decane	2409.458		2,409	158.43	ND	0	161	ND	0	2,409	2.41	247	1142	1.14E-06	0	0	0.00E+00	1.14E-06
C10 as Decane	30196.2		30,196	158.43	ND	0	161	ND	0	30,196	30.20	3101	14314	1.43E-05	0	0	0.00E+00	1.43E-05
n-Undecane	1730.593		1,731	158.02	ND	0	161	ND	0	1,731	1.73	178	820	8.20E-07	0	0	0.00E+00	8.20E-07
C11 as Undecane	17558.03		17,558	158.02	ND	0	161	ND	0	17,558	17.56	1803	8323	8.32E-06	0	0	0.00E+00	8.32E-06
n-Dodecane	473.685	J	474	156.94	ND	0	159	ND	0	474	0.47	49	225	2.25E-07	0	0	0.00E+00	2.25E-07
C12 as Dodecane	4141.794		4,142	156.94	ND	0	159	ND	0	4,142	4.14	425	1963	1.96E-06	0	0	0.00E+00	1.96E-06
n-Tridecane	188.3699	J	188	157.32	ND	0	160	ND	0	188	0.19	19	89	8.93E-08	0	0	0.00E+00	8.93E-08
C13 as Tridecane	177.4855	J	177	157.32	ND	0	160	ND	0	177	0.18	18	84	8.41E-08	0	0	0.00E+00	8.41E-08
n-Tetradecane	79.84	ND	40	157.17	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C14 as tetradecane	79.84	ND	40	157.17	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Pentadecane	80.24	ND	40	157.95	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C15 as Pentadecane	80.24	ND	40	157.95	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexadecane	79.808	ND	40	157.1	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C16 as Hexadecane	79.808	ND	40	157.1	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptadecane	78.88	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C17 as Heptadecane	78.88	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Octadecane	79.76	ND	40	157.01	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C18 as Octodecane	79.76	ND	40	157.01	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Nonadecane	79.92	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C19 as Nonadecane	79.92	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Eicosane	79.728	ND	40	156.94	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C20 as Eicosane	79.728	ND	40	156.94	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heneicosane	80.48	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane	80.48	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane	79.568	ND	40	156.63	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	79.568	ND	40	156.63	ND	0	159	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	80	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	80	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Tetracosane	80.112	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C24 as Tetracosane	80.112	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
Total Hydrocarbon			98,989			0			0		98.99	10167	46,923	4.69E-05	0	0	0.00E+00	4.69E-05

D066B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D066B	D066B		ND Adj	#D067A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	151	ND	0	150	ND	0	76	0.08	8	36	3.61E-08	3.61E-08
C5 as Pentane	152.4825	ND	76	151	ND	0	150	ND	0	76	0.08	8	36	3.61E-08	3.61E-08
n-Hexane	218.5016	ND	109	217	ND	0	156	ND	0	109	0.11	11	52	5.18E-08	5.18E-08
C6 as Hexane	218.5016	ND	109	217	ND	0	156	ND	0	109	0.11	11	52	5.18E-08	5.18E-08
n-Heptane	181.5238	ND	91	180	ND	0	163	ND	0	91	0.09	9	43	4.30E-08	4.30E-08
C7 as Heptane	181.5238	ND	91	180	ND	0	163	ND	0	91	0.09	9	43	4.30E-08	4.30E-08
n-Octane	369.4781	J	369	156	ND	0	158	ND	0	369	0.37	38	175	1.75E-07	1.75E-07
C8 as Octane	9357.035		9,357	156	ND	0	158	ND	0	9,357	9.36	961	4435	4.44E-06	4.44E-06
n-Nonane	1446.531	J	1,447	157	ND	0	159	ND	0	1,447	1.45	149	686	6.86E-07	6.86E-07
C9 as Nonane	30165.25		30,165	157	ND	0	159	ND	0	30,165	30.17	3098	14299	1.43E-05	1.43E-05
n-Decane	2404.162		2,404	158	ND	0	161	ND	0	2,404	2.40	247	1140	1.14E-06	1.14E-06
C10 as Decane	31496.8		31,497	158	ND	0	161	ND	0	31,497	31.50	3235	14930	1.49E-05	1.49E-05
n-Undecane	1577.359	J	1,577	158	ND	0	161	ND	0	1,577	1.58	162	748	7.48E-07	7.48E-07
C11 as Undecane	19550.79		19,551	158	ND	0	161	ND	0	19,551	19.55	2008	9267	9.27E-06	9.27E-06
n-Dodecane	982.6634	J	983	157	ND	0	159	ND	0	983	0.98	101	466	4.66E-07	4.66E-07
C12 as Dodecane	5003.885		5,004	157	ND	0	159	ND	0	5,004	5.00	514	2372	2.37E-06	2.37E-06
n-Tridecane	185.8803	J	186	157	ND	0	160	ND	0	186	0.19	19	88	8.81E-08	8.81E-08
C13 as Tridecane	344.9506	J	345	157	ND	0	160	ND	0	345	0.34	35	164	1.64E-07	1.64E-07
n-Tetradecane	158.4127	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.75E-08	3.75E-08
C14 as tetradecane	158.4127	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.75E-08	3.75E-08
n-Pentadecane	159.2063	ND	80	158	ND	0	160	ND	0	80	0.08	8	38	3.77E-08	3.77E-08
C15 as Pentadecane	159.2063	ND	80	158	ND	0	160	ND	0	80	0.08	8	38	3.77E-08	3.77E-08
n-Hexadecane	158.3492	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.75E-08	3.75E-08
C16 as Hexadecane	158.3492	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.75E-08	3.75E-08
n-Heptadecane	156.5079	ND	78	155	ND	0	158	ND	0	78	0.08	8	37	3.71E-08	3.71E-08
C17 as Heptadecane	156.5079	ND	78	155	ND	0	158	ND	0	78	0.08	8	37	3.71E-08	3.71E-08
n-Octadecane	158.254	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.75E-08	3.75E-08
C18 as Octodecane	158.254	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.75E-08	3.75E-08
n-Nonadecane	158.5714	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C19 as Nonadecane	158.5714	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Eicosane	158.1905	ND	79	157	ND	0	159	ND	0	79	0.08	8	37	3.75E-08	3.75E-08
C20 as Eicosane	158.1905	ND	79	157	ND	0	159	ND	0	79	0.08	8	37	3.75E-08	3.75E-08
n-Heneicosane	159.6825	ND	80	158	ND	0	161	ND	0	80	0.08	8	38	3.78E-08	3.78E-08
C21 as Heneicosane	159.6825	ND	80	158	ND	0	161	ND	0	80	0.08	8	38	3.78E-08	3.78E-08
n-Docosane	157.873	ND	79	157	ND	0	159	ND	0	79	0.08	8	37	3.74E-08	3.74E-08
C22 as Docosane	157.873	ND	79	157	ND	0	159	ND	0	79	0.08	8	37	3.74E-08	3.74E-08
n-Tricosane	158.7302	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C23 as Tricosane	158.7302	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Tetracosane	158.9524	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C24 as Tetracosane	158.9524	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
Total Hydrocarbon			105,180			0			0		105.18	10802	49,858	4.99E-05	4.99E-05

Bagging Data Form — Vacuum Method

Sample Id: D068

WSPA — Western States Petroleum Association

Equipment type:	Pump			**Component ID:**	D-1011	
Equipment Subtype:	Seal - Inboard			**Plant ID:**	Refinery D	
Line Size:	3 inches			**Date:**	16-Apr-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/MD	
Barometric pressure	29.93 inHg	760.2 mmHg		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	66.1 °F	18.9 °C		**TVA ID**	37887	
Component Temp:	57.9 °F	14.4 °C		**Stream Pressure/Temp:**	psig	69 °F
Stream Description:	*Jet P2948 Aux Lube Oil (Pump Off)*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:30	Background	3	ppmv	8-sec Dwell	12	ppmv	Total Dwell	2:00	min:sec	Final M21	43 ppm
10:44	Initial Bag Vacuum	0.01	inches H2O	DGM Vac.	2	inches H2O	Bag Temp	63.9	°F	Leak @	Bottom of Seal

Bag Concentrations (ppmv)

Time	10:49	10:51	10:54	10:57	10:58	11:00	11:02	11:03	11:12	11:15				
ppmv	18.2	28.6	22.7	23.7	22.4	23.3	24.4	24.8	27.2	28.2				

Sorbent Tube Sample Collection Parameters

D068A

Time									
11:03	Volume Start	500.5	Liters		Design Sample Flow Rate = 1 liter/min				
11:16	Volume Stop	513.1	Liters	Total Vol	12.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	1.007	L/min

D068B

11:03	Volume Start	435.9	Liters		Design Sample Flow Rate = 1 liter/min				
11:16	Volume Stop	448.5	Liters	Total Vol	12.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.969 L/min	Sorbent Flow$_{STP}$	1.007	L/min
	Total ST Vol$_{STP}$	26.19	Liters	DGM Vol$_{STP}$	86.23	Liters	Total Run Vol$_{STP}$	112.42	Liters

Bagging Parameters

Time									
11:06	Vacuum check	0.015	inches H2O		DGM$_P$	1.8	inches H2O vacuum	756.9	mmHg
11:06	DGM$_{10L}$ Time	01:33.7	min:sec.frac	DGM Time 1.567	DGM Flow	6.38	DGM Flow$_{STP}$	6.63	liters/minute
11:09	Bag Temp.	64.8	°F	18.2 °C	Sample$_T$	48	°F	8.9	°C

Post-Sample Data

11:32	Post Test M21	Background	-2	ppmv	8-sec Dwell	34 ppmv	Total Dwell	1:30 min:sec	Final M21	110 ppm @ Bottom of Seal
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions =	3.03E-05 kg/hr
Percent difference THC ER =	19%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.97E-08
C5 as Pentane	2.97E-08
n-Hexane	4.25E-08
C6 as Hexane	4.25E-08
n-Heptane	3.53E-08
C7 as Heptane	3.53E-08
n-Octane	1.45E-07
C8 as Octane	3.66E-06
n-Nonane	4.20E-07
C9 as Nonane	1.00E-05
n-Decane	7.43E-07
C10 as Decane	8.99E-06
n-Undecane	4.09E-07
C11 as Undecane	4.17E-06
n-Dodecane	1.41E-07
C12 as Dodecane	5.99E-07
n-Tridecane	3.09E-08
C13 as Tridecane	3.09E-08
n-Tetradecane	3.08E-08
C14 as tetradecane	3.08E-08
n-Pentadecane	3.10E-08
C15 as Pentadecane	3.10E-08
n-Hexadecane	3.08E-08
C16 as Hexadecane	3.08E-08
n-Heptadecane	3.05E-08
C17 as Heptadecane	3.05E-08
n-Octadecane	3.08E-08
C18 as Octodecane	3.08E-08
n-Nonadecane	3.09E-08
C19 as Nonadecane	3.09E-08
n-Eicosane	3.08E-08
C20 as Eicosane	3.08E-08
n-Heneicosane	3.11E-08
C21 as Heneicosane	3.11E-08
n-Docosane	3.07E-08
C22 as Docosane	3.07E-08
n-Tricosane	3.09E-08
C23 as Tricosane	3.09E-08
n-Tetracosane	3.09E-08
C24 as Tetracosane	3.09E-08
Total Hydrocarbon	3.03E-05

THC:	1.60E-03	lbs/day	2.92E-04	tons/yr

D068A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D068A	D068A		ND Adj	#D069A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.24127	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C5 as Pentane	76.24127	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Hexane	109.2508	ND	55	211.78	ND	0	156	ND	0	55	0.05	6	28	2.83E-08	0	0	0.00E+00	2.83E-08
C6 as Hexane	109.2508	ND	55	211.78	ND	0	156	ND	0	55	0.05	6	28	2.83E-08	0	0	0.00E+00	2.83E-08
n-Heptane	90.7619	ND	45	175.94	ND	0	163	ND	0	45	0.05	5	24	2.35E-08	0	0	0.00E+00	2.35E-08
C7 as Heptane	90.7619	ND	45	175.94	ND	0	163	ND	0	45	0.05	5	24	2.35E-08	0	0	0.00E+00	2.35E-08
n-Octane	315.634	J	316	152.25	ND	0	158	ND	0	316	0.32	35	164	1.64E-07	0	0	0.00E+00	1.64E-07
C8 as Octane	8385.675		8,386	152.25	ND	0	158	ND	0	8,386	8.39	943	4351	4.35E-06	0	0	0.00E+00	4.35E-06
n-Nonane	771.1305	J	771	153.38	ND	0	159	ND	0	771	0.77	87	400	4.00E-07	0	0	0.00E+00	4.00E-07
C9 as Nonane	21347.9		21,348	153.38	ND	0	159	ND	0	21,348	21.35	2400	11076	1.11E-05	0	0	0.00E+00	1.11E-05
n-Decane	1622.734		1,623	154.77	ND	0	161	ND	0	1,623	1.62	182	842	8.42E-07	0	0	0.00E+00	8.42E-07
C10 as Decane	19186.09		19,186	154.77	ND	0	161	ND	0	19,186	19.19	2157	9955	9.95E-06	0	0	0.00E+00	9.95E-06
n-Undecane	917.3542		917	154.37	ND	0	161	ND	0	917	0.92	103	476	4.76E-07	0	0	0.00E+00	4.76E-07
C11 as Undecane	8653.343		8,653	154.37	ND	0	161	ND	0	8,653	8.65	973	4490	4.49E-06	0	0	0.00E+00	4.49E-06
n-Dodecane	211.796	J	212	153.32	ND	0	159	ND	0	212	0.21	24	110	1.10E-07	0	0	0.00E+00	1.10E-07
C12 as Dodecane	1325.966		1,326	153.32	ND	0	159	ND	0	1,326	1.33	149	688	6.88E-07	0	0	0.00E+00	6.88E-07
n-Tridecane	79.28571	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C13 as Tridecane	79.28571	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Tetradecane	79.20635	ND	40	153.54	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C14 as tetradecane	79.20635	ND	40	153.54	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Pentadecane	79.60317	ND	40	154.31	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C15 as Pentadecane	79.60317	ND	40	154.31	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Hexadecane	79.1746	ND	40	153.48	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C16 as Hexadecane	79.1746	ND	40	153.48	ND	0	160	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Heptadecane	78.25397	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C17 as Heptadecane	78.25397	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Octadecane	79.12698	ND	40	153.38	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C18 as Octodecane	79.12698	ND	40	153.38	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Nonadecane	79.28571	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C19 as Nonadecane	79.28571	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Eicosane	79.09524	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C20 as Eicosane	79.09524	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Heneicosane	79.84127	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C21 as Heneicosane	79.84127	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Docosane	78.93651	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C22 as Docosane	78.93651	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Tricosane	79.36508	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C23 as Tricosane	79.36508	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Tetracosane	79.47619	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C24 as Tetracosane	79.47619	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
Total Hydrocarbon			63,965			0			0		63.96	7191	33,188	3.32E-05	0	0	0.00E+00	3.32E-05

D068B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D068B	D068B		ND Adj	#D069A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.4825	ND	76	148	ND	0	150	ND	0	76	0.08	9	40	3.96E-08	3.96E-08
C5 as Pentane	152.4825	ND	76	148	ND	0	150	ND	0	76	0.08	9	40	3.96E-08	3.96E-08
n-Hexane	218.5016	ND	109	212	ND	0	156	ND	0	109	0.11	12	57	5.67E-08	5.67E-08
C6 as Hexane	218.5016	ND	109	212	ND	0	156	ND	0	109	0.11	12	57	5.67E-08	5.67E-08
n-Heptane	181.5238	ND	91	176	ND	0	163	ND	0	91	0.09	10	47	4.71E-08	4.71E-08
C7 as Heptane	181.5238	ND	91	176	ND	0	163	ND	0	91	0.09	10	47	4.71E-08	4.71E-08
n-Octane	243.5317	J	244	152	ND	0	158	ND	0	244	0.24	27	126	1.26E-07	1.26E-07
C8 as Octane	5713.387		5,713	152	ND	0	158	ND	0	5,713	5.71	642	2964	2.96E-06	2.96E-06
n-Nonane	847.9202	J	848	153	ND	0	159	ND	0	848	0.85	95	440	4.40E-07	4.40E-07
C9 as Nonane	17306.48		17,306	153	ND	0	159	ND	0	17,306	17.31	1946	8979	8.98E-06	8.98E-06
n-Decane	1240.298	J	1,240	155	ND	0	161	ND	0	1,240	1.24	139	644	6.44E-07	6.44E-07
C10 as Decane	15474.1		15,474	155	ND	0	161	ND	0	15,474	15.47	1740	8029	8.03E-06	8.03E-06
n-Undecane	659.0868	J	659	154	ND	0	161	ND	0	659	0.66	74	342	3.42E-07	3.42E-07
C11 as Undecane	7404.945		7,405	154	ND	0	161	ND	0	7,405	7.40	832	3842	3.84E-06	3.84E-06
n-Dodecane	331.8933	J	332	153	ND	0	159	ND	0	332	0.33	37	172	1.72E-07	1.72E-07
C12 as Dodecane	982.9309	J	983	153	ND	0	159	ND	0	983	0.98	110	510	5.10E-07	5.10E-07
n-Tridecane	158.5714	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C13 as Tridecane	158.5714	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Tetradecane	158.4127	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C14 as tetradecane	158.4127	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Pentadecane	159.2063	ND	80	154	ND	0	160	ND	0	80	0.08	9	41	4.13E-08	4.13E-08
C15 as Pentadecane	159.2063	ND	80	154	ND	0	160	ND	0	80	0.08	9	41	4.13E-08	4.13E-08
n-Hexadecane	158.3492	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C16 as Hexadecane	158.3492	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Heptadecane	156.5079	ND	78	152	ND	0	158	ND	0	78	0.08	9	41	4.06E-08	4.06E-08
C17 as Heptadecane	156.5079	ND	78	152	ND	0	158	ND	0	78	0.08	9	41	4.06E-08	4.06E-08
n-Octadecane	158.254	ND	79	153	ND	0	159	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C18 as Octodecane	158.254	ND	79	153	ND	0	159	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Nonadecane	158.5714	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C19 as Nonadecane	158.5714	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Eicosane	158.1905	ND	79	153	ND	0	159	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C20 as Eicosane	158.1905	ND	79	153	ND	0	159	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Heneicosane	159.6825	ND	80	155	ND	0	161	ND	0	80	0.08	9	41	4.14E-08	4.14E-08
C21 as Heneicosane	159.6825	ND	80	155	ND	0	161	ND	0	80	0.08	9	41	4.14E-08	4.14E-08
n-Docosane	157.873	ND	79	153	ND	0	159	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C22 as Docosane	157.873	ND	79	153	ND	0	159	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Tricosane	158.7302	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
C23 as Tricosane	158.7302	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
n-Tetracosane	158.9524	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
C24 as Tetracosane	158.9524	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
Total Hydrocarbon			52,658			0			0		52.66	5920	27,322	2.73E-05	2.73E-05

Bagging Data Form — Vacuum Method

Sample Id D070

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	D-97		
Equipment Subtype:	Gate		**Plant ID:**	Refinery D		
Line Size:	3	inches	**Date:**	14-Nov-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	30.19 inHg	766.8 mmHg	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	65.1 °F	18.4 °C	**TVA ID**	37887		
Component Temp:	°F	-17.8 °C	**Stream Pressure/Temp:**	psig		°F
Stream Description:	Jet					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
ºF= (F-32)*5/9 ºC
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:13	Background	5	ppmv	8-sec Dwell	932	ppmv	Total Dwell	1:30	min:sec	Final M21	3710 ppm
13:56	Initial Bag Vacuum	0.08	inches H2O	DGM Vac.	2.1	inches H2O	Bag Temp	79.5	°F	Leak @	Packing

Bag Concentrations (ppmv) (had to vent bag)

Time	13:58	14:00	14:02	14:04	14:06	14:08	14:10	14:12	14:14	14:16	14:18	14:20	14:22	14:26
ppmv	346	585	674	799	910	986	1079	1145	1236	1322	1353	1428	1463	1398
Time	14:28	14:32												
ppmv	1394	1421												

Sorbent Tube Sample Collection Parameters

D070A

Time								
14:20	Volume Start	814.1	Liters		Design Sample Flow Rate = 1 liter/min			
14:33	Volume Stop	826.8	Liters	Total Vol	12.7 Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.977 L/min	Sorbent Flow$_{STP}$	0.998 L/min

D070B

14:20	Volume Start	803.6	Liters		Design Sample Flow Rate = 1 liter/min			
14:33	Volume Stop	816.5	Liters	Total Vol	12.9 Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.992 L/min	Sorbent Flow$_{STP}$	1.014 L/min
	Total ST Vol$_{STP}$	26.15	Liters	DGM Vol$_{STP}$	86.61 Liters		Total Run Vol$_{STP}$	112.76 Liters

Bagging Parameters

Time									
14:22	Vacuum check	0.06	inches H2O			DGM$_P$	2	inches H2O vacuum	763.1 mmHg
14:25	DGM$_{10L}$ Time	01:32.4	min:sec.frac	DGM Time	1.533	DGM Flow	6.52	DGM Flow$_{STP}$	6.66 liters/minute
14:23	Bag Temp.	87.8	°F	31.0	°C	Sample$_T$	61	°F	16.1 °C

Post-Sample Data

15:07	Post Test M21	Background	24 ppmv	8-sec Dwell	8862 ppmv	Total Dwell	1:00 min:sec	Final M21	10,300 ppm @ Packing
Condensate accumulation: starting time			N/A hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected			N/A ml						
Density of organic condensate			N/A g/ml						

Average THC emissions =	1.40E-03 kg/hr
Percent difference THC ER =	17%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.92E-08
C5 as Pentane	2.92E-08
n-Hexane	4.19E-08
C6 as Hexane	0.00E+00
n-Heptane	3.48E-08
C7 as Heptane	3.45E-06
n-Octane	3.04E-05
C8 as Octane	3.74E-04
n-Nonane	7.37E-05
C9 as Nonane	5.56E-04
n-Decane	6.31E-05
C10 as Decane	2.36E-04
n-Undecane	1.48E-05
C11 as Undecane	4.31E-05
n-Dodecane	2.43E-06
C12 as Dodecane	2.67E-06
n-Tridecane	1.52E-07
C13 as Tridecane	1.52E-07
n-Tetradecane	1.52E-07
C14 as tetradecane	1.52E-07
n-Pentadecane	1.53E-07
C15 as Pentadecane	1.53E-07
n-Hexadecane	1.52E-07
C16 as Hexadecane	1.52E-07
n-Heptadecane	1.50E-07
C17 as Heptadecane	1.50E-07
n-Octadecane	1.52E-07
C18 as Octodecane	1.52E-07
n-Nonadecane	1.52E-07
C19 as Nonadecane	1.52E-07
n-Eicosane	1.52E-07
C20 as Eicosane	1.52E-07
n-Heneicosane	1.53E-07
C21 as Heneicosane	1.53E-07
n-Docosane	1.51E-07
C22 as Docosane	1.51E-07
n-Tricosane	1.52E-07
C23 as Tricosane	1.52E-07
n-Tetracosane	1.52E-07
C24 as Tetracosane	2.08E-07
Total Hydrocarbon	1.40E-03

THC: 7.43E-02 lbs/day 1.36E-02 tons/yr

D070A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D070A	D070A		ND Adj	#D071A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.64095	ND	38	145.15	ND	0	150	ND	0	38	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C5 as Pentane	75.64095	ND	38	145.15	ND	0	150	ND	0	38	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Hexane	108.3906	ND	54	150.79	ND	0	156	ND	0	54	0.05	6	28	2.82E-08	0	0	0.00E+00	2.82E-08
C6 as Hexane	108.3906	ND	54	250.85	J	251	156	ND	0	-197	0.00	0	0	0.00E+00	0	0	0.00E+00	0.00E+00
n-Heptane	90.04725	ND	45	157.58	ND	0	163	ND	0	45	0.05	5	23	2.34E-08	0	0	0.00E+00	2.34E-08
C7 as Heptane	6828.912		6,829	157.58	ND	0	163	ND	0	6,829	6.83	770	3554	3.55E-06	0	0	0.00E+00	3.55E-06
n-Octane	64102.52		64,103	153.43	ND	0	158	ND	0	64,103	64.10	7228	33362	3.34E-05	0	0	0.00E+00	3.34E-05
C8 as Octane	784206		784,206	153.43	ND	0	158	ND	0	784,206	784.21	88429	408136	4.08E-04	0	0	0.00E+00	4.08E-04
n-Nonane	155031.3		155,031	154.57	ND	0	159	ND	0	155,031	155.03	17482	80685	8.07E-05	0	0	0.00E+00	8.07E-05
C9 as Nonane	1159010		1,159,010	154.57	ND	0	159	ND	0	1,159,010	1159.01	130693	603200	6.03E-04	0	0	0.00E+00	6.03E-04
n-Decane	131481.2		131,481	155.97	ND	0	161	ND	0	131,481	131.48	14826	68429	6.84E-05	0	0	0.00E+00	6.84E-05
C10 as Decane	490483.5		490,484	155.97	ND	0	161	ND	0	490,484	490.48	55308	255269	2.55E-04	0	0	0.00E+00	2.55E-04
n-Undecane	30572.2		30,572	155.57	ND	0	161	ND	0	30,572	30.57	3447	15911	1.59E-05	0	0	0.00E+00	1.59E-05
C11 as Undecane	88903.13		88,903	155.57	ND	0	161	ND	0	88,903	88.90	10025	46269	4.63E-05	0	0	0.00E+00	4.63E-05
n-Dodecane	4517.93		4,518	154.51	ND	0	159	ND	0	4,518	4.52	509	2351	2.35E-06	0	0	0.00E+00	2.35E-06
C12 as Dodecane	6050.852		6,051	154.51	ND	0	159	ND	0	6,051	6.05	682	3149	3.15E-06	0	0	0.00E+00	3.15E-06
n-Tridecane	393.3071	ND	197	154.88	ND	0	160	ND	0	197	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C13 as Tridecane	393.3071	ND	197	154.88	ND	0	160	ND	0	197	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Tetradecane	392.9134	ND	196	154.73	ND	0	160	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C14 as tetradecane	392.9134	ND	196	154.73	ND	0	160	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Pentadecane	394.8819	ND	197	155.5	ND	0	160	ND	0	197	0.20	22	103	1.03E-07	0	0	0.00E+00	1.03E-07
C15 as Pentadecane	394.8819	ND	197	155.5	ND	0	160	ND	0	197	0.20	22	103	1.03E-07	0	0	0.00E+00	1.03E-07
n-Hexadecane	392.7559	ND	196	154.67	ND	0	160	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C16 as Hexadecane	392.7559	ND	196	154.67	ND	0	160	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Heptadecane	388.189	ND	194	152.87	ND	0	158	ND	0	194	0.19	22	101	1.01E-07	0	0	0.00E+00	1.01E-07
C17 as Heptadecane	388.189	ND	194	152.87	ND	0	158	ND	0	194	0.19	22	101	1.01E-07	0	0	0.00E+00	1.01E-07
n-Octadecane	392.5197	ND	196	154.57	ND	0	159	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C18 as Octodecane	392.5197	ND	196	154.57	ND	0	159	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Nonadecane	393.3071	ND	197	154.88	ND	0	160	ND	0	197	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C19 as Nonadecane	393.3071	ND	197	154.88	ND	0	160	ND	0	197	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Eicosane	392.3622	ND	196	154.51	ND	0	159	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C20 as Eicosane	392.3622	ND	196	154.51	ND	0	159	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Heneicosane	396.063	ND	198	155.97	ND	0	161	ND	0	198	0.20	22	103	1.03E-07	0	0	0.00E+00	1.03E-07
C21 as Heneicosane	396.063	ND	198	155.97	ND	0	161	ND	0	198	0.20	22	103	1.03E-07	0	0	0.00E+00	1.03E-07
n-Docosane	391.5748	ND	196	154.2	ND	0	159	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C22 as Docosane	391.5748	ND	196	154.2	ND	0	159	ND	0	196	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Tricosane	393.7008	ND	197	155.04	ND	0	160	ND	0	197	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
C23 as Tricosane	393.7008	ND	197	155.04	ND	0	160	ND	0	197	0.20	22	102	1.02E-07	0	0	0.00E+00	1.02E-07
n-Tetracosane	394.252	ND	197	155.26	ND	0	160	ND	0	197	0.20	22	103	1.03E-07	0	0	0.00E+00	1.03E-07
C24 as Tetracosane	410.4798	J	410	155.26	ND	0	160	ND	0	410	0.41	46	214	2.14E-07	0	0	0.00E+00	2.14E-07
Total Hydrocarbon			2,926,346			251			0		2926.29	329977	#######	1.52E-03	0	0	0.00E+00	1.52E-03

D070B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D070B	D070B		ND Adj	#D071A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.9364	ND	74	145	ND	0	150	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
C5 as Pentane	148.9364	ND	74	145	ND	0	150	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
n-Hexane	213.4202	ND	107	151	ND	0	156	ND	0	107	0.11	12	56	5.55E-08	5.55E-08
C6 as Hexane	213.4202	ND	107	251	J	251	156	ND	0	-144	0.00	0	0	0.00E+00	0.00E+00
n-Heptane	177.3023	ND	89	158	ND	0	163	ND	0	89	0.09	10	46	4.61E-08	4.61E-08
C7 as Heptane	6427.883		6,428	158	ND	0	163	ND	0	6,428	6.43	725	3345	3.35E-06	3.35E-06
n-Octane	52881.29		52,881	153	ND	0	158	ND	0	52,881	52.88	5963	27522	2.75E-05	2.75E-05
C8 as Octane	654217.7		654,218	153	ND	0	158	ND	0	654,218	654.22	73772	340484	3.40E-04	3.40E-04
n-Nonane	128084.9		128,085	155	ND	0	159	ND	0	128,085	128.08	14443	66661	6.67E-05	6.67E-05
C9 as Nonane	977357.8		977,358	155	ND	0	159	ND	0	977,358	977.36	110210	508660	5.09E-04	5.09E-04
n-Decane	110984.6		110,985	156	ND	0	161	ND	0	110,985	110.98	12515	57761	5.78E-05	5.78E-05
C10 as Decane	417120		417,120	156	ND	0	161	ND	0	417,120	417.12	47036	217088	2.17E-04	2.17E-04
n-Undecane	26271.51		26,272	156	ND	0	161	ND	0	26,272	26.27	2962	13673	1.37E-05	1.37E-05
C11 as Undecane	76603.57		76,604	156	ND	0	161	ND	0	76,604	76.60	8638	39868	3.99E-05	3.99E-05
n-Dodecane	4804.772	J	4,805	155	ND	0	159	ND	0	4,805	4.80	542	2501	2.50E-06	2.50E-06
C12 as Dodecane	4204.832	J	4,205	155	ND	0	159	ND	0	4,205	4.20	474	2188	2.19E-06	2.19E-06
n-Tridecane	774.4186	ND	387	155	ND	0	160	ND	0	387	0.39	44	202	2.02E-07	2.02E-07
C13 as Tridecane	774.4186	ND	387	155	ND	0	160	ND	0	387	0.39	44	202	2.02E-07	2.02E-07
n-Tetradecane	773.6434	ND	387	155	ND	0	160	ND	0	387	0.39	44	201	2.01E-07	2.01E-07
C14 as tetradecane	773.6434	ND	387	155	ND	0	160	ND	0	387	0.39	44	201	2.01E-07	2.01E-07
n-Pentadecane	777.5194	ND	389	156	ND	0	160	ND	0	389	0.39	44	202	2.02E-07	2.02E-07
C15 as Pentadecane	777.5194	ND	389	156	ND	0	160	ND	0	389	0.39	44	202	2.02E-07	2.02E-07
n-Hexadecane	773.3334	ND	387	155	ND	0	160	ND	0	387	0.39	44	201	2.01E-07	2.01E-07
C16 as Hexadecane	773.3334	ND	387	155	ND	0	160	ND	0	387	0.39	44	201	2.01E-07	2.01E-07
n-Heptadecane	764.3411	ND	382	153	ND	0	158	ND	0	382	0.38	43	199	1.99E-07	1.99E-07
C17 as Heptadecane	764.3411	ND	382	153	ND	0	158	ND	0	382	0.38	43	199	1.99E-07	1.99E-07
n-Octadecane	772.8682	ND	386	155	ND	0	159	ND	0	386	0.39	44	201	2.01E-07	2.01E-07
C18 as Octodecane	772.8682	ND	386	155	ND	0	159	ND	0	386	0.39	44	201	2.01E-07	2.01E-07
n-Nonadecane	774.4186	ND	387	155	ND	0	160	ND	0	387	0.39	44	202	2.02E-07	2.02E-07
C19 as Nonadecane	774.4186	ND	387	155	ND	0	160	ND	0	387	0.39	44	202	2.02E-07	2.02E-07
n-Eicosane	772.5582	ND	386	155	ND	0	159	ND	0	386	0.39	44	201	2.01E-07	2.01E-07
C20 as Eicosane	772.5582	ND	386	155	ND	0	159	ND	0	386	0.39	44	201	2.01E-07	2.01E-07
n-Heneicosane	779.845	ND	390	156	ND	0	161	ND	0	390	0.39	44	203	2.03E-07	2.03E-07
C21 as Heneicosane	779.845	ND	390	156	ND	0	161	ND	0	390	0.39	44	203	2.03E-07	2.03E-07
n-Docosane	771.0078	ND	386	154	ND	0	159	ND	0	386	0.39	43	201	2.01E-07	2.01E-07
C22 as Docosane	771.0078	ND	386	154	ND	0	159	ND	0	386	0.39	43	201	2.01E-07	2.01E-07
n-Tricosane	775.1938	ND	388	155	ND	0	160	ND	0	388	0.39	44	202	2.02E-07	2.02E-07
C23 as Tricosane	775.1938	ND	388	155	ND	0	160	ND	0	388	0.39	44	202	2.02E-07	2.02E-07
n-Tetracosane	776.2791	ND	388	155	ND	0	160	ND	0	388	0.39	44	202	2.02E-07	2.02E-07
C24 as Tetracosane	776.2791	ND	388	155	ND	0	160	ND	0	388	0.39	44	202	2.02E-07	2.02E-07
Total Hydrocarbon			2,468,695			251			0		2468.59	278365	#######	1.28E-03	1.28E-03

Bagging Data Form — Vacuum Method

Sample Id D073

WSPA — Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	D-878	
Equipment Subtype:	Union		**Plant ID:**	Refinery D	
Line Size:	3/4	*inches*	**Date:**	15-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/RS	
Barometric pressure	30.04 *inHg*	763.0 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	79.8 *°F*	26.6 *°C*	**TVA ID**	36502	
Component Temp:	117 *°F*	47.2 *°C*	**Stream Pressure/Temp:**	7 *psig*	*°F*
Stream Description:	*Jet (1st Deck of V-752)*				

CONVERSIONS:
- 1 inch Hg = 25.4 mmHg
- 1 inch H2O column = 1.87 mmHg
- °F= (F-32)*5/9 °C
- 1 m^3 = 1000 liters
- 1 kg = 1E+9 µg
- 1 kg = 2.20462 pounds
- 1 ton = 2,000 pounds

Pre-Sample Data

Time								
10:03	Background	9 *ppmv*	8-sec Dwell	50 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	163 *ppm*
12:37	Initial Bag Vacuum	0.085 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	86.7 *°F*	Leak @	threaded side of connector

Bag Concentrations (ppmv) (had to vent bag)

Time	12:38	12:40	12:42	12:44	12:46	12:54								
ppmv	43.6	42.8	43.2	43.6	42.1	41.4								

Sorbent Tube Sample Collection Parameters

D073A

Time						
12:44	Volume Start	829.3 *Liters*		Design Sample Flow Rate = 1 liter/min		
12:57	Volume Stop	842.1 *Liters*	Total Vol	12.8 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	0.985 *L/min*	$\text{Sorbent Flow}_{STP}$	0.967 *L/min*

D073B

12:44	Volume Start	818.8 *Liters*		Design Sample Flow Rate = 1 liter/min		
12:57	Volume Stop	831.8 *Liters*	Total Vol	13.0 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	1.000 *L/min*	$\text{Sorbent Flow}_{STP}$	0.982 *L/min*
	$\text{Total ST Vol}_{STP}$	25.35 *Liters*	DGM Vol_{STP}	81.53 *Liters*	$\text{Total Run Vol}_{STP}$	106.87 *Liters*

Bagging Parameters

Time								
12:48	Vacuum check	0.09 *inches H2O*			DGM_P	2 *inches H2O vacuum*		759.3 *mmHg*
12:50	DGM_{10L} Time	01:34.0 *min:sec.frac*	DGM Time	1.567	DGM Flow	6.38	DGM Flow_{STP}	6.27 *liters/minute*
12:48	Bag Temp.	87.1 *°F*	30.6 *°C*		Sample_T	79 *°F*		26.1 *°C*

Post-Sample Data

13:03	Post Test M21	Background	3 *ppmv*	8-sec Dwell	98 *ppmv*	Total Dwell 1:30 *min:sec*	Final M21	187 *ppm*
							@	threaded side of connector

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	2.97E-05 kg/hr
Percent difference THC ER =	26%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.75E-08
C5 as Pentane	2.75E-08
n-Hexane	3.94E-08
C6 as Hexane	3.94E-08
n-Heptane	3.27E-08
C7 as Heptane	2.04E-07
n-Octane	4.27E-07
C8 as Octane	5.68E-06
n-Nonane	5.32E-07
C9 as Nonane	7.37E-06
n-Decane	5.71E-07
C10 as Decane	8.43E-06
n-Undecane	5.50E-07
C11 as Undecane	3.65E-06
n-Dodecane	3.34E-07
C12 as Dodecane	9.31E-07
n-Tridecane	1.09E-07
C13 as Tridecane	8.29E-08
n-Tetradecane	5.19E-08
C14 as tetradecane	2.85E-08
n-Pentadecane	2.87E-08
C15 as Pentadecane	2.87E-08
n-Hexadecane	2.85E-08
C16 as Hexadecane	2.85E-08
n-Heptadecane	2.82E-08
C17 as Heptadecane	2.82E-08
n-Octadecane	2.85E-08
C18 as Octodecane	2.85E-08
n-Nonadecane	2.86E-08
C19 as Nonadecane	2.86E-08
n-Eicosane	2.85E-08
C20 as Eicosane	2.85E-08
n-Heneicosane	2.88E-08
C21 as Heneicosane	2.88E-08
n-Docosane	2.85E-08
C22 as Docosane	2.85E-08
n-Tricosane	2.86E-08
C23 as Tricosane	2.86E-08
n-Tetracosane	2.86E-08
C24 as Tetracosane	2.86E-08
Total Hydrocarbon	2.97E-05

THC:	1.57E-03	lbs/day	2.87E-04	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D073A	D073A		ND Adj	#D074A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.05	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
C5 as Pentane	75.05	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
n-Hexane	107.5437	ND	54	211.78	ND	0	156	ND	0	54	0.05	6	27	2.65E-08	0	0	0.00E+00	2.65E-08
C6 as Hexane	107.5437	ND	54	211.78	ND	0	156	ND	0	54	0.05	6	27	2.65E-08	0	0	0.00E+00	2.65E-08
n-Heptane	89.34375	ND	45	175.94	ND	0	163	ND	0	45	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C7 as Heptane	739.9822	J	740	175.94	ND	0	163	ND	0	740	0.74	79	365	3.65E-07	0	0	0.00E+00	3.65E-07
n-Octane	980.2678		980	152.25	ND	0	158	ND	0	980	0.98	105	484	4.84E-07	0	0	0.00E+00	4.84E-07
C8 as Octane	13011.41		13,011	152.25	ND	0	158	ND	0	13,011	13.01	1391	6418	6.42E-06	0	0	0.00E+00	6.42E-06
n-Nonane	1217.9		1,218	153.38	ND	0	159	ND	0	1,218	1.22	130	601	6.01E-07	0	0	0.00E+00	6.01E-07
C9 as Nonane	16857.61		16,858	153.38	ND	0	159	ND	0	16,858	16.86	1802	8315	8.32E-06	0	0	0.00E+00	8.32E-06
n-Decane	1315.823		1,316	154.77	ND	0	161	ND	0	1,316	1.32	141	649	6.49E-07	0	0	0.00E+00	6.49E-07
C10 as Decane	19307.78		19,308	154.77	ND	0	161	ND	0	19,308	19.31	2063	9524	9.52E-06	0	0	0.00E+00	9.52E-06
n-Undecane	1266.887		1,267	154.37	ND	0	161	ND	0	1,267	1.27	135	625	6.25E-07	0	0	0.00E+00	6.25E-07
C11 as Undecane	8473.09		8,473	154.37	ND	0	161	ND	0	8,473	8.47	906	4179	4.18E-06	0	0	0.00E+00	4.18E-06
n-Dodecane	753.2094	J	753	153.32	ND	0	159	ND	0	753	0.75	80	372	3.72E-07	0	0	0.00E+00	3.72E-07
C12 as Dodecane	2291.656		2,292	153.32	ND	0	159	ND	0	2,292	2.29	245	1130	1.13E-06	0	0	0.00E+00	1.13E-06
n-Tridecane	214.0413	J	214	153.69	ND	0	160	ND	0	214	0.21	23	106	1.06E-07	0	0	0.00E+00	1.06E-07
C13 as Tridecane	259.117	J	259	153.69	ND	0	160	ND	0	259	0.26	28	128	1.28E-07	0	0	0.00E+00	1.28E-07
n-Tetradecane	133.795	J	134	153.54	ND	0	160	ND	0	134	0.13	14	66	6.60E-08	0	0	0.00E+00	6.60E-08
C14 as tetradecane	77.96875	ND	39	153.54	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Pentadecane	78.35937	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C15 as Pentadecane	78.35937	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C16 as Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heptadecane	77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C17 as Heptadecane	77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Octadecane	77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C18 as Octodecane	77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Nonadecane	78.04687	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C19 as Nonadecane	78.04687	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Eicosane	77.85937	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C20 as Eicosane	77.85937	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heneicosane	78.59375	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C21 as Heneicosane	78.59375	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Docosane	77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C22 as Docosane	77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Tricosane	78.125	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C23 as Tricosane	78.125	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tetracosane	78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C24 as Tetracosane	78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
Total Hydrocarbon			67,869			0			0		67.87	7253	33,477	3.35E-05	0	0	0.00E+00	3.35E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D073B	D073B		ND Adj	#D074A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.7908	ND	74	148	ND	0	150	ND	0	74	0.07	8	36	3.64E-08	3.64E-08
C5 as Pentane	147.7908	ND	74	148	ND	0	150	ND	0	74	0.07	8	36	3.64E-08	3.64E-08
n-Hexane	211.7785	ND	106	212	ND	0	156	ND	0	106	0.11	11	52	5.22E-08	5.22E-08
C6 as Hexane	211.7785	ND	106	212	ND	0	156	ND	0	106	0.11	11	52	5.22E-08	5.22E-08
n-Heptane	175.9385	ND	88	176	ND	0	163	ND	0	88	0.09	9	43	4.34E-08	4.34E-08
C7 as Heptane	175.9385	ND	88	176	ND	0	163	ND	0	88	0.09	9	43	4.34E-08	4.34E-08
n-Octane	750.331	J	750	152	ND	0	158	ND	0	750	0.75	80	370	3.70E-07	3.70E-07
C8 as Octane	10020.25		10,020	152	ND	0	158	ND	0	10,020	10.02	1071	4943	4.94E-06	4.94E-06
n-Nonane	940.6236	J	941	153	ND	0	159	ND	0	941	0.94	101	464	4.64E-07	4.64E-07
C9 as Nonane	13008.41		13,008	153	ND	0	159	ND	0	13,008	13.01	1390	6417	6.42E-06	6.42E-06
n-Decane	1001.231	J	1,001	155	ND	0	161	ND	0	1,001	1.00	107	494	4.94E-07	4.94E-07
C10 as Decane	14864.45		14,864	155	ND	0	161	ND	0	14,864	14.86	1589	7332	7.33E-06	7.33E-06
n-Undecane	962.8949	J	963	154	ND	0	161	ND	0	963	0.96	103	475	4.75E-07	4.75E-07
C11 as Undecane	6322.618		6,323	154	ND	0	161	ND	0	6,323	6.32	676	3119	3.12E-06	3.12E-06
n-Dodecane	599.9889	J	600	153	ND	0	159	ND	0	600	0.60	64	296	2.96E-07	2.96E-07
C12 as Dodecane	1484.206	J	1,484	153	ND	0	159	ND	0	1,484	1.48	159	732	7.32E-07	7.32E-07
n-Tridecane	227.4034	J	227	154	ND	0	160	ND	0	227	0.23	24	112	1.12E-07	1.12E-07
C13 as Tridecane	153.6923	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Tetradecane	153.5385	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C14 as tetradecane	153.5385	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Pentadecane	154.3077	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C15 as Pentadecane	154.3077	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
n-Hexadecane	153.4769	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C16 as Hexadecane	153.4769	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Heptadecane	151.6923	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
C17 as Heptadecane	151.6923	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
n-Octadecane	153.3846	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
C18 as Octodecane	153.3846	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
n-Nonadecane	153.6923	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C19 as Nonadecane	153.6923	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Eicosane	153.3231	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
C20 as Eicosane	153.3231	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
n-Heneicosane	154.7692	ND	77	155	ND	0	161	ND	0	77	0.08	8	38	3.82E-08	3.82E-08
C21 as Heneicosane	154.7692	ND	77	155	ND	0	161	ND	0	77	0.08	8	38	3.82E-08	3.82E-08
n-Docosane	153.0154	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C22 as Docosane	153.0154	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Tricosane	153.8462	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C23 as Tricosane	153.8462	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Tetracosane	154.0615	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C24 as Tetracosane	154.0615	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
Total Hydrocarbon			52,484			0			0		52.48	5609	25,888	2.59E-05	2.59E-05

Bagging Data Form — Vacuum Method

Sample Id D075

Equipment type:	Connector		**Component ID:**	D-27	
Equipment Subtype:	Threaded Connection		**Plant ID:**	Refinery D	
Line Size:	3/4	*inches*	**Date:**	15-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/RS	
Barometric pressure	30.03 *inHg*	762.8 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	60.3 *°F*	15.7 *°C*	**TVA ID**	36502	
Component Temp:	*°F*	-17.8 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Stream Description: *Syn Jet Manifold Syn Jet HCU Btms to Jet A Rundown*

Pre-Sample Data

Time											
13:29	Background	0	*ppmv*	8-sec Dwell	76	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	457 *ppm*
14:20	Initial Bag Vacuum	0.02	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	68	*°F*	Leak @	Threaded Connection

Bag Concentrations (ppmv)

Time	14:20	14:22	14:24	14:26	14:28	14:30	14:32	14:34	14:36	14:43	14:47			
ppmv	33	37.4	39	40	35	40.1	40.6	41.3	42	41.7	42.1			

Sorbent Tube Sample Collection Parameters

D075A

Time									
14:36	Volume Start	842.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:49	Volume Stop	854.9	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	1.009	*L/min*

D075B

14:36	Volume Start	831.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:49	Volume Stop	844.8	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	1.024	*L/min*
	Total ST Vol$_{STP}$	26.43	*Liters*	DGM Vol$_{STP}$	77.58	*Liters*	Total Run Vol$_{STP}$	104.02	*Liters*

Bagging Parameters

Time										
14:37	Vacuum check	0.025	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	759.4	*mmHg*
14:42	DGM$_{10L}$ Time	01:42.8	*min:sec.frac*	DGM Time	1.717	DGM Flow	5.83	DGM Flow$_{STP}$	5.97	*liters/minute*
14:39	Bag Temp.	65.5	*°F*	18.6	*°C*	Sample$_T$	57	*°F*	13.9	*°C*

Post-Sample Data

14:57	Post Test M21	Background	8	*ppmv*	8-sec Dwell	65	*ppmv*	Total Dwell	3:00 *min:sec*	Final M21	322 *ppm*
										@	Threaded Connection

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	4.01E-05 kg/hr
Percent difference THC ER =	10%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.67E-08
C5 as Pentane	2.67E-08
n-Hexane	3.83E-08
C6 as Hexane	3.83E-08
n-Heptane	3.18E-08
C7 as Heptane	3.07E-07
n-Octane	4.81E-07
C8 as Octane	7.43E-06
n-Nonane	3.88E-07
C9 as Nonane	1.20E-05
n-Decane	5.57E-07
C10 as Decane	9.89E-06
n-Undecane	2.95E-07
C11 as Undecane	5.25E-06
n-Dodecane	3.58E-07
C12 as Dodecane	2.01E-06
n-Tridecane	1.14E-07
C13 as Tridecane	2.60E-07
n-Tetradecane	2.78E-08
C14 as tetradecane	2.78E-08
n-Pentadecane	2.79E-08
C15 as Pentadecane	2.79E-08
n-Hexadecane	2.78E-08
C16 as Hexadecane	2.78E-08
n-Heptadecane	2.75E-08
C17 as Heptadecane	2.75E-08
n-Octadecane	2.78E-08
C18 as Octodecane	2.78E-08
n-Nonadecane	2.78E-08
C19 as Nonadecane	2.78E-08
n-Eicosane	2.77E-08
C20 as Eicosane	2.77E-08
n-Heneicosane	2.80E-08
C21 as Heneicosane	2.80E-08
n-Docosane	2.77E-08
C22 as Docosane	2.77E-08
n-Tricosane	2.78E-08
C23 as Tricosane	2.78E-08
n-Tetracosane	2.79E-08
C24 as Tetracosane	2.79E-08
Total Hydrocarbon	4.01E-05

THC:	2.12E-03	lbs/day	3.87E-04	tons/yr

D075A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D075A	D075A		ND Adj	#D076A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.05	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C5 as Pentane	75.05	ND	38	147.79	ND	0	150	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Hexane	107.5437	ND	54	211.78	ND	0	156	ND	0	54	0.05	6	26	2.58E-08	0	0	0.00E+00	2.58E-08
C6 as Hexane	107.5437	ND	54	211.78	ND	0	156	ND	0	54	0.05	6	26	2.58E-08	0	0	0.00E+00	2.58E-08
n-Heptane	89.34375	ND	45	175.94	ND	0	163	ND	0	45	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
C7 as Heptane	1038.606		1,039	175.94	ND	0	163	ND	0	1,039	1.04	108	499	4.99E-07	0	0	0.00E+00	4.99E-07
n-Octane	1045.29		1,045	152.25	ND	0	158	ND	0	1,045	1.05	109	502	5.02E-07	0	0	0.00E+00	5.02E-07
C8 as Octane	16065.51		16,066	152.25	ND	0	158	ND	0	16,066	16.07	1671	7713	7.71E-06	0	0	0.00E+00	7.71E-06
n-Nonane	847.9174		848	153.38	ND	0	159	ND	0	848	0.85	88	407	4.07E-07	0	0	0.00E+00	4.07E-07
C9 as Nonane	26209.47		26,209	153.38	ND	0	159	ND	0	26,209	26.21	2726	12582	1.26E-05	0	0	0.00E+00	1.26E-05
n-Decane	1080.486		1,080	154.77	ND	0	161	ND	0	1,080	1.08	112	519	5.19E-07	0	0	0.00E+00	5.19E-07
C10 as Decane	21636.69		21,637	154.77	ND	0	161	ND	0	21,637	21.64	2251	10387	1.04E-05	0	0	0.00E+00	1.04E-05
n-Undecane	647.566	J	648	154.37	ND	0	161	ND	0	648	0.65	67	311	3.11E-07	0	0	0.00E+00	3.11E-07
C11 as Undecane	11578.79		11,579	154.37	ND	0	161	ND	0	11,579	11.58	1204	5559	5.56E-06	0	0	0.00E+00	5.56E-06
n-Dodecane	790.6098		791	153.32	ND	0	159	ND	0	791	0.79	82	380	3.80E-07	0	0	0.00E+00	3.80E-07
C12 as Dodecane	4692.026		4,692	153.32	ND	0	159	ND	0	4,692	4.69	488	2253	2.25E-06	0	0	0.00E+00	2.25E-06
n-Tridecane	283.1845	J	283	153.69	ND	0	160	ND	0	283	0.28	29	136	1.36E-07	0	0	0.00E+00	1.36E-07
C13 as Tridecane	730.4779	J	730	153.69	ND	0	160	ND	0	730	0.73	76	351	3.51E-07	0	0	0.00E+00	3.51E-07
n-Tetradecane	77.96875	ND	39	153.54	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C14 as tetradecane	77.96875	ND	39	153.54	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Pentadecane	78.35937	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C15 as Pentadecane	78.35937	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C16 as Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Heptadecane	77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C17 as Heptadecane	77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Octadecane	77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C18 as Octodecane	77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Nonadecane	78.04687	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C19 as Nonadecane	78.04687	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Eicosane	77.85937	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C20 as Eicosane	77.85937	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Heneicosane	78.59375	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C21 as Heneicosane	78.59375	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Docosane	77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C22 as Docosane	77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Tricosane	78.125	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C23 as Tricosane	78.125	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Tetracosane	78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C24 as Tetracosane	78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
Total Hydrocarbon			87,732			0			0		87.73	9125	42,117	4.21E-05	0	0	0.00E+00	4.21E-05

D075B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D075B	D075B		ND Adj	#D076A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.7908	ND	74	148	ND	0	150	ND	0	74	0.07	8	35	3.55E-08	3.55E-08
C5 as Pentane	147.7908	ND	74	148	ND	0	150	ND	0	74	0.07	8	35	3.55E-08	3.55E-08
n-Hexane	211.7785	ND	106	212	ND	0	156	ND	0	106	0.11	11	51	5.08E-08	5.08E-08
C6 as Hexane	211.7785	ND	106	212	ND	0	156	ND	0	106	0.11	11	51	5.08E-08	5.08E-08
n-Heptane	175.9385	ND	88	176	ND	0	163	ND	0	88	0.09	9	42	4.22E-08	4.22E-08
C7 as Heptane	240.427	J	240	176	ND	0	163	ND	0	240	0.24	25	115	1.15E-07	1.15E-07
n-Octane	956.6173	J	957	152	ND	0	158	ND	0	957	0.96	100	459	4.59E-07	4.59E-07
C8 as Octane	14907.73		14,908	152	ND	0	158	ND	0	14,908	14.91	1551	7157	7.16E-06	7.16E-06
n-Nonane	768.265	J	768	153	ND	0	159	ND	0	768	0.77	80	369	3.69E-07	3.69E-07
C9 as Nonane	23754.87		23,755	153	ND	0	159	ND	0	23,755	23.75	2471	11404	1.14E-05	1.14E-05
n-Decane	1241.715	J	1,242	155	ND	0	161	ND	0	1,242	1.24	129	596	5.96E-07	5.96E-07
C10 as Decane	19560.51		19,561	155	ND	0	161	ND	0	19,561	19.56	2035	9390	9.39E-06	9.39E-06
n-Undecane	582.1475	J	582	154	ND	0	161	ND	0	582	0.58	61	279	2.79E-07	2.79E-07
C11 as Undecane	10276		10,276	154	ND	0	161	ND	0	10,276	10.28	1069	4933	4.93E-06	4.93E-06
n-Dodecane	701.5451	J	702	153	ND	0	159	ND	0	702	0.70	73	337	3.37E-07	3.37E-07
C12 as Dodecane	3681.333		3,681	153	ND	0	159	ND	0	3,681	3.68	383	1767	1.77E-06	1.77E-06
n-Tridecane	193.5043	J	194	154	ND	0	160	ND	0	194	0.19	20	93	9.29E-08	9.29E-08
C13 as Tridecane	353.581	J	354	154	ND	0	160	ND	0	354	0.35	37	170	1.70E-07	1.70E-07
n-Tetradecane	153.5385	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C14 as tetradecane	153.5385	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
n-Pentadecane	154.3077	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
C15 as Pentadecane	154.3077	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
n-Hexadecane	153.4769	ND	77	153	ND	0	160	ND	0	77	0.08	8	37	3.68E-08	3.68E-08
C16 as Hexadecane	153.4769	ND	77	153	ND	0	160	ND	0	77	0.08	8	37	3.68E-08	3.68E-08
n-Heptadecane	151.6923	ND	76	152	ND	0	158	ND	0	76	0.08	8	36	3.64E-08	3.64E-08
C17 as Heptadecane	151.6923	ND	76	152	ND	0	158	ND	0	76	0.08	8	36	3.64E-08	3.64E-08
n-Octadecane	153.3846	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	3.68E-08
C18 as Octodecane	153.3846	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	3.68E-08
n-Nonadecane	153.6923	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C19 as Nonadecane	153.6923	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
n-Eicosane	153.3231	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	3.68E-08
C20 as Eicosane	153.3231	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	3.68E-08
n-Heneicosane	154.7692	ND	77	155	ND	0	161	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C21 as Heneicosane	154.7692	ND	77	155	ND	0	161	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Docosane	153.0154	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.67E-08	3.67E-08
C22 as Docosane	153.0154	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.67E-08	3.67E-08
n-Tricosane	153.8462	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C23 as Tricosane	153.8462	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
n-Tetracosane	154.0615	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
C24 as Tetracosane	154.0615	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
Total Hydrocarbon			79,355			0			0		79.35	8254	38,096	3.81E-05	3.81E-05

Bagging Data Form — Vacuum Method

Sample Id: D077

WSPA Western States Petroleum Association

Equipment type:	Pump 13196			**Component ID:**	D-1883	
Equipment Subtype:	Seal			**Plant ID:**	Refinery D	
Line Size:	1 inches			**Date:**	19-Nov-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS	
Barometric pressure	30.09 inHg	764.3 mmHg		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	58 °F	14.4 °C		**TVA ID**	37887	
Component Temp:	°F	-17.8 °C		**Stream Pressure/Temp:**	psig	°F
Stream Description:	*RS Transmix (0:1)*					

CONVERSIONS:
- 1 inch Hg = 25.4 mmHg
- 1 inch H2O column = 1.87 mmHg
- °F= (F-32)*5/9 °C
- 1 m³ = 1000 liters
- 1 kg = 1E+9 µg
- 1 kg = 2.20462 pounds
- 1 ton = 2,000 pounds

Pre-Sample Data

Time								
8:54	Background	7 ppmv	8-sec Dwell	5 ppmv	Total Dwell	5:00 min:sec	Final M21	110 ppm
9:51	Initial Bag Vacuum	0.03 inches H2O	DGM Vac.	2.1 inches H2O	Bag Temp	59.4 °F	Leak @	Seal

Bag Concentrations (ppmv)

Time	9:51	9:53	9:55	9:57	9:59	10:01	10:07
ppmv	12.2	13.6	14.2	14.6	14.8	15	15.6

Sorbent Tube Sample Collection Parameters

D077A

Time						
10:01	Volume Start	858.5 Liters		Design Sample Flow Rate = 1 liter/min		
10:14	Volume Stop	871.4 Liters	Total Vol	12.9 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.992 L/min	$Sorbent Flow_{STP}$	1.030 L/min

D077B

10:01	Volume Start	846.8 Liters		Design Sample Flow Rate = 1 liter/min		
10:14	Volume Stop	859.7 Liters	Total Vol	12.9 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.992 L/min	$Sorbent Flow_{STP}$	1.030 L/min

$Total ST Vol_{STP}$ 26.78 Liters — $DGM Vol_{STP}$ 92.01 Liters — $Total Run Vol_{STP}$ 118.80 Liters

Bagging Parameters

Time								
10:03	Vacuum check	0.03 inches H2O			DGM_P	2 inches H2O vacuum	760.5	mmHg
10:06	DGM_{10L} Time	01:28.1 min:sec.frac	DGM Time	1.467	DGM Flow	6.82	$DGM Flow_{STP}$ 7.08	liters/minute
10:04	Bag Temp.	60.4 °F	15.8 °C		$Sample_T$	51 °F	10.6	°C

Post-Sample Data

10:20 Post Test M21	Background	4 ppmv	8-sec Dwell	55 ppmv	Total Dwell 2:00 min:sec	Final M21 125 ppm @ Seal
Condensate accumulation: starting time	N/A hour:min		Final time	N/A hour:min	0:00 hours:min	
Organic condensate collected	N/A ml					
Density of organic condensate	N/A g/ml					

Average THC emissions =	7.15E-06 kg/hr
Percent difference THC ER =	24%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.06E-08
C5 as Pentane	3.06E-08
n-Hexane	4.39E-08
C6 as Hexane	4.39E-08
n-Heptane	3.65E-08
C7 as Heptane	3.65E-08
n-Octane	6.17E-08
C8 as Octane	7.59E-07
n-Nonane	6.13E-08
C9 as Nonane	1.14E-06
n-Decane	1.19E-07
C10 as Decane	2.18E-06
n-Undecane	1.71E-07
C11 as Undecane	1.03E-06
n-Dodecane	1.40E-07
C12 as Dodecane	3.92E-07
n-Tridecane	5.50E-08
C13 as Tridecane	1.04E-07
n-Tetradecane	4.76E-08
C14 as tetradecane	3.18E-08
n-Pentadecane	3.20E-08
C15 as Pentadecane	3.20E-08
n-Hexadecane	3.18E-08
C16 as Hexadecane	3.18E-08
n-Heptadecane	3.14E-08
C17 as Heptadecane	3.14E-08
n-Octadecane	3.18E-08
C18 as Octodecane	3.18E-08
n-Nonadecane	3.18E-08
C19 as Nonadecane	3.18E-08
n-Eicosane	3.18E-08
C20 as Eicosane	3.18E-08
n-Heneicosane	3.21E-08
C21 as Heneicosane	3.21E-08
n-Docosane	3.17E-08
C22 as Docosane	3.17E-08
n-Tricosane	3.19E-08
C23 as Tricosane	3.19E-08
n-Tetracosane	3.19E-08
C24 as Tetracosane	3.19E-08
Total Hydrocarbon	7.15E-06

THC: 3.78E-04 lbs/day 6.91E-05 tons/yr

D077A

Component	ANALYTICAL RESULTS D077A µg/m³	Flag	ND Adj µg/m³	BACKGROUND #D078A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #D013 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#D0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	74.46822	ND	37	148.94	ND	0	150	ND	0	37	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C5 as Pentane	74.46822	ND	37	148.94	ND	0	150	ND	0	37	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Hexane	106.7101	ND	53	213.42	ND	0	156	ND	0	53	0.05	6	29	2.93E-08	0	0	0.00E+00	2.93E-08
C6 as Hexane	106.7101	ND	53	213.42	ND	0	156	ND	0	53	0.05	6	29	2.93E-08	0	0	0.00E+00	2.93E-08
n-Heptane	88.65117	ND	44	177.3	ND	0	163	ND	0	44	0.04	5	24	2.43E-08	0	0	0.00E+00	2.43E-08
C7 as Heptane	88.65117	ND	44	177.3	ND	0	163	ND	0	44	0.04	5	24	2.43E-08	0	0	0.00E+00	2.43E-08
n-Octane	148.1903	J	148	153.43	ND	0	158	ND	0	148	0.15	18	81	8.13E-08	0	0	0.00E+00	8.13E-08
C8 as Octane	1569.372		1,569	153.43	ND	0	158	ND	0	1,569	1.57	186	860	8.60E-07	0	0	0.00E+00	8.60E-07
n-Nonane	146.2884	J	146	154.57	ND	0	159	ND	0	146	0.15	17	80	8.02E-08	0	0	0.00E+00	8.02E-08
C9 as Nonane	2347.338		2,347	154.57	ND	0	159	ND	0	2,347	2.35	279	1287	1.29E-06	0	0	0.00E+00	1.29E-06
n-Decane	224.2986	J	224	155.97	ND	0	161	ND	0	224	0.22	27	123	1.23E-07	0	0	0.00E+00	1.23E-07
C10 as Decane	4269.136		4,269	155.97	ND	0	161	ND	0	4,269	4.27	507	2341	2.34E-06	0	0	0.00E+00	2.34E-06
n-Undecane	336.6991	J	337	155.57	ND	0	161	ND	0	337	0.34	40	185	1.85E-07	0	0	0.00E+00	1.85E-07
C11 as Undecane	2537.803		2,538	155.57	ND	0	161	ND	0	2,538	2.54	301	1391	1.39E-06	0	0	0.00E+00	1.39E-06
n-Dodecane	281.3983	J	281	154.51	ND	0	159	ND	0	281	0.28	33	154	1.54E-07	0	0	0.00E+00	1.54E-07
C12 as Dodecane	1171.87		1,172	154.51	ND	0	159	ND	0	1,172	1.17	139	643	6.43E-07	0	0	0.00E+00	6.43E-07
n-Tridecane	123.2551	J	123	154.88	ND	0	160	ND	0	123	0.12	15	68	6.76E-08	0	0	0.00E+00	6.76E-08
C13 as Tridecane	300.6966	J	301	154.88	ND	0	160	ND	0	301	0.30	36	165	1.65E-07	0	0	0.00E+00	1.65E-07
n-Tetradecane	96.32155	J	96	154.73	ND	0	160	ND	0	96	0.10	11	53	5.28E-08	0	0	0.00E+00	5.28E-08
C14 as tetradecane	77.36434	ND	39	154.73	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Pentadecane	77.75194	ND	39	155.5	ND	0	160	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C15 as Pentadecane	77.75194	ND	39	155.5	ND	0	160	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
n-Hexadecane	77.33334	ND	39	154.67	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C16 as Hexadecane	77.33334	ND	39	154.67	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Heptadecane	76.43411	ND	38	152.87	ND	0	158	ND	0	38	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C17 as Heptadecane	76.43411	ND	38	152.87	ND	0	158	ND	0	38	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Octadecane	77.28682	ND	39	154.57	ND	0	159	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C18 as Octodecane	77.28682	ND	39	154.57	ND	0	159	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Nonadecane	77.44186	ND	39	154.88	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C19 as Nonadecane	77.44186	ND	39	154.88	ND	0	160	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Eicosane	77.25582	ND	39	154.51	ND	0	159	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C20 as Eicosane	77.25582	ND	39	154.51	ND	0	159	ND	0	39	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
C21 as Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
n-Docosane	77.10078	ND	39	154.2	ND	0	159	ND	0	39	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C22 as Docosane	77.10078	ND	39	154.2	ND	0	159	ND	0	39	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Tricosane	77.51938	ND	39	155.04	ND	0	160	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C23 as Tricosane	77.51938	ND	39	155.04	ND	0	160	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
n-Tetracosane	77.62791	ND	39	155.26	ND	0	160	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C24 as Tetracosane	77.62791	ND	39	155.26	ND	0	160	ND	0	39	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
Total Hydrocarbon			14,635			0			0		14.63	1739	8,024	8.02E-06	0	0	0.00E+00	8.02E-06

D077B

Component	ANALYTICAL RESULTS D077B µg/m³	Flag	ND Adj µg/m³	BACKGROUND #D078A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #D013 µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	148.9364	ND	74	149	ND	0	150	ND	0	74	0.07	9	41	4.08E-08	4.08E-08
C5 as Pentane	148.9364	ND	74	149	ND	0	150	ND	0	74	0.07	9	41	4.08E-08	4.08E-08
n-Hexane	213.4202	ND	107	213	ND	0	156	ND	0	107	0.11	13	59	5.85E-08	5.85E-08
C6 as Hexane	213.4202	ND	107	213	ND	0	156	ND	0	107	0.11	13	59	5.85E-08	5.85E-08
n-Heptane	177.3023	ND	89	177	ND	0	163	ND	0	89	0.09	11	49	4.86E-08	4.86E-08
C7 as Heptane	177.3023	ND	89	177	ND	0	163	ND	0	89	0.09	11	49	4.86E-08	4.86E-08
n-Octane	153.4264	ND	77	153	ND	0	158	ND	0	77	0.08	9	42	4.21E-08	4.21E-08
C8 as Octane	1197.8	J	1,198	153	ND	0	158	ND	0	1,198	1.20	142	657	6.57E-07	6.57E-07
n-Nonane	154.5736	ND	77	155	ND	0	159	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
C9 as Nonane	1824.941		1,825	155	ND	0	159	ND	0	1,825	1.82	217	1001	1.00E-06	1.00E-06
n-Decane	209.4511	J	209	156	ND	0	161	ND	0	209	0.21	25	115	1.15E-07	1.15E-07
C10 as Decane	3667.336		3,667	156	ND	0	161	ND	0	3,667	3.67	436	2011	2.01E-06	2.01E-06
n-Undecane	286.3093	J	286	156	ND	0	161	ND	0	286	0.29	34	157	1.57E-07	1.57E-07
C11 as Undecane	1224.405	J	1,224	156	ND	0	161	ND	0	1,224	1.22	145	671	6.71E-07	6.71E-07
n-Dodecane	230.0282	J	230	155	ND	0	159	ND	0	230	0.23	27	126	1.26E-07	1.26E-07
C12 as Dodecane	259.6857	J	260	155	ND	0	159	ND	0	260	0.26	31	142	1.42E-07	1.42E-07
n-Tridecane	154.8837	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.25E-08	4.25E-08
C13 as Tridecane	154.8837	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.25E-08	4.25E-08
n-Tetradecane	154.7287	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
C14 as tetradecane	154.7287	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
n-Pentadecane	155.5039	ND	78	156	ND	0	160	ND	0	78	0.08	9	43	4.26E-08	4.26E-08
C15 as Pentadecane	155.5039	ND	78	156	ND	0	160	ND	0	78	0.08	9	43	4.26E-08	4.26E-08
n-Hexadecane	154.6667	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
C16 as Hexadecane	154.6667	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
n-Heptadecane	152.8682	ND	76	153	ND	0	158	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
C17 as Heptadecane	152.8682	ND	76	153	ND	0	158	ND	0	76	0.08	9	42	4.19E-08	4.19E-08
n-Octadecane	154.5736	ND	77	155	ND	0	159	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
C18 as Octodecane	154.5736	ND	77	155	ND	0	159	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
n-Nonadecane	154.8837	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.25E-08	4.25E-08
C19 as Nonadecane	154.8837	ND	77	155	ND	0	160	ND	0	77	0.08	9	42	4.25E-08	4.25E-08
n-Eicosane	154.5116	ND	77	155	ND	0	159	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
C20 as Eicosane	154.5116	ND	77	155	ND	0	159	ND	0	77	0.08	9	42	4.24E-08	4.24E-08
n-Heneicosane	155.969	ND	78	156	ND	0	161	ND	0	78	0.08	9	43	4.28E-08	4.28E-08
C21 as Heneicosane	155.969	ND	78	156	ND	0	161	ND	0	78	0.08	9	43	4.28E-08	4.28E-08
n-Docosane	154.2016	ND	77	154	ND	0	159	ND	0	77	0.08	9	42	4.23E-08	4.23E-08
C22 as Docosane	154.2016	ND	77	154	ND	0	159	ND	0	77	0.08	9	42	4.23E-08	4.23E-08
n-Tricosane	155.0388	ND	78	155	ND	0	160	ND	0	78	0.08	9	43	4.25E-08	4.25E-08
C23 as Tricosane	155.0388	ND	78	155	ND	0	160	ND	0	78	0.08	9	43	4.25E-08	4.25E-08
n-Tetracosane	155.2558	ND	78	155	ND	0	160	ND	0	78	0.08	9	43	4.26E-08	4.26E-08
C24 as Tetracosane	155.2558	ND	78	155	ND	0	160	ND	0	78	0.08	9	43	4.26E-08	4.26E-08
Total Hydrocarbon			11,451			0			0		11.45	1360	6,278	6.28E-06	6.28E-06

Bagging Data Form — Vacuum Method

Sample Id: D079

WSPA — Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	D-628	
Equipment Subtype:	Swage Nut			**Plant ID:**	Refinery D	
Line Size:	1/2	*inches*		**Date:**	19-Nov-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS	
Barometric pressure	29.98	*inHg*	761.5 *mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	72.5	*°F*	22.5 *°C*	**TVA ID**	37887	
Component Temp:	75	*°F*	23.9 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Diesel - Stab Btms to Carb*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds
STP = 294.15 K & 760 mmHg

Pre-Sample Data

Time											
10:41	Background	5	*ppmv*	8-sec Dwell	1936	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	2885 *ppm*
11:06	Initial Bag Vacuum	0.135	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	73.8	*°F*	Leak @	Tubing Connection

Bag Concentrations (ppmv)

Time	11:07	11:08	11:10	11:12	11:14	11:16	11:18	11:20	11:22	11:24	11:29	11:35		
ppmv	31	314	468	532	560	585	598	602	615	597	551	608		

Sorbent Tube Sample Collection Parameters

D079A

Time									
11:24	Volume Start	871.4	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:37	Volume Stop	884.0	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.974	*L/min*

D079B

11:24	Volume Start	859.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:37	Volume Stop	872.6	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent $Flow_{STP}$	0.998	*L/min*
	Total ST Vol_{STP}	25.63	*Liters*	DGM Vol_{STP}	77.63	*Liters*	Total Run Vol_{STP}	103.27	*Liters*

Bagging Parameters

Time										
11:25	Vacuum check	0.115	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	758.1	*mmHg*
11:28	DGM_{10L} Time	01:40.9	*min:sec.frac*	DGM Time	1.683	DGM Flow	5.94	DGM $Flow_{STP}$	5.97	*liters/minute*
11:26	Bag Temp.	72.7	*°F*	22.6	*°C*	$Sample_T$	66	*°F*	18.9	*°C*

Post-Sample Data

11:47	Post Test M21	Background	13	*ppmv*	8-sec Dwell	1844	*ppmv*	Total Dwell	1:30 *min:sec*	Final M21	3109 *ppm*
										@	Tubing Connection

Condensate accumulation: starting time	11:24	*hour:min*	Final time	11:37 *hour:min*	0:13	*hours:min*
Organic condensate collected	1	*ml*				
Density of organic condensate	N/A	*g/ml*	#5079 LIQ			

Average THC emissions =	1.69E-03 kg/hr
Percent difference THC ER =	10%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.81E-08
C5 as Pentane	2.81E-08
n-Hexane	4.02E-08
C6 as Hexane	4.02E-08
n-Heptane	3.34E-08
C7 as Heptane	5.83E-06
n-Octane	1.04E-05
C8 as Octane	1.92E-04
n-Nonane	1.86E-05
C9 as Nonane	2.93E-04
n-Decane	2.42E-05
C10 as Decane	4.27E-04
n-Undecane	3.32E-05
C11 as Undecane	3.45E-04
n-Dodecane	3.16E-05
C12 as Dodecane	1.66E-04
n-Tridecane	1.36E-05
C13 as Tridecane	6.95E-05
n-Tetradecane	7.60E-06
C14 as tetradecane	2.87E-05
n-Pentadecane	5.35E-06
C15 as Pentadecane	1.11E-05
n-Hexadecane	2.39E-06
C16 as Hexadecane	2.78E-06
n-Heptadecane	1.19E-06
C17 as Heptadecane	1.05E-06
n-Octadecane	7.03E-07
C18 as Octodecane	2.86E-07
n-Nonadecane	3.98E-07
C19 as Nonadecane	1.02E-07
n-Eicosane	2.28E-07
C20 as Eicosane	1.02E-07
n-Heneicosane	1.03E-07
C21 as Heneicosane	1.03E-07
n-Docosane	1.02E-07
C22 as Docosane	1.02E-07
n-Tricosane	1.02E-07
C23 as Tricosane	1.02E-07
n-Tetracosane	1.02E-07
C24 as Tetracosane	1.02E-07
C25 (n-Pentacosane)	6.50E-08
Other C25 as n-Pentacosane	6.50E-08
C26 (n-Hexacosane)	6.45E-08
Other C26 as n-Hexacosane	6.45E-08
C27 (n-Heptacosane)	6.53E-08
Other C27 as n-Heptacosane	6.53E-08
C28 (n-Octacosane)	6.43E-08
Other C28 as n-Octacosane	6.43E-08
C29 (n-Nonacosane)	6.42E-08
Other C29 as n-Nonacosane	6.42E-08
C30 (n-Triacontane)	6.49E-08
Other C30 as n-Triacontane	6.49E-08
Total Hydrocarbon	1.69E-03

THC:	**8.97E-02**	**lbs/day**	**1.64E-02**	**tons/yr**

ANALYTICAL RESULTS — D079A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS				COMBINED EMISSION RATE
D079A	D079A		ND Adj	#D080A		ND Adj	#D013		ND Adj						Capture		#D079LIQ		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	76.24127	ND	38	150.1	ND	0	150	ND	0	38	0.04	4	18	1.82E-08	1	ND	0.0	1.25E-09	1.94E-08
C5 as Pentane	76.24127	ND	38	150.1	ND	0	150	ND	0	38	0.04	4	18	1.82E-08	1	ND	0.0	1.25E-09	1.94E-08
n-Hexane	109.2508	ND	55	215.09	ND	0	156	ND	0	55	0.05	6	26	2.60E-08	2	ND	0.0	1.79E-09	2.78E-08
C6 as Hexane	109.2508	ND	55	215.09	ND	0	156	ND	0	55	0.05	6	26	2.60E-08	2	ND	0.0	1.79E-09	2.78E-08
n-Heptane	90.7619	ND	45	178.69	ND	0	163	ND	0	45	0.05	5	22	2.16E-08	2	ND	0.0	1.48E-09	2.31E-08
C7 as Heptane	12689.99		12,690	178.69	ND	0	163	ND	0	12,690	12.69	1310	6048	6.05E-06	114		3.7	2.21E-07	6.27E-06
n-Octane	21784.11		21,784	154.62	ND	0	158	ND	0	21,784	21.78	2250	10383	1.04E-05	511	J	16.5	9.88E-07	1.14E-05
C8 as Octane	367008.8		367,009	154.62	ND	0	158	ND	0	367,009	367.01	37901	174925	1.75E-04	18,301		590.3	3.54E-05	2.10E-04
n-Nonane	31148.62		31,149	155.78	ND	0	159	ND	0	31,149	31.15	3217	14846	1.48E-05	2,785		89.8	5.39E-06	2.02E-05
C9 as Nonane	416720.1		416,720	155.78	ND	0	159	ND	0	416,720	416.72	43034	198619	1.99E-04	60,789		1,960.9	1.18E-04	3.16E-04
n-Decane	27191.95		27,192	157.19	ND	0	161	ND	0	27,192	27.19	2808	12960	1.30E-05	6,614		213.3	1.28E-05	2.58E-05
C10 as Decane	415575.2		415,575	157.19	ND	0	161	ND	0	415,575	415.58	42916	198073	1.98E-04	132,119		4,261.9	2.56E-04	4.54E-04
n-Undecane	22092.08		22,092	156.78	ND	0	161	ND	0	22,092	22.09	2281	10530	1.05E-05	12,336		397.9	2.39E-05	3.44E-05
C11 as Undecane	158866.9		158,867	156.78	ND	0	161	ND	0	158,867	158.87	16406	75720	7.57E-05	141,740		4,572.3	2.74E-04	3.50E-04
n-Dodecane	11269.28		11,269	155.72	ND	0	159	ND	0	11,269	11.27	1164	5371	5.37E-06	13,874		447.6	2.69E-05	3.22E-05
C12 as Dodecane	42664.8		42,665	155.72	ND	0	159	ND	0	42,665	42.66	4406	20335	2.03E-05	76,630		2,471.9	1.48E-04	1.69E-04
n-Tridecane	2278.445		2,278	156.09	ND	0	160	ND	0	2,278	2.28	235	1086	1.09E-06	6,513		210.1	1.26E-05	1.37E-05
C13 as Tridecane	8031.944		8,032	156.09	ND	0	160	ND	0	8,032	8.03	829	3828	3.83E-06	34,097		1,099.9	6.60E-05	6.98E-05
n-Tetradecane	508.9963	J	509	155.94	ND	0	160	ND	0	509	0.51	53	243	2.43E-07	3,807		122.8	7.37E-06	7.61E-06
C14 as tetradecane	182.3122	J	182	155.94	ND	0	160	ND	0	182	0.18	19	87	8.69E-08	14,808		477.7	2.87E-05	2.87E-05
n-Pentadecane	159.2063	ND	80	156.72	ND	0	160	ND	0	80	0.08	8	38	3.79E-08	2,743		88.5	5.31E-06	5.35E-06
C15 as Pentadecane	159.2063	ND	80	156.72	ND	0	160	ND	0	80	0.08	8	38	3.79E-08	5,733		184.9	1.11E-05	1.11E-05
n-Hexadecane	158.3492	ND	79	155.87	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	1,215		39.2	2.35E-06	2.39E-06
C16 as Hexadecane	158.3492	ND	79	155.87	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	1,417		45.7	2.74E-06	2.78E-06
n-Heptadecane	156.5079	ND	78	154.06	ND	0	158	ND	0	78	0.08	8	37	3.73E-08	594	J	19.1	1.15E-06	1.19E-06
C17 as Heptadecane	156.5079	ND	78	154.06	ND	0	158	ND	0	78	0.08	8	37	3.73E-08	521	J	16.8	1.01E-06	1.05E-06
n-Octadecane	158.254	ND	79	155.78	ND	0	159	ND	0	79	0.08	8	38	3.77E-08	344	J	11.1	6.66E-07	7.03E-07
C18 as Octodecane	158.254	ND	79	155.78	ND	0	159	ND	0	79	0.08	8	38	3.77E-08	128	J	4.1	2.48E-07	2.86E-07
n-Nonadecane	158.5714	ND	79	156.09	ND	0	160	ND	0	79	0.08	8	38	3.78E-08	186	J	6.0	3.60E-07	3.98E-07
C19 as Nonadecane	158.5714	ND	79	156.09	ND	0	160	ND	0	79	0.08	8	38	3.78E-08	67	ND	1.1	6.48E-08	1.03E-07
n-Eicosane	158.1905	ND	79	155.72	ND	0	159	ND	0	79	0.08	8	38	3.77E-08	99	J	3.2	1.91E-07	2.29E-07
C20 as Eicosane	158.1905	ND	79	155.72	ND	0	159	ND	0	79	0.08	8	38	3.77E-08	67	ND	1.1	6.46E-08	1.02E-07
n-Heneicosane	159.6825	ND	80	157.19	ND	0	161	ND	0	80	0.08	8	38	3.81E-08	67	ND	1.1	6.52E-08	1.03E-07
C21 as Heneicosane	159.6825	ND	80	157.19	ND	0	161	ND	0	80	0.08	8	38	3.81E-08	67	ND	1.1	6.52E-08	1.03E-07
n-Docosane	157.873	ND	79	155.41	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	67	ND	1.1	6.45E-08	1.02E-07
C22 as Docosane	157.873	ND	79	155.41	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	67	ND	1.1	6.45E-08	1.02E-07
n-Tricosane	158.7302	ND	79	156.25	ND	0	160	ND	0	79	0.08	8	38	3.78E-08	67	ND	1.1	6.48E-08	1.03E-07
C23 as Tricosane	158.7302	ND	79	156.25	ND	0	160	ND	0	79	0.08	8	38	3.78E-08	67	ND	1.1	6.48E-08	1.03E-07
n-Tetracosane	158.9524	ND	79	156.47	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	67	ND	1.1	6.49E-08	1.03E-07
C24 as Tetracosane	158.9524	ND	79	156.47	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	67	ND	1.1	6.49E-08	1.03E-07
C25 (n-Pentacosane)			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.50E-08	6.50E-08
Other C25 as n-Pentacosane			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.50E-08	6.50E-08
C26 (n-Hexacosane)			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.45E-08	6.45E-08
Other C26 as n-Hexacosane			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.45E-08	6.45E-08
C27 (n-Heptacosane)			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.53E-08	6.53E-08
Other C27 as n-Heptacosane			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.53E-08	6.53E-08
C28 (n-Octacosane)			0			0			0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.43E-08	6.43E-08
Other C28 as n-Octacosane			0			0			0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.43E-08	6.43E-08
C29 (n-Nonacosane)			0			0			0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.42E-08	6.42E-08
Other C29 as n-Nonacosane			0			0			0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.42E-08	6.42E-08
C30 (n-Triacontane)			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.49E-08	6.49E-08
Other C30 as n-Triacontane			0			0			0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.49E-08	6.49E-08
Total Hydrocarbon			1,539,829			0			0		1539.83	159016	733,920	7.34E-04	539,499		17,379	1.04E-03	1.78E-03

ANALYTICAL RESULTS — D079B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS				COMBINED EMISSION RATE
D079B	D079B		ND Adj	#D080A		ND Adj	#D013		ND Adj						Capture		#S045		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	Flag	µg/min	kg/hr	kg/hr
n-Pentane	148.9364	ND	74	150	ND	0	150	ND	0	74	0.07	8	35	3.55E-08	1	ND	0.0	1.25E-09	3.67E-08
C5 as Pentane	148.9364	ND	74	150	ND	0	150	ND	0	74	0.07	8	35	3.55E-08	1	ND	0.0	1.25E-09	3.67E-08
n-Hexane	213.4202	ND	107	215	ND	0	156	ND	0	107	0.11	11	51	5.09E-08	2	ND	0.0	1.79E-09	5.26E-08
C6 as Hexane	213.4202	ND	107	215	ND	0	156	ND	0	107	0.11	11	51	5.09E-08	2	ND	0.0	1.79E-09	5.26E-08
n-Heptane	177.3023	ND	89	179	ND	0	163	ND	0	89	0.09	9	42	4.23E-08	2	ND	0.0	1.48E-09	4.37E-08
C7 as Heptane	10849.17		10,849	179	ND	0	163	ND	0	10,849	10.85	1120	5171	5.17E-06	114	0	3.7	2.21E-07	5.39E-06
n-Octane	17831.65		17,832	155	ND	0	158	ND	0	17,832	17.83	1841	8499	8.50E-06	511	J	16.5	9.88E-07	9.49E-06
C8 as Octane	289775		289,775	155	ND	0	158	ND	0	289,775	289.77	29925	138114	1.38E-04	18,301	0	590.3	3.54E-05	1.74E-04
n-Nonane	24198.76		24,199	156	ND	0	159	ND	0	24,199	24.20	2499	11534	1.15E-05	2,785	0	89.8	5.39E-06	1.69E-05
C9 as Nonane	320291		320,291	156	ND	0	159	ND	0	320,291	320.29	33076	152659	1.53E-04	60,789	0	1,960.9	1.18E-04	2.70E-04
n-Decane	20849.41		20,849	157	ND	0	161	ND	0	20,849	20.85	2153	9937	9.94E-06	6,614	0	213.3	1.28E-05	2.27E-05
C10 as Decane	302850.8		302,851	157	ND	0	161	ND	0	302,851	302.85	31275	144346	1.44E-04	132,119	0	4,261.9	2.56E-04	4.00E-04
n-Undecane	16957.11		16,957	157	ND	0	161	ND	0	16,957	16.96	1751	8082	8.08E-06	12,336	0	397.9	2.39E-05	3.20E-05
C11 as Undecane	139510.2		139,510	157	ND	0	161	ND	0	139,510	139.51	14407	66494	6.65E-05	141,740	0	4,572.3	2.74E-04	3.41E-04
n-Dodecane	8730.948		8,731	156	ND	0	159	ND	0	8,731	8.73	902	4161	4.16E-06	13,874	0	447.6	2.69E-05	3.10E-05
C12 as Dodecane	33452.54		33,453	156	ND	0	159	ND	0	33,453	33.45	3455	15944	1.59E-05	76,630	0	2,471.9	1.48E-04	1.64E-04
n-Tridecane	1850.401		1,850	156	ND	0	160	ND	0	1,850	1.85	191	882	8.82E-07	6,513	0	210.1	1.26E-05	1.35E-05
C13 as Tridecane	6687.987		6,688	156	ND	0	160	ND	0	6,688	6.69	691	3188	3.19E-06	34,097	0	1,099.9	6.60E-05	6.92E-05
n-Tetradecane	476.5339	J	477	156	ND	0	160	ND	0	477	0.48	49	227	2.27E-07	3,807	0	122.8	7.37E-06	7.60E-06
C14 as tetradecane	190.7409	J	191	156	ND	0	160	ND	0	191	0.19	20	91	9.09E-08	14,808	0	477.7	2.87E-05	2.88E-05
n-Pentadecane	155.5039	ND	78	157	ND	0	160	ND	0	78	0.08	8	37	3.71E-08	2,743	0	88.5	5.31E-06	5.35E-06
C15 as Pentadecane	155.5039	ND	78	157	ND	0	160	ND	0	78	0.08	8	37	3.71E-08	5,733	0	184.9	1.11E-05	1.11E-05
n-Hexadecane	154.6667	ND	77	156	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	1,215	0	39.2	2.35E-06	2.39E-06
C16 as Hexadecane	154.6667	ND	77	156	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	1,417	0	45.7	2.74E-06	2.78E-06
n-Heptadecane	152.8682	ND	76	154	ND	0	158	ND	0	76	0.08	8	36	3.64E-08	594	J	19.1	1.15E-06	1.19E-06
C17 as Heptadecane	152.8682	ND	76	154	ND	0	158	ND	0	76	0.08	8	36	3.64E-08	521	J	16.8	1.01E-06	1.05E-06
n-Octadecane	154.5736	ND	77	156	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	344	J	11.1	6.66E-07	7.02E-07
C18 as Octodecane	154.5736	ND	77	156	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	128	J	4.1	2.48E-07	2.85E-07
n-Nonadecane	154.8837	ND	77	156	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	186	J	6.0	3.60E-07	3.97E-07
C19 as Nonadecane	154.8837	ND	77	156	ND	0	160	ND	0	77	0.08	8	37	3.69E-08	67	ND	1.1	6.48E-08	1.02E-07
n-Eicosane	154.5116	ND	77	156	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	99	J	3.2	1.91E-07	2.28E-07
C20 as Eicosane	154.5116	ND	77	156	ND	0	159	ND	0	77	0.08	8	37	3.68E-08	67	ND	1.1	6.46E-08	1.01E-07
n-Heneicosane	155.969	ND	78	157	ND	0	161	ND	0	78	0.08	8	37	3.72E-08	67	ND	1.1	6.52E-08	1.02E-07
C21 as Heneicosane	155.969	ND	78	157	ND	0	161	ND	0	78	0.08	8	37	3.72E-08	67	ND	1.1	6.52E-08	1.02E-07
n-Docosane	154.2016	ND	77	155	ND	0	159	ND	0	77	0.08	8	37	3.67E-08	67	ND	1.1	6.45E-08	1.01E-07
C22 as Docosane	154.2016	ND	77	155	ND	0	159	ND	0	77	0.08	8	37	3.67E-08	67	ND	1.1	6.45E-08	1.01E-07
n-Tricosane	155.0388	ND	78	156	ND	0	160	ND	0	78	0.08	8	37	3.69E-08	67	ND	1.1	6.48E-08	1.02E-07
C23 as Tricosane	155.0388	ND	78	156	ND	0	160	ND	0	78	0.08	8	37	3.69E-08	67	ND	1.1	6.48E-08	1.02E-07
n-Tetracosane	155.2558	ND	78	156	ND	0	160	ND	0	78	0.08	8	37	3.70E-08	67	ND	1.1	6.49E-08	1.02E-07
C24 as Tetracosane	155.2558	ND	78	156	ND	0	160	ND	0	78	0.08	8	37	3.70E-08	67	ND	1.1	6.49E-08	1.02E-07
C25 (n-Pentacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.50E-08	6.50E-08
Other C25 as n-Pentacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.50E-08	6.50E-08
C26 (n-Hexacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.45E-08	6.45E-08
Other C26 as n-Hexacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.45E-08	6.45E-08
C27 (n-Heptacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.53E-08	6.53E-08
Other C27 as n-Heptacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.53E-08	6.53E-08
C28 (n-Octacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.43E-08	6.43E-08
Other C28 as n-Octacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.43E-08	6.43E-08
C29 (n-Nonacosane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.42E-08	6.42E-08
Other C29 as n-Nonacosane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	66	ND	1.1	6.42E-08	6.42E-08
C30 (n-Triacontane)			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.49E-08	6.49E-08
Other C30 as n-Triacontane			0	0	0	0	0	0	0	0	0.00	0	0	0.00E+00	67	ND	1.1	6.49E-08	6.49E-08
Total Hydrocarbon			1,196,501			0			0		1196.50	0	570,282	5.70E-04	539,499	0	17,379	1.04E-03	1.61E-03

Bagging Data Form — Vacuum Method

Sample Id D081

WSPA — Western States Petroleum Association

Equipment type:	Flange		**Component ID:**	D-2269		
Equipment Subtype:			**Plant ID:**	Refinery D		
Line Size:	4	*inches*	**Date:**	20-Nov-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/MS		
Barometric pressure	29.94 *inHg*	760.5 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	64 *°F*	17.8 *°C*	**TVA ID**	36502		
Component Temp:	215 *°F*	101.7 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*	
Stream Description:	*Gas Oil 4th Level C13910*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:25	Background	2	*ppmv*	8-sec Dwell	29	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	528 *ppm*
10:26	Initial Bag Vacuum	0.055	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	201.6	*°F*	Leak @	Flange

Bag Concentrations (ppmv) (had to vent bag)

Time	10:28	10:30	10:35	10:41	10:42	10:50	10:54							
ppmv	1.2	16.7	18.4	19.4	19.1	18.7	18							

Sorbent Tube Sample Collection Parameters

D081A

Time									
10:44	Volume Start	887.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:57	Volume Stop	900.5	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	1.005	*L/min*

D081B

10:44	Volume Start	874.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:57	Volume Stop	887.5	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	1.021	*L/min*
	Total ST Vol$_{STP}$	26.34	*Liters*	DGM Vol$_{STP}$	80.44	*Liters*	Total Run Vol$_{STP}$	106.77	*Liters*

Bagging Parameters

Time										
10:45	Vacuum check	0.055	*inches H2O*			DGM$_P$	2	*inches H2O vacuum*	756.7	*mmHg*
10:48	DGM$_{10L}$ Time	01:38.8	*min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM Flow$_{STP}$	6.19	*liters/minute*
10:46	Bag Temp.	210	*°F*	98.9	*°C*	Sample$_T$	57	*°F*	13.9	*°C*

Post-Sample Data

11:07	Post Test M21	Background	2 *ppmv*	8-sec Dwell	37	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	548 *ppm*
									@	Flange
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A *ml*							
Density of organic condensate			N/A *g/ml*							

Average THC emissions =	1.03E-05	kg/hr
Percent difference THC ER =	38%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.75E-08
C5 as Pentane	2.75E-08
n-Hexane	3.93E-08
C6 as Hexane	3.93E-08
n-Heptane	3.27E-08
C7 as Heptane	3.27E-08
n-Octane	4.52E-08
C8 as Octane	2.83E-07
n-Nonane	4.43E-08
C9 as Nonane	6.57E-07
n-Decane	7.53E-08
C10 as Decane	9.01E-07
n-Undecane	1.26E-07
C11 as Undecane	3.77E-06
n-Dodecane	9.34E-07
C12 as Dodecane	2.44E-06
n-Tridecane	1.05E-07
C13 as Tridecane	1.04E-07
n-Tetradecane	2.85E-08
C14 as tetradecane	2.85E-08
n-Pentadecane	2.87E-08
C15 as Pentadecane	2.87E-08
n-Hexadecane	2.85E-08
C16 as Hexadecane	2.85E-08
n-Heptadecane	2.82E-08
C17 as Heptadecane	2.82E-08
n-Octadecane	2.85E-08
C18 as Octodecane	2.85E-08
n-Nonadecane	2.86E-08
C19 as Nonadecane	2.86E-08
n-Eicosane	2.85E-08
C20 as Eicosane	2.85E-08
n-Heneicosane	2.88E-08
C21 as Heneicosane	2.88E-08
n-Docosane	2.84E-08
C22 as Docosane	2.84E-08
n-Tricosane	2.86E-08
C23 as Tricosane	2.86E-08
n-Tetracosane	2.86E-08
C24 as Tetracosane	2.86E-08
Total Hydrocarbon	1.03E-05

THC:	**5.45E-04**	**lbs/day**	**9.96E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D081A	D081A		ND Adj	#D083A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.05	ND	38	146.66	ND	0	150	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C5 as Pentane	75.05	ND	38	146.66	ND	0	150	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Hexane	107.5437	ND	54	210.16	ND	0	156	ND	0	54	0.05	6	26	2.65E-08	0	0	0.00E+00	2.65E-08
C6 as Hexane	107.5437	ND	54	210.16	ND	0	156	ND	0	54	0.05	6	26	2.65E-08	0	0	0.00E+00	2.65E-08
n-Heptane	89.34375	ND	45	174.6	ND	0	163	ND	0	45	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
C7 as Heptane	89.34375	ND	45	174.6	ND	0	163	ND	0	45	0.04	5	22	2.20E-08	0	0	0.00E+00	2.20E-08
n-Octane	107.4624	J	107	151.08	ND	0	158	ND	0	107	0.11	11	53	5.30E-08	0	0	0.00E+00	5.30E-08
C8 as Octane	761.5363	J	762	151.08	ND	0	158	ND	0	762	0.76	81	375	3.75E-07	0	0	0.00E+00	3.75E-07
n-Nonane	102.9201	J	103	152.21	ND	0	159	ND	0	103	0.10	11	51	5.07E-08	0	0	0.00E+00	5.07E-08
C9 as Nonane	1564.241		1,564	152.21	ND	0	159	ND	0	1,564	1.56	167	771	7.71E-07	0	0	0.00E+00	7.71E-07
n-Decane	143.3368	J	143	153.59	ND	0	161	ND	0	143	0.14	15	71	7.06E-08	0	0	0.00E+00	7.06E-08
C10 as Decane	2282.76		2,283	153.59	ND	0	161	ND	0	2,283	2.28	244	1125	1.12E-06	0	0	0.00E+00	1.12E-06
n-Undecane	289.4324	J	289	153.19	ND	0	161	ND	0	289	0.29	31	143	1.43E-07	0	0	0.00E+00	1.43E-07
C11 as Undecane	9237.506		9,238	153.19	ND	0	161	ND	0	9,238	9.24	986	4552	4.55E-06	0	0	0.00E+00	4.55E-06
n-Dodecane	2077.636		2,078	152.15	ND	0	159	ND	0	2,078	2.08	222	1024	1.02E-06	0	0	0.00E+00	1.02E-06
C12 as Dodecane	6654.63		6,655	152.15	ND	0	159	ND	0	6,655	6.65	711	3279	3.28E-06	0	0	0.00E+00	3.28E-06
n-Tridecane	228.9313	J	229	152.52	ND	0	160	ND	0	229	0.23	24	113	1.13E-07	0	0	0.00E+00	1.13E-07
C13 as Tridecane	343.8593	J	344	152.52	ND	0	160	ND	0	344	0.34	37	169	1.69E-07	0	0	0.00E+00	1.69E-07
n-Tetradecane	77.96875	ND	39	152.37	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C14 as tetradecane	77.96875	ND	39	152.37	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Pentadecane	78.35937	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C15 as Pentadecane	78.35937	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Hexadecane	77.9375	ND	39	152.31	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C16 as Hexadecane	77.9375	ND	39	152.31	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heptadecane	77.03125	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C17 as Heptadecane	77.03125	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Octadecane	77.89062	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C18 as Octodecane	77.89062	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Nonadecane	78.04687	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C19 as Nonadecane	78.04687	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Eicosane	77.85937	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C20 as Eicosane	77.85937	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heneicosane	78.59375	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C21 as Heneicosane	78.59375	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Docosane	77.70312	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C22 as Docosane	77.70312	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Tricosane	78.125	ND	39	152.67	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C23 as Tricosane	78.125	ND	39	152.67	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tetracosane	78.23437	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C24 as Tetracosane	78.23437	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
Total Hydrocarbon			24,924			0			0		24.92	2661	12,283	1.23E-05	0	0	0.00E+00	1.23E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D081B	D081B		ND Adj	#D083A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.7908	ND	74	147	ND	0	150	ND	0	74	0.07	8	36	3.64E-08	3.64E-08
C5 as Pentane	147.7908	ND	74	147	ND	0	150	ND	0	74	0.07	8	36	3.64E-08	3.64E-08
n-Hexane	211.7785	ND	106	210	ND	0	156	ND	0	106	0.11	11	52	5.22E-08	5.22E-08
C6 as Hexane	211.7785	ND	106	210	ND	0	156	ND	0	106	0.11	11	52	5.22E-08	5.22E-08
n-Heptane	175.9385	ND	88	175	ND	0	163	ND	0	88	0.09	9	43	4.34E-08	4.34E-08
C7 as Heptane	175.9385	ND	88	175	ND	0	163	ND	0	88	0.09	9	43	4.34E-08	4.34E-08
n-Octane	152.2462	ND	76	151	ND	0	158	ND	0	76	0.08	8	38	3.75E-08	3.75E-08
C8 as Octane	386.5183	J	387	151	ND	0	158	ND	0	387	0.39	41	190	1.90E-07	1.90E-07
n-Nonane	153.3846	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
C9 as Nonane	1102.755	J	1,103	152	ND	0	159	ND	0	1,103	1.10	118	543	5.43E-07	5.43E-07
n-Decane	162.4186	J	162	154	ND	0	161	ND	0	162	0.16	17	80	8.00E-08	8.00E-08
C10 as Decane	1373.466	J	1,373	154	ND	0	161	ND	0	1,373	1.37	147	677	6.77E-07	6.77E-07
n-Undecane	223.2486	J	223	153	ND	0	161	ND	0	223	0.22	24	110	1.10E-07	1.10E-07
C11 as Undecane	6045.286		6,045	153	ND	0	161	ND	0	6,045	6.05	645	2979	2.98E-06	2.98E-06
n-Dodecane	1713.417		1,713	152	ND	0	159	ND	0	1,713	1.71	183	844	8.44E-07	8.44E-07
C12 as Dodecane	3258.48		3,258	152	ND	0	159	ND	0	3,258	3.26	348	1606	1.61E-06	1.61E-06
n-Tridecane	196.9673	J	197	153	ND	0	160	ND	0	197	0.20	21	97	9.71E-08	9.71E-08
C13 as Tridecane	153.6923	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Tetradecane	153.5385	ND	77	152	ND	0	160	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
C14 as tetradecane	153.5385	ND	77	152	ND	0	160	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
n-Pentadecane	154.3077	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C15 as Pentadecane	154.3077	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
n-Hexadecane	153.4769	ND	77	152	ND	0	160	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
C16 as Hexadecane	153.4769	ND	77	152	ND	0	160	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
n-Heptadecane	151.6923	ND	76	151	ND	0	158	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
C17 as Heptadecane	151.6923	ND	76	151	ND	0	158	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
n-Octadecane	153.3846	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
C18 as Octodecane	153.3846	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
n-Nonadecane	153.6923	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C19 as Nonadecane	153.6923	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Eicosane	153.3231	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
C20 as Eicosane	153.3231	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
n-Heneicosane	154.7692	ND	77	154	ND	0	161	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C21 as Heneicosane	154.7692	ND	77	154	ND	0	161	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
n-Docosane	153.0154	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C22 as Docosane	153.0154	ND	77	152	ND	0	159	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Tricosane	153.8462	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C23 as Tricosane	153.8462	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Tetracosane	154.0615	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
C24 as Tetracosane	154.0615	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.80E-08	3.80E-08
Total Hydrocarbon			16,917			0			0		16.92	1806	8,337	8.34E-06	8.34E-06

Bagging Data Form — Vacuum Method

Sample Id D083

WSPA — Western States Petroleum Association

Equipment type:	Connectors	**Component ID:**	D-862
Equipment Subtype:	Bull Plug	**Plant ID:**	Refinery D
Line Size:	3/4 *inches*	**Date:**	20-Nov-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR/RS
Barometric pressure	29.91 *inHg* 759.7 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	69 *°F* 20.6 *°C*	**TVA ID**	36502
Component Temp:	89 *°F* 31.7 *°C*	**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*Jet @ E16194*		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:10	Background	10	*ppmv*	8-sec Dwell	39	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	338 *ppm*
13:37	Initial Bag Vacuum	0.045	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	114.3	*°F*	Leak @	Connector-Threaded

Bag Concentrations (ppmv) (had to vent bag)

Time	13:39	13:41	13:43	13:45	13:47	13:49	13:55	13:56	14:01					
ppmv	19.1	21.1	22	22.7	23.6	24.1	23.9	23.9	24.1					

Sorbent Tube Sample Collection Parameters

D083A

Time										
13:49	Volume Start	900.5	*Liters*		Design Sample Flow Rate = 1 liter/min					
14:02	Volume Stop	913.2	*Liters*	Total Vol	12.7	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977	*L/min*	Sorbent $Flow_{STP}$	0.972	*L/min*

D083B

13:49	Volume Start	887.5	*Liters*		Design Sample Flow Rate = 1 liter/min					
14:02	Volume Stop	900.2	*Liters*	Total Vol	12.7	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977	*L/min*	Sorbent $Flow_{STP}$	0.972	*L/min*
	Total ST Vol_{STP}	25.28	*Liters*	DGM Vol_{STP}	78.42	*Liters*	Total Run Vol_{STP}	103.70	*Liters*	

Bagging Parameters

Time										
13:50	Vacuum check	0.06	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	756.4	*mmHg*
13:53	DGM_{10L} Time	01:39.2	*min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM $Flow_{STP}$	6.03	*liters/minute*
13:51	Bag Temp.	123.4	*°F*	50.8	*°C*	$Sample_T$	70	*°F*	21.1	*°C*

Post-Sample Data

14:09	Post Test M21	Background	10	*ppmv*	8-sec Dwell	80	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	388 *ppm*
										@	Connector-Threaded

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	1.53E-05 kg/hr
Percent difference THC ER =	23%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.72E-08
C5 as Pentane	2.72E-08
n-Hexane	3.89E-08
C6 as Hexane	3.89E-08
n-Heptane	3.23E-08
C7 as Heptane	3.23E-08
n-Octane	5.51E-08
C8 as Octane	1.33E-06
n-Nonane	1.42E-07
C9 as Nonane	2.92E-06
n-Decane	2.42E-07
C10 as Decane	5.12E-06
n-Undecane	3.47E-07
C11 as Undecane	3.01E-06
n-Dodecane	2.79E-07
C12 as Dodecane	8.48E-07
n-Tridecane	9.00E-08
C13 as Tridecane	9.20E-08
n-Tetradecane	4.38E-08
C14 as tetradecane	2.82E-08
n-Pentadecane	2.83E-08
C15 as Pentadecane	2.83E-08
n-Hexadecane	2.82E-08
C16 as Hexadecane	2.82E-08
n-Heptadecane	2.79E-08
C17 as Heptadecane	2.79E-08
n-Octadecane	2.82E-08
C18 as Octodecane	2.82E-08
n-Nonadecane	2.82E-08
C19 as Nonadecane	2.82E-08
n-Eicosane	2.82E-08
C20 as Eicosane	2.82E-08
n-Heneicosane	2.84E-08
C21 as Heneicosane	2.84E-08
n-Docosane	2.81E-08
C22 as Docosane	2.81E-08
n-Tricosane	2.83E-08
C23 as Tricosane	2.83E-08
n-Tetracosane	2.83E-08
C24 as Tetracosane	2.83E-08
Total Hydrocarbon	1.53E-05

THC:	**8.10E-04**	**lbs/day**	**1.48E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D083A	D083A		ND Adj	#D084A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.64095	ND	38	151.28	ND	0	150	ND	0	38	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C5 as Pentane	75.64095	ND	38	151.28	ND	0	150	ND	0	38	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Hexane	108.3906	ND	54	216.78	ND	0	156	ND	0	54	0.05	6	26	2.59E-08	0	0	0.00E+00	2.59E-08
C6 as Hexane	108.3906	ND	54	216.78	ND	0	156	ND	0	54	0.05	6	26	2.59E-08	0	0	0.00E+00	2.59E-08
n-Heptane	90.04725	ND	45	180.09	ND	0	163	ND	0	45	0.05	5	22	2.15E-08	0	0	0.00E+00	2.15E-08
C7 as Heptane	90.04725	ND	45	180.09	ND	0	163	ND	0	45	0.05	5	22	2.15E-08	0	0	0.00E+00	2.15E-08
n-Octane	152.1926	J	152	155.84	ND	0	158	ND	0	152	0.15	16	73	7.28E-08	0	0	0.00E+00	7.28E-08
C8 as Octane	3187.589		3,188	155.84	ND	0	158	ND	0	3,188	3.19	331	1526	1.53E-06	0	0	0.00E+00	1.53E-06
n-Nonane	319.7288	J	320	157.01	ND	0	159	ND	0	320	0.32	33	153	1.53E-07	0	0	0.00E+00	1.53E-07
C9 as Nonane	6761.785		6,762	157.01	ND	0	159	ND	0	6,762	6.76	701	3236	3.24E-06	0	0	0.00E+00	3.24E-06
n-Decane	554.9461	J	555	158.43	ND	0	161	ND	0	555	0.55	58	266	2.66E-07	0	0	0.00E+00	2.66E-07
C10 as Decane	11898.92		11,899	158.43	ND	0	161	ND	0	11,899	11.90	1234	5695	5.70E-06	0	0	0.00E+00	5.70E-06
n-Undecane	797.9225		798	158.02	ND	0	161	ND	0	798	0.80	83	382	3.82E-07	0	0	0.00E+00	3.82E-07
C11 as Undecane	7212.294		7,212	158.02	ND	0	161	ND	0	7,212	7.21	748	3452	3.45E-06	0	0	0.00E+00	3.45E-06
n-Dodecane	653.9422	J	654	156.94	ND	0	159	ND	0	654	0.65	68	313	3.13E-07	0	0	0.00E+00	3.13E-07
C12 as Dodecane	2424.839		2,425	156.94	ND	0	159	ND	0	2,425	2.42	251	1161	1.16E-06	0	0	0.00E+00	1.16E-06
n-Tridecane	174.9139	J	175	157.32	ND	0	160	ND	0	175	0.17	18	84	8.37E-08	0	0	0.00E+00	8.37E-08
C13 as Tridecane	305.645	J	306	157.32	ND	0	160	ND	0	306	0.31	32	146	1.46E-07	0	0	0.00E+00	1.46E-07
n-Tetradecane	104.3653	J	104	157.17	ND	0	160	ND	0	104	0.10	11	50	5.00E-08	0	0	0.00E+00	5.00E-08
C14 as tetradecane	78.58268	ND	39	157.17	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Pentadecane	78.97638	ND	39	157.95	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C15 as Pentadecane	78.97638	ND	39	157.95	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Hexadecane	78.55118	ND	39	157.1	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C16 as Hexadecane	78.55118	ND	39	157.1	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Heptadecane	77.6378	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C17 as Heptadecane	77.6378	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Octadecane	78.50394	ND	39	157.01	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C18 as Octodecane	78.50394	ND	39	157.01	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Nonadecane	78.66142	ND	39	157.32	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C19 as Nonadecane	78.66142	ND	39	157.32	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Eicosane	78.47244	ND	39	156.94	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C20 as Eicosane	78.47244	ND	39	156.94	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Heneicosane	79.2126	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C21 as Heneicosane	79.2126	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Docosane	78.31496	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C22 as Docosane	78.31496	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Tricosane	78.74016	ND	39	157.48	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C23 as Tricosane	78.74016	ND	39	157.48	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Tetracosane	78.85039	ND	39	157.7	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C24 as Tetracosane	78.85039	ND	39	157.7	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
Total Hydrocarbon			35,648			0			0		35.65	3697	17,062	1.71E-05	0	0	0.00E+00	1.71E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D083B	D083B		ND Adj	#D084A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.2819	ND	76	151	ND	0	150	ND	0	76	0.08	8	36	3.62E-08	3.62E-08
C5 as Pentane	151.2819	ND	76	151	ND	0	150	ND	0	76	0.08	8	36	3.62E-08	3.62E-08
n-Hexane	216.7811	ND	108	217	ND	0	156	ND	0	108	0.11	11	52	5.19E-08	5.19E-08
C6 as Hexane	216.7811	ND	108	217	ND	0	156	ND	0	108	0.11	11	52	5.19E-08	5.19E-08
n-Heptane	180.0945	ND	90	180	ND	0	163	ND	0	90	0.09	9	43	4.31E-08	4.31E-08
C7 as Heptane	180.0945	ND	90	180	ND	0	163	ND	0	90	0.09	9	43	4.31E-08	4.31E-08
n-Octane	155.8425	ND	78	156	ND	0	158	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
C8 as Octane	2378.503		2,379	156	ND	0	158	ND	0	2,379	2.38	247	1138	1.14E-06	1.14E-06
n-Nonane	273.326	J	273	157	ND	0	159	ND	0	273	0.27	28	131	1.31E-07	1.31E-07
C9 as Nonane	5454.238		5,454	157	ND	0	159	ND	0	5,454	5.45	566	2611	2.61E-06	2.61E-06
n-Decane	454.9096	J	455	158	ND	0	161	ND	0	455	0.45	47	218	2.18E-07	2.18E-07
C10 as Decane	9478.231		9,478	158	ND	0	161	ND	0	9,478	9.48	983	4536	4.54E-06	4.54E-06
n-Undecane	653.3952	J	653	158	ND	0	161	ND	0	653	0.65	68	313	3.13E-07	3.13E-07
C11 as Undecane	5364.114		5,364	158	ND	0	161	ND	0	5,364	5.36	556	2567	2.57E-06	2.57E-06
n-Dodecane	510.843	J	511	157	ND	0	159	ND	0	511	0.51	53	245	2.45E-07	2.45E-07
C12 as Dodecane	1118.338	J	1,118	157	ND	0	159	ND	0	1,118	1.12	116	535	5.35E-07	5.35E-07
n-Tridecane	201.2598	J	201	157	ND	0	160	ND	0	201	0.20	21	96	9.63E-08	9.63E-08
C13 as Tridecane	157.3228	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Tetradecane	157.1654	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C14 as tetradecane	157.1654	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Pentadecane	157.9528	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
C15 as Pentadecane	157.9528	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.78E-08	3.78E-08
n-Hexadecane	157.1024	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C16 as Hexadecane	157.1024	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Heptadecane	155.2756	ND	78	155	ND	0	158	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
C17 as Heptadecane	155.2756	ND	78	155	ND	0	158	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
n-Octadecane	157.0079	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C18 as Octodecane	157.0079	ND	79	157	ND	0	159	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Nonadecane	157.3228	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
C19 as Nonadecane	157.3228	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.76E-08	3.76E-08
n-Eicosane	156.9449	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C20 as Eicosane	156.9449	ND	78	157	ND	0	159	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Heneicosane	158.4252	ND	79	158	ND	0	161	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C21 as Heneicosane	158.4252	ND	79	158	ND	0	161	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Docosane	156.6299	ND	78	157	ND	0	159	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
C22 as Docosane	156.6299	ND	78	157	ND	0	159	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
n-Tricosane	157.4803	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C23 as Tricosane	157.4803	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
n-Tetracosane	157.7008	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
C24 as Tetracosane	157.7008	ND	79	158	ND	0	160	ND	0	79	0.08	8	38	3.77E-08	3.77E-08
Total Hydrocarbon			28,321			0			0		28.32	2937	13,555	1.36E-05	1.36E-05

Bagging Data Form — Vacuum Method

Sample Id: D085

WSPA — Western States Petroleum Association

Equipment type:	Connector @ P16189		**Component ID:**	D-4	
Equipment Subtype:	Bull Plug		**Plant ID:**	Refinery D	
Line Size:	3/4	*inches*	**Date:**	27-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR/RS	
Barometric pressure	29.98 *inHg*	761.5 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	61.6 °F	16.4 °C	**TVA ID**	37887	
Component Temp:	81 °F	27.2 °C	**Stream Pressure/Temp:**	1040 *psig*	°F
Stream Description:	*Jet Feed Charge*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
12:41	Background	3	*ppmv*	8-sec Dwell	190	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	519	*ppm*
13:09	Initial Bag Vacuum	0.06	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	69.1	°F	Leak @	Threaded Connection	

Bag Concentrations (ppmv) (had to vent bag)

Time	13:12	13:14	13:16	13:18	13:20	13:22	13:24	13:26	13:28	13:30	13:42			
ppmv	26.5	28.5	32.2	34.5	37	39.7	42	43.4	45.9	47.5	55.6			

Sorbent Tube Sample Collection Parameters

D085A

Time									
13:30	Volume Start	918.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:43	Volume Stop	931.3	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.993	*L/min*

D085B

13:30	Volume Start	902.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:43	Volume Stop	915.0	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent $Flow_{STP}$	1.009	*L/min*
	Total ST Vol_{STP}	26.03	*Liters*	DGM Vol_{STP}	79.93	*Liters*	Total Run Vol_{STP}	105.96	*Liters*

Bagging Parameters

Time										
13:31	Vacuum check	0.095	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	758.1	*mmHg*
13:35	DGM_{10L} Time	01:40.4	*min:sec.frac*	DGM Time	1.667	DGM Flow	6.00	DGM $Flow_{STP}$	6.15	*liters/minute*
13:32	Bag Temp.	66.7	°F	19.3	°C	$Sample_T$	56	°F	13.3	°C

Post-Sample Data

13:54 Post Test M21	Background	5	*ppmv*	8-sec Dwell	313	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	707 *ppm*
											@ Threaded Connection
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00	*hours:min*		
Organic condensate collected		N/A	*ml*								
Density of organic condensate		N/A	*g/ml*								

Average THC emissions =	6.60E-05 kg/hr
Percent difference THC ER =	17%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.70E-08
C5 as Pentane	2.70E-08
n-Hexane	2.80E-08
C6 as Hexane	2.80E-08
n-Heptane	2.93E-08
C7 as Heptane	2.72E-07
n-Octane	5.47E-07
C8 as Octane	9.36E-06
n-Nonane	1.02E-06
C9 as Nonane	1.70E-05
n-Decane	1.29E-06
C10 as Decane	1.75E-05
n-Undecane	9.98E-07
C11 as Undecane	1.20E-05
n-Dodecane	7.04E-07
C12 as Dodecane	4.05E-06
n-Tridecane	2.01E-07
C13 as Tridecane	3.80E-07
n-Tetradecane	6.49E-08
C14 as tetradecane	2.87E-08
n-Pentadecane	2.89E-08
C15 as Pentadecane	2.89E-08
n-Hexadecane	2.87E-08
C16 as Hexadecane	2.87E-08
n-Heptadecane	2.84E-08
C17 as Heptadecane	2.84E-08
n-Octadecane	2.87E-08
C18 as Octodecane	2.87E-08
n-Nonadecane	2.88E-08
C19 as Nonadecane	2.88E-08
n-Eicosane	2.87E-08
C20 as Eicosane	2.87E-08
n-Heneicosane	2.90E-08
C21 as Heneicosane	2.90E-08
n-Docosane	2.87E-08
C22 as Docosane	2.87E-08
n-Tricosane	2.88E-08
C23 as Tricosane	2.88E-08
n-Tetracosane	2.88E-08
C24 as Tetracosane	2.88E-08
Total Hydrocarbon	6.60E-05

THC:	**3.49E-03**	**lbs/day**	**6.37E-04**	**tons/yr**

D085A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS			COMBINED EMISSION RATE
D085A	D085A		ND Adj	#D086A		ND Adj	#D013		ND Adj						Capture	#D0XX		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.30159	ND	37	144.03	ND	0	150	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	74.30159	ND	37	144.03	ND	0	150	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	77.19047	ND	39	149.63	ND	0	156	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C6 as Hexane	77.19047	ND	39	149.63	ND	0	156	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptane	80.66666	ND	40	156.37	ND	0	163	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C7 as Heptane	612.2783	J	612	156.37	ND	0	163	ND	0	612	0.61	65	299	2.99E-07	0	0	0.00E+00	2.99E-07
n-Octane	1235.602		1,236	152.25	ND	0	158	ND	0	1,236	1.24	131	604	6.04E-07	0	0	0.00E+00	6.04E-07
C8 as Octane	20721.59		20,722	152.25	ND	0	158	ND	0	20,722	20.72	2196	10134	1.01E-05	0	0	0.00E+00	1.01E-05
n-Nonane	2288.381		2,288	153.38	ND	0	159	ND	0	2,288	2.29	242	1119	1.12E-06	0	0	0.00E+00	1.12E-06
C9 as Nonane	37688.72		37,689	153.38	ND	0	159	ND	0	37,689	37.69	3994	18432	1.84E-05	0	0	0.00E+00	1.84E-05
n-Decane	2893.975		2,894	154.77	ND	0	161	ND	0	2,894	2.89	307	1415	1.42E-06	0	0	0.00E+00	1.42E-06
C10 as Decane	38864.29		38,864	154.77	ND	0	161	ND	0	38,864	38.86	4118	19007	1.90E-05	0	0	0.00E+00	1.90E-05
n-Undecane	2239.833		2,240	154.37	ND	0	161	ND	0	2,240	2.24	237	1095	1.10E-06	0	0	0.00E+00	1.10E-06
C11 as Undecane	26408.87		26,409	154.37	ND	0	161	ND	0	26,409	26.41	2798	12915	1.29E-05	0	0	0.00E+00	1.29E-05
n-Dodecane	1554.895		1,555	153.32	ND	0	159	ND	0	1,555	1.55	165	760	7.60E-07	0	0	0.00E+00	7.60E-07
C12 as Dodecane	9341.17		9,341	153.32	ND	0	159	ND	0	9,341	9.34	990	4568	4.57E-06	0	0	0.00E+00	4.57E-06
n-Tridecane	535.89	J	536	153.69	ND	0	160	ND	0	536	0.54	57	262	2.62E-07	0	0	0.00E+00	2.62E-07
C13 as Tridecane	1114.296		1,114	153.69	ND	0	160	ND	0	1,114	1.11	118	545	5.45E-07	0	0	0.00E+00	5.45E-07
n-Tetradecane	187.3682	J	187	153.54	ND	0	160	ND	0	187	0.19	20	92	9.16E-08	0	0	0.00E+00	9.16E-08
C14 as tetradecane	79.20635	ND	40	153.54	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Pentadecane	79.60317	ND	40	154.31	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C15 as Pentadecane	79.60317	ND	40	154.31	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Hexadecane	79.1746	ND	40	153.48	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C16 as Hexadecane	79.1746	ND	40	153.48	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heptadecane	78.25397	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C17 as Heptadecane	78.25397	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Octadecane	79.12698	ND	40	153.38	ND	0	159	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C18 as Octodecane	79.12698	ND	40	153.38	ND	0	159	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Nonadecane	79.28571	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	79.28571	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	79.09524	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C20 as Eicosane	79.09524	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heneicosane	79.84127	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C21 as Heneicosane	79.84127	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Docosane	78.93651	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C22 as Docosane	78.93651	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tricosane	79.36508	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C23 as Tricosane	79.36508	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tetracosane	79.47619	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C24 as Tetracosane	79.47619	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
Total Hydrocarbon			146,711			0			0		146.71	15546	71,749	7.17E-05	0	0	0.00E+00	7.17E-05

D085B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
D085B	D085B		ND Adj	#D086A		ND Adj	#D013		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146.2812	ND	73	144	ND	0	150	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
C5 as Pentane	146.2812	ND	73	144	ND	0	150	ND	0	73	0.07	8	36	3.58E-08	3.58E-08
n-Hexane	151.9687	ND	76	150	ND	0	156	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
C6 as Hexane	151.9687	ND	76	150	ND	0	156	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
n-Heptane	158.8125	ND	79	156	ND	0	163	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C7 as Heptane	499.3489	J	499	156	ND	0	163	ND	0	499	0.50	53	244	2.44E-07	2.44E-07
n-Octane	1001.202	J	1,001	152	ND	0	158	ND	0	1,001	1.00	106	490	4.90E-07	4.90E-07
C8 as Octane	17559.15		17,559	152	ND	0	158	ND	0	17,559	17.56	1861	8587	8.59E-06	8.59E-06
n-Nonane	1883.221		1,883	153	ND	0	159	ND	0	1,883	1.88	200	921	9.21E-07	9.21E-07
C9 as Nonane	31634.12		31,634	153	ND	0	159	ND	0	31,634	31.63	3352	15471	1.55E-05	1.55E-05
n-Decane	2370.819		2,371	155	ND	0	161	ND	0	2,371	2.37	251	1159	1.16E-06	1.16E-06
C10 as Decane	32531.73		32,532	155	ND	0	161	ND	0	32,532	32.53	3447	15910	1.59E-05	1.59E-05
n-Undecane	1840.926		1,841	154	ND	0	161	ND	0	1,841	1.84	195	900	9.00E-07	9.00E-07
C11 as Undecane	22465.43		22,465	154	ND	0	161	ND	0	22,465	22.47	2380	10987	1.10E-05	1.10E-05
n-Dodecane	1325.558	J	1,326	153	ND	0	159	ND	0	1,326	1.33	140	648	6.48E-07	6.48E-07
C12 as Dodecane	7217.137		7,217	153	ND	0	159	ND	0	7,217	7.22	765	3530	3.53E-06	3.53E-06
n-Tridecane	285.1395	J	285	154	ND	0	160	ND	0	285	0.29	30	139	1.39E-07	1.39E-07
C13 as Tridecane	439.7344	J	440	154	ND	0	160	ND	0	440	0.44	47	215	2.15E-07	2.15E-07
n-Tetradecane	155.9375	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C14 as tetradecane	155.9375	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Pentadecane	156.7187	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C15 as Pentadecane	156.7187	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Hexadecane	155.875	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C16 as Hexadecane	155.875	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Heptadecane	154.0625	ND	77	152	ND	0	158	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C17 as Heptadecane	154.0625	ND	77	152	ND	0	158	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Octadecane	155.7812	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C18 as Octodecane	155.7812	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Nonadecane	156.0937	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C19 as Nonadecane	156.0937	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Eicosane	155.7187	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C20 as Eicosane	155.7187	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Heneicosane	157.1875	ND	79	155	ND	0	161	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
C21 as Heneicosane	157.1875	ND	79	155	ND	0	161	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
n-Docosane	155.4062	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C22 as Docosane	155.4062	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Tricosane	156.25	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C23 as Tricosane	156.25	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Tetracosane	156.4687	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C24 as Tetracosane	156.4687	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
Total Hydrocarbon			123,147			0			0		123.15	13049	60,225	6.02E-05	6.02E-05

Bagging Data Form **Vacuum Method** **Sample Id** D087

Equipment type:	Connector			**Component ID:**	D-348		
Equipment Subtype:	Bull Plug			**Plant ID:**	Refinery D		
Line Size:	1	*inches*		**Date:**	28-Nov-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS		
Barometric pressure	29.78	*inHg*	756.4 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	68	*°F*	20.0 *°C*	**TVA ID**	36502		
Component Temp:	143	*°F*	61.7 *°C*	**Stream Pressure/Temp:**		*psig*	*°F*
Stream Description:	*Jet @ E932B*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:02	Background	4	*ppmv*	8-sec Dwell	224	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	2169 *ppm*
10:48	Initial Bag Vacuum	0.06	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	80.6	*°F*	Leak @	Plug Threads

Bag Concentrations (ppmv) (had to vent bag)

Time	10:51	10:53	10:55	10:57	10:59	11:01	11:03	11:05	11:12	11:15				
ppmv	154	262	297	306	314	324	327	326	299	311				

Sorbent Tube Sample Collection Parameters

D087A

Time									
11:05	Volume Start	934.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:18	Volume Stop	947.5	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent $Flow_{STP}$	0.985	*L/min*

D087B

11:05	Volume Start	917.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:18	Volume Stop	930.1	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent $Flow_{STP}$	1.000	*L/min*
	Total ST Vol_{STP}	25.81	*Liters*	DGM Vol_{STP}	79.63	*Liters*	Total Run Vol_{STP}	105.44	*Liters*

Bagging Parameters

Time										
11:06	Vacuum check	0.07	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	753.0	*mmHg*
11:09	DGM_{10L} Time	01:38.2	*min:sec.frac*	DGM Time	1.633	DGM Flow	6.12	DGM $Flow_{STP}$	6.13	*liters/minute*
11:07	Bag Temp.	89.1	*°F*	31.7	*°C*	$Sample_T$	65	*°F*	18.3	*°C*

Post-Sample Data

11:26 Post Test M21	Background	16	*ppmv*	8-sec Dwell	1119	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	2574 *ppm*
									@	Plug Threads
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*							
Density of organic condensate		N/A	*g/ml*							

Average THC emissions =	4.78E-04	kg/hr
Percent difference THC ER =	1%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.64E-08
C5 as Pentane	2.64E-08
n-Hexane	2.74E-08
C6 as Hexane	2.74E-08
n-Heptane	6.08E-08
C7 as Heptane	6.47E-07
n-Octane	1.51E-06
C8 as Octane	3.85E-05
n-Nonane	3.85E-06
C9 as Nonane	7.98E-05
n-Decane	7.02E-06
C10 as Decane	1.38E-04
n-Undecane	1.10E-05
C11 as Undecane	1.12E-04
n-Dodecane	1.07E-05
C12 as Dodecane	5.24E-05
n-Tridecane	3.64E-06
C13 as Tridecane	1.56E-05
n-Tetradecane	6.20E-07
C14 as tetradecane	1.11E-06
n-Pentadecane	2.83E-08
C15 as Pentadecane	2.83E-08
n-Hexadecane	2.82E-08
C16 as Hexadecane	2.82E-08
n-Heptadecane	2.78E-08
C17 as Heptadecane	2.78E-08
n-Octadecane	2.81E-08
C18 as Octodecane	2.81E-08
n-Nonadecane	2.82E-08
C19 as Nonadecane	2.82E-08
n-Eicosane	2.81E-08
C20 as Eicosane	2.81E-08
n-Heneicosane	2.84E-08
C21 as Heneicosane	2.84E-08
n-Docosane	2.81E-08
C22 as Docosane	2.81E-08
n-Tricosane	2.82E-08
C23 as Tricosane	2.82E-08
n-Tetracosane	2.83E-08
C24 as Tetracosane	2.83E-08
Total Hydrocarbon	4.78E-04

THC:	2.53E-02	lbs/day	4.61E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D087A	D087A		ND Adj	#D088A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.14062	ND	37	144.03	ND	0	150	ND	0	37	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C5 as Pentane	73.14062	ND	37	144.03	ND	0	150	ND	0	37	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Hexane	75.98437	ND	38	149.63	ND	0	156	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C6 as Hexane	75.98437	ND	38	149.63	ND	0	156	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Heptane	171.6104	J	172	156.37	ND	0	163	ND	0	172	0.17	18	84	8.35E-08	0	0	0.00E+00	8.35E-08
C7 as Heptane	1357.651		1,358	156.37	ND	0	163	ND	0	1,358	1.36	143	661	6.61E-07	0	0	0.00E+00	6.61E-07
n-Octane	3147.629		3,148	152.25	ND	0	158	ND	0	3,148	3.15	332	1532	1.53E-06	0	0	0.00E+00	1.53E-06
C8 as Octane	79916.03		79,916	152.25	ND	0	158	ND	0	79,916	79.92	8426	38890	3.89E-05	0	0	0.00E+00	3.89E-05
n-Nonane	7980.321		7,980	153.38	ND	0	159	ND	0	7,980	7.98	841	3884	3.88E-06	0	0	0.00E+00	3.88E-06
C9 as Nonane	165287.8		165,288	153.38	ND	0	159	ND	0	165,288	165.29	17428	80435	8.04E-05	0	0	0.00E+00	8.04E-05
n-Decane	14506.73		14,507	154.77	ND	0	161	ND	0	14,507	14.51	1530	7059	7.06E-06	0	0	0.00E+00	7.06E-06
C10 as Decane	268920.5		268,921	154.77	ND	0	161	ND	0	268,921	268.92	28354	130866	1.31E-04	0	0	0.00E+00	1.31E-04
n-Undecane	22702.61		22,703	154.37	ND	0	161	ND	0	22,703	22.70	2394	11048	1.10E-05	0	0	0.00E+00	1.10E-05
C11 as Undecane	245837.1		245,837	154.37	ND	0	161	ND	0	245,837	245.84	25920	119633	1.20E-04	0	0	0.00E+00	1.20E-04
n-Dodecane	21791.42		21,791	153.32	ND	0	159	ND	0	21,791	21.79	2298	10604	1.06E-05	0	0	0.00E+00	1.06E-05
C12 as Dodecane	105793.1		105,793	153.32	ND	0	159	ND	0	105,793	105.79	11155	51483	5.15E-05	0	0	0.00E+00	5.15E-05
n-Tridecane	7062.188		7,062	153.69	ND	0	160	ND	0	7,062	7.06	745	3437	3.44E-06	0	0	0.00E+00	3.44E-06
C13 as Tridecane	29539.65		29,540	153.69	ND	0	160	ND	0	29,540	29.54	3115	14375	1.44E-05	0	0	0.00E+00	1.44E-05
n-Tetradecane	1044.398		1,044	153.54	ND	0	160	ND	0	1,044	1.04	110	508	5.08E-07	0	0	0.00E+00	5.08E-07
C14 as tetradecane	1864.244		1,864	153.54	ND	0	160	ND	0	1,864	1.86	197	907	9.07E-07	0	0	0.00E+00	9.07E-07
n-Pentadecane	78.35937	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C15 as Pentadecane	78.35937	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C16 as Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptadecane	77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C17 as Heptadecane	77.03125	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Octadecane	77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C18 as Octodecane	77.89062	ND	39	153.38	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Nonadecane	78.04687	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C19 as Nonadecane	78.04687	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Eicosane	77.85937	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C20 as Eicosane	77.85937	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heneicosane	78.59375	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane	78.59375	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane	77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	77.70312	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	78.125	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	78.125	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Tetracosane	78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C24 as Tetracosane	78.23437	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
Total Hydrocarbon			977,852			0			0		977.85	103102	475,857	4.76E-04	0	0	0.00E+00	4.76E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D087B	D087B		ND Adj	#D088A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	144.0308	ND	72	144	ND	0	150	ND	0	72	0.07	8	35	3.50E-08	3.50E-08
C5 as Pentane	144.0308	ND	72	144	ND	0	150	ND	0	72	0.07	8	35	3.50E-08	3.50E-08
n-Hexane	149.6308	ND	75	150	ND	0	156	ND	0	75	0.07	8	36	3.64E-08	3.64E-08
C6 as Hexane	149.6308	ND	75	150	ND	0	156	ND	0	75	0.07	8	36	3.64E-08	3.64E-08
n-Heptane	156.3692	ND	78	156	ND	0	163	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C7 as Heptane	1299.586	J	1,300	156	ND	0	163	ND	0	1,300	1.30	137	632	6.32E-07	6.32E-07
n-Octane	3068.337		3,068	152	ND	0	158	ND	0	3,068	3.07	324	1493	1.49E-06	1.49E-06
C8 as Octane	78213.02		78,213	152	ND	0	158	ND	0	78,213	78.21	8247	38061	3.81E-05	3.81E-05
n-Nonane	7838.25		7,838	153	ND	0	159	ND	0	7,838	7.84	826	3814	3.81E-06	3.81E-06
C9 as Nonane	162677.6		162,678	153	ND	0	159	ND	0	162,678	162.68	17152	79165	7.92E-05	7.92E-05
n-Decane	14336.98		14,337	155	ND	0	161	ND	0	14,337	14.34	1512	6977	6.98E-06	6.98E-06
C10 as Decane	298543.1		298,543	155	ND	0	161	ND	0	298,543	298.54	31478	145281	1.45E-04	1.45E-04
n-Undecane	22673.52		22,674	154	ND	0	161	ND	0	22,674	22.67	2391	11034	1.10E-05	1.10E-05
C11 as Undecane	216468.8		216,469	154	ND	0	161	ND	0	216,469	216.47	22824	105341	1.05E-04	1.05E-04
n-Dodecane	22266.33		22,266	153	ND	0	159	ND	0	22,266	22.27	2348	10836	1.08E-05	1.08E-05
C12 as Dodecane	109576.5		109,576	153	ND	0	159	ND	0	109,576	109.58	11553	53324	5.33E-05	5.33E-05
n-Tridecane	7888.183		7,888	154	ND	0	160	ND	0	7,888	7.89	832	3839	3.84E-06	3.84E-06
C13 as Tridecane	34379.76		34,380	154	ND	0	160	ND	0	34,380	34.38	3625	16730	1.67E-05	1.67E-05
n-Tetradecane	1504.291	J	1,504	154	ND	0	160	ND	0	1,504	1.50	159	732	7.32E-07	7.32E-07
C14 as tetradecane	2713.408		2,713	154	ND	0	160	ND	0	2,713	2.71	286	1320	1.32E-06	1.32E-06
n-Pentadecane	154.3077	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
C15 as Pentadecane	154.3077	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
n-Hexadecane	153.4769	ND	77	153	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C16 as Hexadecane	153.4769	ND	77	153	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Heptadecane	151.6923	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.69E-08	3.69E-08
C17 as Heptadecane	151.6923	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.69E-08	3.69E-08
n-Octadecane	153.3846	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C18 as Octodecane	153.3846	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Nonadecane	153.6923	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
C19 as Nonadecane	153.6923	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
n-Eicosane	153.3231	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C20 as Eicosane	153.3231	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Heneicosane	154.7692	ND	77	155	ND	0	161	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C21 as Heneicosane	154.7692	ND	77	155	ND	0	161	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Docosane	153.0154	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C22 as Docosane	153.0154	ND	77	153	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Tricosane	153.8462	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
C23 as Tricosane	153.8462	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
n-Tetracosane	154.0615	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C24 as Tetracosane	154.0615	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
Total Hydrocarbon			985,355			0			0		985.36	103893	479,508	4.80E-04	4.80E-04

Bagging Data Form — Vacuum Method

Sample Id D089

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	D-1669	
Equipment Subtype:	Control Valve IV			**Plant ID:**	Refinery D	
Line Size:	10	*inches*		**Date:**	30-Nov-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR/RS	
Barometric pressure	30.01 *inHg*	762.3 *mmHg*		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	64 *°F*	17.8 *°C*		**TVA ID**	37887	
Component Temp:	219 *°F*	103.9 *°C*		**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*HGO CFH Product Stripper Bottoms from Pumps*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
8:22	Background	5 *ppmv*	8-sec Dwell	11 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	22 *ppm*
9:26	Initial Bag Vacuum	0.01 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	109.9 *°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:27	9:29	9:31	9:33	9:35	9:42	9:45							
ppmv	1.2	2.1	2.2	2.1	2.2	2.1	2.1							

Sorbent Tube Sample Collection Parameters

D089A

Time							
9:37	Volume Start	952.7 *Liters*		Design Sample Flow Rate = 1 liter/min			
9:50	Volume Stop	965.6 *Liters*	Total Vol	12.9 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	1.010 *L/min*

D089B

9:37	Volume Start	933.4 *Liters*		Design Sample Flow Rate = 1 liter/min			
9:50	Volume Stop	946.5 *Liters*	Total Vol	13.1 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	1.008 *L/min*	Sorbent Flow$_{STP}$	1.026 *L/min*
	Total ST Vol$_{STP}$	26.47 *Liters*	DGM Vol$_{STP}$	83.57 *Liters*	Total Run Vol$_{STP}$	110.04 *Liters*	

Bagging Parameters

Time							
9:38	Vacuum check	0.017 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	758.9 *mmHg*
9:41	DGM$_{10L}$ Time	01:34.5 *min:sec.frac*	DGM Time	1.583	DGM Flow	6.32	DGM Flow$_{STP}$ 6.43 *liters/minute*
9:39	Bag Temp.	115.7 *°F*	46.5 *°C*		Sample$_T$	60 *°F*	15.6 *°C*

Post-Sample Data

9:58 Post Test M21	Background	0 *ppmv*	8-sec Dwell	11 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21 19 *ppm* @ Packing
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A *ml*					
Density of organic condensate		N/A *g/ml*					

Average THC emissions =	1.16E-06	kg/hr
Percent difference THC ER =	65%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.74E-08
C5 as Pentane	2.74E-08
n-Hexane	2.84E-08
C6 as Hexane	2.84E-08
n-Heptane	2.97E-08
C7 as Heptane	2.97E-08
n-Octane	2.89E-08
C8 as Octane	2.89E-08
n-Nonane	2.91E-08
C9 as Nonane	2.91E-08
n-Decane	2.94E-08
C10 as Decane	2.94E-08
n-Undecane	2.93E-08
C11 as Undecane	2.93E-08
n-Dodecane	2.91E-08
C12 as Dodecane	2.91E-08
n-Tridecane	2.92E-08
C13 as Tridecane	2.92E-08
n-Tetradecane	2.92E-08
C14 as tetradecane	2.92E-08
n-Pentadecane	2.93E-08
C15 as Pentadecane	2.93E-08
n-Hexadecane	2.92E-08
C16 as Hexadecane	2.92E-08
n-Heptadecane	2.88E-08
C17 as Heptadecane	2.88E-08
n-Octadecane	2.91E-08
C18 as Octodecane	2.91E-08
n-Nonadecane	2.92E-08
C19 as Nonadecane	2.92E-08
n-Eicosane	2.91E-08
C20 as Eicosane	2.91E-08
n-Heneicosane	2.94E-08
C21 as Heneicosane	2.94E-08
n-Docosane	2.91E-08
C22 as Docosane	2.91E-08
n-Tricosane	2.92E-08
C23 as Tricosane	2.92E-08
n-Tetracosane	2.93E-08
C24 as Tetracosane	2.93E-08
Total Hydrocarbon	1.16E-06

THC:	**6.15E-05**	**lbs/day**	**1.12E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
D089A	D089A		ND Adj	#D063A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#D0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	72.57365	ND	36	142.93	ND	0	150	ND	0	36	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C5 as Pentane	72.57365	ND	36	142.93	ND	0	150	ND	0	36	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Hexane	75.39535	ND	38	148.49	ND	0	156	ND	0	38	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C6 as Hexane	75.39535	ND	38	148.49	ND	0	156	ND	0	38	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Heptane	78.7907	ND	39	155.18	ND	0	163	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C7 as Heptane	78.7907	ND	39	155.18	ND	0	163	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Octane	76.71318	ND	38	151.08	ND	0	158	ND	0	38	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C8 as Octane	76.71318	ND	38	151.08	ND	0	158	ND	0	38	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Nonane	77.28682	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C9 as Nonane	77.28682	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Decane	77.9845	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C10 as Decane	77.9845	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Undecane	77.78295	ND	39	153.19	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C11 as Undecane	77.78295	ND	39	153.19	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Dodecane	77.25582	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C12 as Dodecane	77.25582	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tridecane	77.44186	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C13 as Tridecane	77.44186	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetradecane	77.36434	ND	39	152.37	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C14 as tetradecane	77.36434	ND	39	152.37	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Pentadecane	77.75194	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C15 as Pentadecane	77.75194	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Hexadecane	77.33334	ND	39	152.31	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C16 as Hexadecane	77.33334	ND	39	152.31	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heptadecane	76.43411	ND	38	150.53	ND	0	158	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C17 as Heptadecane	76.43411	ND	38	150.53	ND	0	158	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Octadecane	77.28682	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C18 as Octodecane	77.28682	ND	39	152.21	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Nonadecane	77.44186	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C19 as Nonadecane	77.44186	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Eicosane	77.25582	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C20 as Eicosane	77.25582	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heneicosane	77.9845	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C21 as Heneicosane	77.9845	ND	39	153.59	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Docosane	77.10078	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	77.10078	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	77.51938	ND	39	152.67	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C23 as Tricosane	77.51938	ND	39	152.67	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetracosane	77.62791	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C24 as Tetracosane	77.62791	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
Total Hydrocarbon			1,542			0			0		1.54	170	783	7.83E-07	0	0	0.00E+00	7.83E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
D089B	D089B		ND Adj	#D063A		ND Adj	#D013		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	142.9313	ND	71	143	ND	0	150	ND	0	71	0.07	8	36	3.63E-08	3.63E-08
C5 as Pentane	142.9313	ND	71	143	ND	0	150	ND	0	71	0.07	8	36	3.63E-08	3.63E-08
n-Hexane	148.4885	ND	74	148	ND	0	156	ND	0	74	0.07	8	38	3.77E-08	3.77E-08
C6 as Hexane	148.4885	ND	74	148	ND	0	156	ND	0	74	0.07	8	38	3.77E-08	3.77E-08
n-Heptane	155.1756	ND	78	155	ND	0	163	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
C7 as Heptane	155.1756	ND	78	155	ND	0	163	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
n-Octane	151.084	ND	76	151	ND	0	158	ND	0	76	0.08	8	38	3.84E-08	3.84E-08
C8 as Octane	151.084	ND	76	151	ND	0	158	ND	0	76	0.08	8	38	3.84E-08	3.84E-08
n-Nonane	152.2137	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
C9 as Nonane	152.2137	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
n-Decane	153.5878	ND	77	154	ND	0	161	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C10 as Decane	153.5878	ND	77	154	ND	0	161	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Undecane	153.1908	ND	77	153	ND	0	161	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
C11 as Undecane	153.1908	ND	77	153	ND	0	161	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
n-Dodecane	152.1527	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
C12 as Dodecane	152.1527	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
n-Tridecane	152.5191	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
C13 as Tridecane	152.5191	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
n-Tetradecane	152.3664	ND	76	152	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
C14 as tetradecane	152.3664	ND	76	152	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
n-Pentadecane	153.1298	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
C15 as Pentadecane	153.1298	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.89E-08	3.89E-08
n-Hexadecane	152.3053	ND	76	152	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
C16 as Hexadecane	152.3053	ND	76	152	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
n-Heptadecane	150.5343	ND	75	151	ND	0	158	ND	0	75	0.08	8	38	3.82E-08	3.82E-08
C17 as Heptadecane	150.5343	ND	75	151	ND	0	158	ND	0	75	0.08	8	38	3.82E-08	3.82E-08
n-Octadecane	152.2137	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
C18 as Octodecane	152.2137	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
n-Nonadecane	152.5191	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
C19 as Nonadecane	152.5191	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.87E-08	3.87E-08
n-Eicosane	152.1527	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
C20 as Eicosane	152.1527	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
n-Heneicosane	153.5878	ND	77	154	ND	0	161	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C21 as Heneicosane	153.5878	ND	77	154	ND	0	161	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Docosane	151.8473	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
C22 as Docosane	151.8473	ND	76	152	ND	0	159	ND	0	76	0.08	8	39	3.86E-08	3.86E-08
n-Tricosane	152.6718	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.88E-08	3.88E-08
C23 as Tricosane	152.6718	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.88E-08	3.88E-08
n-Tetracosane	152.8855	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.88E-08	3.88E-08
C24 as Tetracosane	152.8855	ND	76	153	ND	0	160	ND	0	76	0.08	8	39	3.88E-08	3.88E-08
Total Hydrocarbon			3,038			0			0		3.04	334	1,543	1.54E-06	1.54E-06

Refinery E Sample Results

Bagging Data Form — Vacuum Method

Sample Id: E001

Equipment type:	Valve (MOV 633)			**Component ID:**	E-542
Equipment Subtype:	Control			**Unit:**	Refinery E
Line Size:	8 inches			**Date:**	6-Aug-18
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR
Barometric pressure	29.91 inHg	759.7 mmHg		**Sample Pump A**	LP52979
				Sample Pump B	LP52975
Ambient Temp:	84 °F	28.9 °C		**TVA ID**	36502
Component Temp:	155 °F	68.3 °C		**Stream Pressure/Temp:**	psig °F
Stream Description:	LAGO Mixed Feed to D-401 Direct				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:06	Background	5	ppmv	8-sec Dwell	140	ppmv	Total Dwell	5:00	min:sec	Final M21	2428 ppm
10:55	Initial Bag Vacuum	0.005	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	109.9	°F	Leak @	Packing

Bag Concentrations (ppmv)

Time	10:58	11:00	11:02	11:06	11:08	11:10	11:12	11:14	11:16	11:25	11:28			
ppmv	42.4	45.9	53.5	59.7	62.7	62.5	66.2	71.4	71.5	77.3	79.2			

Sorbent Tube Sample Collection Parameters

E001A

Time										
11:16	Volume Start	185.3	Liters		Design Sample Flow Rate = 1 liter/min					
11:29	Volume Stop	197.8	Liters	Total Vol	12.5	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.962	L/min	Sorbent Flow$_{STP}$	0.945	L/min

E001B

Time										
11:16	Volume Start	181.0	Liters		Design Sample Flow Rate = 1 liter/min					
11:29	Volume Stop	193.7	Liters	Total Vol	12.7	Liters				
	Sample Run Time	13	Minutes		Sorbent Flow	0.977	L/min	Sorbent Flow$_{STP}$	0.960	L/min
	Total ST Vol$_{STP}$	24.75	Liters	DGM Vol$_{STP}$	80.66	Liters	Total Run Vol$_{STP}$	105.41	Liters	

Bagging Parameters

Time										
11:17	Vacuum check	0.005	inches H2O			DGM$_P$	1.8	inches H2O vacuum	756.4	mmHg
11:20	DGM$_{10L}$ Time	01:35.1	min:sec.frac	DGM Time	1.583	DGM Flow	6.32	DGM Flow$_{STP}$	6.20	liters/minute
11:18	Bag Temp.	116.8	°F	47.1	°C	Sample$_T$	77	°F	25.0	°C

Post-Sample Data

11:36	Post Test M21	Background	13	ppmv	8-sec Dwell	356	ppmv	Total Dwell	3:00 min:sec	Final M21 3711 ppm, Leak @ Packing
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A	hour:min		0:00 hours:min	
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions =	1.88E-04	kg/hr
Percent difference THC ER =	11%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.77E-08
C5 as Pentane	2.77E-08
n-Hexane	3.98E-08
C6 as Hexane	3.98E-08
n-Heptane	3.30E-08
C7 as Heptane	3.30E-08
n-Octane	2.86E-08
C8 as Octane	2.90E-07
n-Nonane	1.64E-07
C9 as Nonane	2.94E-05
n-Decane	3.46E-06
C10 as Decane	6.44E-05
n-Undecane	6.15E-06
C11 as Undecane	5.37E-05
n-Dodecane	1.80E-06
C12 as Dodecane	2.11E-05
n-Tridecane	1.53E-06
C13 as Tridecane	4.71E-06
n-Tetradecane	3.17E-07
C14 as tetradecane	4.44E-07
n-Pentadecane	1.20E-07
C15 as Pentadecane	3.98E-08
n-Hexadecane	2.88E-08
C16 as Hexadecane	2.88E-08
n-Heptadecane	2.85E-08
C17 as Heptadecane	2.85E-08
n-Octadecane	2.88E-08
C18 as Octodecane	2.88E-08
n-Nonadecane	2.89E-08
C19 as Nonadecane	2.89E-08
n-Eicosane	2.88E-08
C20 as Eicosane	2.88E-08
n-Heneicosane	2.91E-08
C21 as Heneicosane	2.91E-08
n-Docosane	2.87E-08
C22 as Docosane	2.87E-08
n-Tricosane	2.89E-08
C23 as Tricosane	2.89E-08
n-Tetracosane	2.89E-08
C24 as Tetracosane	2.89E-08
Total Hydrocarbon	1.88E-04

THC:	**9.97E-03**	**lbs/day**	**1.82E-03**	**tons/yr**

E001A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS			COMBINED EMISSION RATE
E001A	E001A		ND Adj	E002A		ND Adj	#E009A		ND Adj						Capture	#E0XX		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C5 as Pentane	76.8512	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Hexane	110.1248	ND	55	211.78	ND	0	220	ND	0	55	0.06	6	27	2.68E-08	0	0	0.00E+00	2.68E-08
C6 as Hexane	110.1248	ND	55	211.78	ND	0	220	ND	0	55	0.06	6	27	2.68E-08	0	0	0.00E+00	2.68E-08
n-Heptane	91.4880	ND	46	175.94	ND	0	183	ND	0	46	0.05	5	22	2.23E-08	0	0	0.00E+00	2.23E-08
C7 as Heptane	91.4880	ND	46	175.94	ND	0	183	ND	0	46	0.05	5	22	2.23E-08	0	0	0.00E+00	2.23E-08
n-Octane	79.1680	ND	40	152.25	ND	0	158	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C8 as Octane	619.6733	J	620	152.25	ND	0	158	ND	0	620	0.62	65	301	3.01E-07	0	0	0.00E+00	3.01E-07
n-Nonane	338.5647	J	339	153.38	ND	0	160	ND	0	339	0.34	36	165	1.65E-07	0	0	0.00E+00	1.65E-07
C9 as Nonane	#########		57,747	153.38	ND	0	160	ND	0	57,747	57.75	6087	28094	2.81E-05	0	0	0.00E+00	2.81E-05
n-Decane	6333.0711		6,333	154.77	ND	0	161	ND	0	6,333	6.33	668	3081	3.08E-06	0	0	0.00E+00	3.08E-06
C10 as Decane	#########		125,477	154.77	ND	0	161	ND	0	125,477	125.48	13227	61046	6.10E-05	0	0	0.00E+00	6.10E-05
n-Undecane	#########		11,825	154.37	ND	0	161	ND	0	11,825	11.82	1246	5753	5.75E-06	0	0	0.00E+00	5.75E-06
C11 as Undecane	#########		103,096	154.37	ND	0	161	ND	0	103,096	103.10	10867	50157	5.02E-05	0	0	0.00E+00	5.02E-05
n-Dodecane	3531.3210		3,531	153.32	ND	0	159	ND	0	3,531	3.53	372	1718	1.72E-06	0	0	0.00E+00	1.72E-06
C12 as Dodecane	#########		40,785	153.32	ND	0	159	ND	0	40,785	40.79	4299	19842	1.98E-05	0	0	0.00E+00	1.98E-05
n-Tridecane	3010.5243		3,011	153.69	ND	0	160	ND	0	3,011	3.01	317	1465	1.46E-06	0	0	0.00E+00	1.46E-06
C13 as Tridecane	9667.3945		9,667	153.69	ND	0	160	ND	0	9,667	9.67	1019	4703	4.70E-06	0	0	0.00E+00	4.70E-06
n-Tetradecane	645.3747	J	645	153.54	ND	0	160	ND	0	645	0.65	68	314	3.14E-07	0	0	0.00E+00	3.14E-07
C14 as tetradecane	1314.8655		1,315	153.54	ND	0	160	ND	0	1,315	1.31	139	640	6.40E-07	0	0	0.00E+00	6.40E-07
n-Pentadecane	307.9714	J	308	154.31	ND	0	160	ND	0	308	0.31	32	150	1.50E-07	0	0	0.00E+00	1.50E-07
C15 as Pentadecane	84.5121	J	85	154.31	ND	0	160	ND	0	85	0.08	9	41	4.11E-08	0	0	0.00E+00	4.11E-08
n-Hexadecane	79.8080	ND	40	153.48	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C16 as Hexadecane	79.8080	ND	40	153.48	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heptadecane	78.8800	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C17 as Heptadecane	78.8800	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Octadecane	79.7600	ND	40	153.38	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C18 as Octodecane	79.7600	ND	40	153.38	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Nonadecane	79.9200	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	79.9200	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	79.7280	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C20 as Eicosane	79.7280	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heneicosane	80.4800	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C21 as Heneicosane	80.4800	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Docosane	79.5680	ND	40	153.02	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C22 as Docosane	79.5680	ND	40	153.02	ND	0	159	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tricosane	80.0000	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C23 as Tricosane	80.0000	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tetracosane	80.1120	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C24 as Tetracosane	80.1120	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
Total Hydrocarbon			365,819			0			0		365.82	38561	177,974	1.78E-04	0	0	0.00E+00	1.78E-04

E001B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
E001B	E001B		ND Adj	E002A		ND Adj	#E009A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.28189	ND	76	148	ND	0	154	ND	0	76	0.08	8	37	3.68E-08	3.68E-08
C5 as Pentane	151.28189	ND	76	148	ND	0	154	ND	0	76	0.08	8	37	3.68E-08	3.68E-08
n-Hexane	216.78111	ND	108	212	ND	0	220	ND	0	108	0.11	11	53	5.27E-08	5.27E-08
C6 as Hexane	216.78111	ND	108	212	ND	0	220	ND	0	108	0.11	11	53	5.27E-08	5.27E-08
n-Heptane	180.09449	ND	90	176	ND	0	183	ND	0	90	0.09	9	44	4.38E-08	4.38E-08
C7 as Heptane	180.09449	ND	90	176	ND	0	183	ND	0	90	0.09	9	44	4.38E-08	4.38E-08
n-Octane	155.84252	ND	78	152	ND	0	158	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C8 as Octane	574.14732	J	574	152	ND	0	158	ND	0	574	0.57	61	279	2.79E-07	2.79E-07
n-Nonane	335.7621	J	336	153	ND	0	160	ND	0	336	0.34	35	163	1.63E-07	1.63E-07
C9 as Nonane	63229.59		63,230	153	ND	0	160	ND	0	63,230	63.23	6665	30762	3.08E-05	3.08E-05
n-Decane	7905.5842		7,906	155	ND	0	161	ND	0	7,906	7.91	833	3846	3.85E-06	3.85E-06
C10 as Decane	139300.62		139,301	155	ND	0	161	ND	0	139,301	139.30	14684	67771	6.78E-05	6.78E-05
n-Undecane	13463.057		13,463	154	ND	0	161	ND	0	13,463	13.46	1419	6550	6.55E-06	6.55E-06
C11 as Undecane	117511.59		117,512	154	ND	0	161	ND	0	117,512	117.51	12387	57171	5.72E-05	5.72E-05
n-Dodecane	3878.2784		3,878	153	ND	0	159	ND	0	3,878	3.88	409	1887	1.89E-06	1.89E-06
C12 as Dodecane	46096.165		46,096	153	ND	0	159	ND	0	46,096	46.10	4859	22426	2.24E-05	2.24E-05
n-Tridecane	3285.5052		3,286	154	ND	0	160	ND	0	3,286	3.29	346	1598	1.60E-06	1.60E-06
C13 as Tridecane	9674.4819		9,674	154	ND	0	160	ND	0	9,674	9.67	1020	4707	4.71E-06	4.71E-06
n-Tetradecane	659.14365	J	659	154	ND	0	160	ND	0	659	0.66	69	321	3.21E-07	3.21E-07
C14 as tetradecane	511.00726	J	511	154	ND	0	160	ND	0	511	0.51	54	249	2.49E-07	2.49E-07
n-Pentadecane	183.68283	J	184	154	ND	0	160	ND	0	184	0.18	19	89	8.94E-08	8.94E-08
C15 as Pentadecane	157.95276	ND	79	154	ND	0	160	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
n-Hexadecane	157.10236	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
C16 as Hexadecane	157.10236	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
n-Heptadecane	155.27559	ND	78	152	ND	0	158	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C17 as Heptadecane	155.27559	ND	78	152	ND	0	158	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Octadecane	157.00788	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
C18 as Octodecane	157.00788	ND	79	153	ND	0	160	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
n-Nonadecane	157.32284	ND	79	154	ND	0	160	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
C19 as Nonadecane	157.32284	ND	79	154	ND	0	160	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
n-Eicosane	156.94488	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C20 as Eicosane	156.94488	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Heneicosane	158.4252	ND	79	155	ND	0	161	ND	0	79	0.08	8	39	3.85E-08	3.85E-08
C21 as Heneicosane	158.4252	ND	79	155	ND	0	161	ND	0	79	0.08	8	39	3.85E-08	3.85E-08
n-Docosane	156.62992	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C22 as Docosane	156.62992	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Tricosane	157.48032	ND	79	154	ND	0	160	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
C23 as Tricosane	157.48032	ND	79	154	ND	0	160	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
n-Tetracosane	157.70079	ND	79	154	ND	0	160	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
C24 as Tetracosane	157.70079	ND	79	154	ND	0	160	ND	0	79	0.08	8	38	3.84E-08	3.84E-08
Total Hydrocarbon			408,728			0			0		408.73	43084	198,850	1.99E-04	1.99E-04

Bagging Data Form — Vacuum Method

Sample Id: E003

WSPA — Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	E-33	
Equipment Subtype:	Reducing Union			**Unit:**	Refinery E	
Line Size:	3/4	*inches*		**Date:**	6-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.86 *inHg*	758.4 *mmHg*		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	107 °F	41.7 °C		**TVA ID**	34251	
Component Temp:	233 °F	111.7 °C		**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Frac Bottoms Discharge P504*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:19	Background	-2	*ppmv*	8-sec Dwell		*ppmv*	Total Dwell	4:00	*min:sec*	Final M21	1002 *ppm*
14:00	Initial Bag Vacuum	0.012	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	129.2	°F	Leak @	threaded connector

Bag Concentrations (ppmv)

Time	14:03	14:05	14:07	14:09	14:11	14:13	14:15	14:21						
ppmv	38.8	42.1	43.8	44.2	46.2	49	49.2	44.6						

Sorbent Tube Sample Collection Parameters

E003A

Time								
14:15	Volume Start	197.8 *Liters*		Design Sample Flow Rate = 1 liter/min				
14:28	Volume Stop	210.4 *Liters*	Total Vol	12.6 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent Flow$_{STP}$	0.905	*L/min*

E003B

14:15	Volume Start	193.7 *Liters*		Design Sample Flow Rate = 1 liter/min				
14:28	Volume Stop	206.4 *Liters*	Total Vol	12.7 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.912	*L/min*
	Total ST Vol$_{STP}$	23.62 *Liters*	DGM Vol$_{STP}$	76.66 *Liters*	Total Run Vol$_{STP}$	100.28 *Liters*		

Bagging Parameters

Time										
14:16	Vacuum check	0.01	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	755.1	*mmHg*
14:19	DGM$_{10L}$ Time	01:34.8	*min:sec.frac*	DGM Time	1.583	DGM Flow	6.32	DGM Flow$_{STP}$	5.90	*liters/minute*
14:17	Bag Temp.	137.1	°F	58.4	°C	Sample$_T$	104	°F	40.0	°C

Post-Sample Data

14:34	Post Test M21	Background	16 *ppmv*	8-sec Dwell	516 *ppmv*	Total Dwell	3:00 *min:sec*	Final M21	1216 *ppm*
								Leak @	threaded connector

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	6.97E-05 kg/hr
Percent difference THC ER =	7%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.63E-08
C5 as Pentane	2.63E-08
n-Hexane	3.77E-08
C6 as Hexane	3.77E-08
n-Heptane	3.13E-08
C7 as Heptane	1.04E-07
n-Octane	2.71E-08
C8 as Octane	4.13E-07
n-Nonane	1.10E-07
C9 as Nonane	7.99E-06
n-Decane	8.52E-07
C10 as Decane	1.72E-05
n-Undecane	2.32E-06
C11 as Undecane	1.90E-05
n-Dodecane	9.77E-07
C12 as Dodecane	1.04E-05
n-Tridecane	1.14E-06
C13 as Tridecane	4.99E-06
n-Tetradecane	5.39E-07
C14 as tetradecane	1.66E-06
n-Pentadecane	3.44E-07
C15 as Pentadecane	6.71E-07
n-Hexadecane	1.85E-07
C16 as Hexadecane	1.55E-07
n-Heptadecane	4.40E-08
C17 as Heptadecane	2.70E-08
n-Octadecane	2.73E-08
C18 as Octodecane	2.73E-08
n-Nonadecane	2.74E-08
C19 as Nonadecane	2.74E-08
n-Eicosane	2.73E-08
C20 as Eicosane	2.73E-08
n-Heneicosane	2.76E-08
C21 as Heneicosane	2.76E-08
n-Docosane	2.73E-08
C22 as Docosane	2.73E-08
n-Tricosane	2.74E-08
C23 as Tricosane	2.74E-08
n-Tetracosane	2.74E-08
C24 as Tetracosane	2.74E-08
Total Hydrocarbon	6.97E-05

THC:	**3.69E-03**	**lbs/day**	**6.73E-04**	**tons/yr**

E003A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E003A	E003A		ND Adj	E004A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.2413	ND	38	152.48	ND	0	154	ND	0	38	0.04	4	18	1.76E-08	0	0	0.00E+00	1.76E-08
C5 as Pentane	76.2413	ND	38	152.48	ND	0	154	ND	0	38	0.04	4	18	1.76E-08	0	0	0.00E+00	1.76E-08
n-Hexane	109.2508	ND	55	218.5	ND	0	220	ND	0	55	0.05	5	25	2.53E-08	0	0	0.00E+00	2.53E-08
C6 as Hexane	109.2508	ND	55	218.5	ND	0	220	ND	0	55	0.05	5	25	2.53E-08	0	0	0.00E+00	2.53E-08
n-Heptane	90.7619	ND	45	181.52	ND	0	183	ND	0	45	0.05	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C7 as Heptane	360.4691	J	360	181.52	ND	0	183	ND	0	360	0.36	36	167	1.67E-07	0	0	0.00E+00	1.67E-07
n-Octane	78.5397	ND	39	157.08	ND	0	158	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C8 as Octane	920.9904		921	157.08	ND	0	158	ND	0	921	0.92	92	426	4.26E-07	0	0	0.00E+00	4.26E-07
n-Nonane	239.5266	J	240	158.25	ND	0	160	ND	0	240	0.24	24	111	1.11E-07	0	0	0.00E+00	1.11E-07
C9 as Nonane	16885.6761		16,886	158.25	ND	0	160	ND	0	16,886	16.89	1693	7815	7.82E-06	0	0	0.00E+00	7.82E-06
n-Decane	1832.9483		1,833	159.68	ND	0	161	ND	0	1,833	1.83	184	848	8.48E-07	0	0	0.00E+00	8.48E-07
C10 as Decane	36473.6246		36,474	159.68	ND	0	161	ND	0	36,474	36.47	3658	16882	1.69E-05	0	0	0.00E+00	1.69E-05
n-Undecane	4914.9320		4,915	159.27	ND	0	161	ND	0	4,915	4.91	493	2275	2.27E-06	0	0	0.00E+00	2.27E-06
C11 as Undecane	39880.4394		39,880	159.27	ND	0	161	ND	0	39,880	39.88	3999	18459	1.85E-05	0	0	0.00E+00	1.85E-05
n-Dodecane	2080.1079		2,080	158.19	ND	0	159	ND	0	2,080	2.08	209	963	9.63E-07	0	0	0.00E+00	9.63E-07
C12 as Dodecane	21506.3019		21,506	158.19	ND	0	159	ND	0	21,506	21.51	2157	9954	9.95E-06	0	0	0.00E+00	9.95E-06
n-Tridecane	2370.9065		2,371	158.57	ND	0	160	ND	0	2,371	2.37	238	1097	1.10E-06	0	0	0.00E+00	1.10E-06
C13 as Tridecane	10186.3093		10,186	158.57	ND	0	160	ND	0	10,186	10.19	1022	4715	4.71E-06	0	0	0.00E+00	4.71E-06
n-Tetradecane	1106.7490		1,107	158.41	ND	0	160	ND	0	1,107	1.11	111	512	5.12E-07	0	0	0.00E+00	5.12E-07
C14 as tetradecane	3025.9601		3,026	158.41	ND	0	160	ND	0	3,026	3.03	303	1401	1.40E-06	0	0	0.00E+00	1.40E-06
n-Pentadecane	679.5436	J	680	159.21	ND	0	160	ND	0	680	0.68	68	315	3.15E-07	0	0	0.00E+00	3.15E-07
C15 as Pentadecane	960.4141		960	159.21	ND	0	160	ND	0	960	0.96	96	445	4.45E-07	0	0	0.00E+00	4.45E-07
n-Hexadecane	401.1040	J	401	158.35	ND	0	160	ND	0	401	0.40	40	186	1.86E-07	0	0	0.00E+00	1.86E-07
C16 as Hexadecane	327.6917	J	328	158.35	ND	0	160	ND	0	328	0.33	33	152	1.52E-07	0	0	0.00E+00	1.52E-07
n-Heptadecane	112.6152	J	113	156.51	ND	0	158	ND	0	113	0.11	11	52	5.21E-08	0	0	0.00E+00	5.21E-08
C17 as Heptadecane	78.2540	ND	39	156.51	ND	0	158	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Octadecane	79.1270	ND	40	158.25	ND	0	160	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C18 as Octodecane	79.1270	ND	40	158.25	ND	0	160	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Nonadecane	79.2857	ND	40	158.57	ND	0	160	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C19 as Nonadecane	79.2857	ND	40	158.57	ND	0	160	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Eicosane	79.0952	ND	40	158.19	ND	0	159	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C20 as Eicosane	79.0952	ND	40	158.19	ND	0	159	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Heneicosane	79.8413	ND	40	159.68	ND	0	161	ND	0	40	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C21 as Heneicosane	79.8413	ND	40	159.68	ND	0	161	ND	0	40	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Docosane	78.9365	ND	39	157.87	ND	0	159	ND	0	39	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C22 as Docosane	78.9365	ND	39	157.87	ND	0	159	ND	0	39	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Tricosane	79.3651	ND	40	158.73	ND	0	160	ND	0	40	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C23 as Tricosane	79.3651	ND	40	158.73	ND	0	160	ND	0	40	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Tetracosane	79.4762	ND	40	158.95	ND	0	160	ND	0	40	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C24 as Tetracosane	79.4762	ND	40	158.95	ND	0	160	ND	0	40	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
Total Hydrocarbon			145,131			0			0		145.13	14554	67,173	6.72E-05	0	0	0.00E+00	6.72E-05

E003B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E003B	E003B		ND Adj	E004A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.281892	ND	76	152	ND	0	154	ND	0	76	0.08	8	35	3.50E-08	3.50E-08
C5 as Pentane	151.281892	ND	76	152	ND	0	154	ND	0	76	0.08	8	35	3.50E-08	3.50E-08
n-Hexane	216.7811056	ND	108	219	ND	0	220	ND	0	108	0.11	11	50	5.02E-08	5.02E-08
C6 as Hexane	216.7811056	ND	108	219	ND	0	220	ND	0	108	0.11	11	50	5.02E-08	5.02E-08
n-Heptane	180.0944909	ND	90	182	ND	0	183	ND	0	90	0.09	9	42	4.17E-08	4.17E-08
C7 as Heptane	180.0944909	ND	90	182	ND	0	183	ND	0	90	0.09	9	42	4.17E-08	4.17E-08
n-Octane	155.842522	ND	78	157	ND	0	158	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C8 as Octane	864.2903378	J	864	157	ND	0	158	ND	0	864	0.86	87	400	4.00E-07	4.00E-07
n-Nonane	237.7915953	J	238	158	ND	0	160	ND	0	238	0.24	24	110	1.10E-07	1.10E-07
C9 as Nonane	17653.3871		17,653	158	ND	0	160	ND	0	17,653	17.65	1770	8171	8.17E-06	8.17E-06
n-Decane	1850.464029		1,850	160	ND	0	161	ND	0	1,850	1.85	186	856	8.56E-07	8.56E-07
C10 as Decane	37751.17853		37,751	160	ND	0	161	ND	0	37,751	37.75	3786	17473	1.75E-05	1.75E-05
n-Undecane	5091.384223		5,091	159	ND	0	161	ND	0	5,091	5.09	511	2357	2.36E-06	2.36E-06
C11 as Undecane	42338.02258		42,338	159	ND	0	161	ND	0	42,338	42.34	4246	19596	1.96E-05	1.96E-05
n-Dodecane	2143.024891		2,143	158	ND	0	159	ND	0	2,143	2.14	215	992	9.92E-07	9.92E-07
C12 as Dodecane	23443.67369		23,444	158	ND	0	159	ND	0	23,444	23.44	2351	10851	1.09E-05	1.09E-05
n-Tridecane	2544.16126		2,544	159	ND	0	160	ND	0	2,544	2.54	255	1178	1.18E-06	1.18E-06
C13 as Tridecane	11396.26285		11,396	159	ND	0	160	ND	0	11,396	11.40	1143	5275	5.27E-06	5.27E-06
n-Tetradecane	1222.080372	J	1,222	158	ND	0	160	ND	0	1,222	1.22	123	566	5.66E-07	5.66E-07
C14 as tetradecane	4158.665287		4,159	158	ND	0	160	ND	0	4,159	4.16	417	1925	1.92E-06	1.92E-06
n-Pentadecane	805.6116047	J	806	159	ND	0	160	ND	0	806	0.81	81	373	3.73E-07	3.73E-07
C15 as Pentadecane	1941.113187		1,941	159	ND	0	160	ND	0	1,941	1.94	195	898	8.98E-07	8.98E-07
n-Hexadecane	396.4795823	J	396	158	ND	0	160	ND	0	396	0.40	40	184	1.84E-07	1.84E-07
C16 as Hexadecane	340.3756687	J	340	158	ND	0	160	ND	0	340	0.34	34	158	1.58E-07	1.58E-07
n-Heptadecane	155.2755929	ND	78	157	ND	0	158	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
C17 as Heptadecane	155.2755929	ND	78	157	ND	0	158	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
n-Octadecane	157.0078764	ND	79	158	ND	0	160	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
C18 as Octodecane	157.0078764	ND	79	158	ND	0	160	ND	0	79	0.08	8	36	3.63E-08	3.63E-08
n-Nonadecane	157.322837	ND	79	159	ND	0	160	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
C19 as Nonadecane	157.322837	ND	79	159	ND	0	160	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
n-Eicosane	156.9448842	ND	78	158	ND	0	159	ND	0	78	0.08	8	36	3.63E-08	3.63E-08
C20 as Eicosane	156.9448842	ND	78	158	ND	0	159	ND	0	78	0.08	8	36	3.63E-08	3.63E-08
n-Heneicosane	158.4251992	ND	79	160	ND	0	161	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
C21 as Heneicosane	158.4251992	ND	79	160	ND	0	161	ND	0	79	0.08	8	37	3.67E-08	3.67E-08
n-Docosane	156.6299236	ND	78	158	ND	0	159	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
C22 as Docosane	156.6299236	ND	78	158	ND	0	159	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
n-Tricosane	157.4803173	ND	79	159	ND	0	160	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
C23 as Tricosane	157.4803173	ND	79	159	ND	0	160	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
n-Tetracosane	157.7007898	ND	79	159	ND	0	160	ND	0	79	0.08	8	36	3.65E-08	3.65E-08
C24 as Tetracosane	157.7007898	ND	79	159	ND	0	160	ND	0	79	0.08	8	36	3.65E-08	3.65E-08
Total Hydrocarbon			156,061			0			0		156.06	15650	72,232	7.22E-05	7.22E-05

Bagging Data Form — Vacuum Method

Sample Id: E005

WSPA — Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	E-269	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	10	*inches*		**Date:**	7-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.81 *inHg*	757.2	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	72.1 *°F*	22.3	*°C*	**TVA ID**	36502	
Component Temp:	410 *°F*	210.0	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*DSL*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:53	Background	5	*ppmv*	8-sec Dwell	97	*ppmv*	Total Dwell	5:00	*min:sec*	Final M21	887 *ppm*
9:53	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	1.6	*inches H2O*	Bag Temp	151	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:56	9:58	10:00	10:02	10:04	10:06	10:08	10:10	10:17	10:22				
ppmv	159	213	220	232	241	255	257	262	245	233				

Sorbent Tube Sample Collection Parameters

E005A

Time										
10:10	Volume Start	213.9	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:23	Volume Stop	226.5	*Liters*	Total Vol	12.6	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969	*L/min*	Sorbent Flow$_{STP}$	0.967	*L/min*

E005B

10:10	Volume Start	208.5	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:23	Volume Stop	221.3	*Liters*	Total Vol	12.8	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985	*L/min*	Sorbent Flow$_{STP}$	0.983	*L/min*
	Total ST Vol$_{STP}$	25.35	*Liters*	DGM Vol$_{STP}$	77.08	*Liters*	Total Run Vol$_{STP}$	102.44	*Liters*	

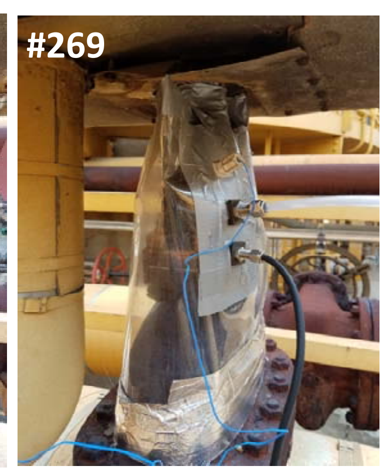
Bagging Parameters

Time									
10:12	Vacuum check	0.005	*inches H2O*			DGM$_P$	1.6	*inches H2O vacuum*	754.2 *mmHg*
10:16	DGM$_{10L}$ Time	01:41.1	*min:sec.frac*	DGM Time	1.683	DGM Flow	5.94	DGM Flow$_{STP}$	5.93 *liters/minute*
10:12	Bag Temp.	162.7	*°F*	72.6	*°C*	Sample$_T$	67	*°F*	19.4 *°C*

Post-Sample Data

10:34	Post Test M21	Background	15 *ppmv*	8-sec Dwell	64 *ppmv*	Total Dwell	6:00 *min:sec*	Final M21	1080 *ppm*	
								Leak @	Stem	
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*			
Organic condensate collected			N/A *ml*							
Density of organic condensate			N/A *g/ml*							

Average THC emissions =	6.32E-04 kg/hr
Percent difference THC ER =	11%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.68E-08
C5 as Pentane	2.68E-08
n-Hexane	3.83E-08
C6 as Hexane	3.83E-08
n-Heptane	3.18E-08
C7 as Heptane	6.77E-06
n-Octane	2.76E-08
C8 as Octane	5.54E-06
n-Nonane	1.17E-06
C9 as Nonane	8.71E-05
n-Decane	1.01E-05
C10 as Decane	1.82E-04
n-Undecane	2.35E-05
C11 as Undecane	1.80E-04
n-Dodecane	9.85E-06
C12 as Dodecane	8.01E-05
n-Tridecane	8.73E-06
C13 as Tridecane	2.65E-05
n-Tetradecane	2.06E-06
C14 as tetradecane	5.35E-06
n-Pentadecane	6.36E-07
C15 as Pentadecane	1.26E-06
n-Hexadecane	1.38E-07
C16 as Hexadecane	1.28E-07
n-Heptadecane	4.75E-08
C17 as Heptadecane	2.75E-08
n-Octadecane	2.78E-08
C18 as Octodecane	2.78E-08
n-Nonadecane	2.78E-08
C19 as Nonadecane	2.78E-08
n-Eicosane	2.78E-08
C20 as Eicosane	2.78E-08
n-Heneicosane	2.80E-08
C21 as Heneicosane	2.80E-08
n-Docosane	2.77E-08
C22 as Docosane	2.77E-08
n-Tricosane	2.78E-08
C23 as Tricosane	2.78E-08
n-Tetracosane	2.79E-08
C24 as Tetracosane	2.79E-08
Total Hydrocarbon	6.32E-04

THC:	3.34E-02	lbs/day	6.10E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E005A	E005A		ND Adj	E006A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.2413	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C5 as Pentane	76.2413	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Hexane	109.2508	ND	55	211.78	ND	0	220	ND	0	55	0.05	6	26	2.58E-08	0	0	0.00E+00	2.58E-08
C6 as Hexane	109.2508	ND	55	211.78	ND	0	220	ND	0	55	0.05	6	26	2.58E-08	0	0	0.00E+00	2.58E-08
n-Heptane	90.7619	ND	45	175.94	ND	0	183	ND	0	45	0.05	5	21	2.15E-08	0	0	0.00E+00	2.15E-08
C7 as Heptane	17838.0811		17,838	175.94	ND	0	183	ND	0	17,838	17.84	1827	8434	8.43E-06	0	0	0.00E+00	8.43E-06
n-Octane	78.5397	ND	39	152.25	ND	0	158	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C8 as Octane	11178.2123		11,178	152.25	ND	0	158	ND	0	11,178	11.18	1145	5285	5.28E-06	0	0	0.00E+00	5.28E-06
n-Nonane	2425.2670		2,425	153.38	ND	0	160	ND	0	2,425	2.43	248	1147	1.15E-06	0	0	0.00E+00	1.15E-06
C9 as Nonane	175107.9447		175,108	153.38	ND	0	160	ND	0	175,108	175.11	17937	82788	8.28E-05	0	0	0.00E+00	8.28E-05
n-Decane	20706.4020		20,706	154.77	ND	0	161	ND	0	20,706	20.71	2121	9790	9.79E-06	0	0	0.00E+00	9.79E-06
C10 as Decane	369758.4093		369,758	154.77	ND	0	161	ND	0	369,758	369.76	37877	174816	1.75E-04	0	0	0.00E+00	1.75E-04
n-Undecane	46523.4207		46,523	154.37	ND	0	161	ND	0	46,523	46.52	4766	21995	2.20E-05	0	0	0.00E+00	2.20E-05
C11 as Undecane	359160.9099		359,161	154.37	ND	0	161	ND	0	359,161	359.16	36791	169805	1.70E-04	0	0	0.00E+00	1.70E-04
n-Dodecane	19825.5279		19,826	153.32	ND	0	159	ND	0	19,826	19.83	2031	9373	9.37E-06	0	0	0.00E+00	9.37E-06
C12 as Dodecane	156874.4618		156,874	153.32	ND	0	159	ND	0	156,874	156.87	16070	74168	7.42E-05	0	0	0.00E+00	7.42E-05
n-Tridecane	16834.8541		16,835	153.69	ND	0	160	ND	0	16,835	16.83	1725	7959	7.96E-06	0	0	0.00E+00	7.96E-06
C13 as Tridecane	49676.9826		49,677	153.69	ND	0	160	ND	0	49,677	49.68	5089	23486	2.35E-05	0	0	0.00E+00	2.35E-05
n-Tetradecane	3602.1839		3,602	153.54	ND	0	160	ND	0	3,602	3.60	369	1703	1.70E-06	0	0	0.00E+00	1.70E-06
C14 as tetradecane	8990.4424		8,990	153.54	ND	0	160	ND	0	8,990	8.99	921	4251	4.25E-06	0	0	0.00E+00	4.25E-06
n-Pentadecane	1001.1120		1,001	154.31	ND	0	160	ND	0	1,001	1.00	103	473	4.73E-07	0	0	0.00E+00	4.73E-07
C15 as Pentadecane	1657.7223		1,658	154.31	ND	0	160	ND	0	1,658	1.66	170	784	7.84E-07	0	0	0.00E+00	7.84E-07
n-Hexadecane	156.1214	J	156	153.48	ND	0	160	ND	0	156	0.16	16	74	7.38E-08	0	0	0.00E+00	7.38E-08
C16 as Hexadecane	132.7779	J	133	153.48	ND	0	160	ND	0	133	0.13	14	63	6.28E-08	0	0	0.00E+00	6.28E-08
n-Heptadecane	78.2540	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C17 as Heptadecane	78.2540	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
n-Octadecane	79.1270	ND	40	153.38	ND	0	160	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C18 as Octodecane	79.1270	ND	40	153.38	ND	0	160	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Nonadecane	79.2857	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C19 as Nonadecane	79.2857	ND	40	153.69	ND	0	160	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Eicosane	79.0952	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C20 as Eicosane	79.0952	ND	40	153.32	ND	0	159	ND	0	40	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Heneicosane	79.8413	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C21 as Heneicosane	79.8413	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Docosane	78.9365	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C22 as Docosane	78.9365	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Tricosane	79.3651	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C23 as Tricosane	79.3651	ND	40	153.85	ND	0	160	ND	0	40	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Tetracosane	79.4762	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C24 as Tetracosane	79.4762	ND	40	154.06	ND	0	160	ND	0	40	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
Total Hydrocarbon			1,262,354			0			0		1262.35	129311	596,820	5.97E-04	0	0	0.00E+00	5.97E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E005B	E005B		ND Adj	E006A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.0999978	ND	75	148	ND	0	154	ND	0	75	0.08	8	35	3.55E-08	3.55E-08
C5 as Pentane	150.0999978	ND	75	148	ND	0	154	ND	0	75	0.08	8	35	3.55E-08	3.55E-08
n-Hexane	215.0874968	ND	108	212	ND	0	220	ND	0	108	0.11	11	51	5.08E-08	5.08E-08
C6 as Hexane	215.0874968	ND	108	212	ND	0	220	ND	0	108	0.11	11	51	5.08E-08	5.08E-08
n-Heptane	178.6874973	ND	89	176	ND	0	183	ND	0	89	0.09	9	42	4.22E-08	4.22E-08
C7 as Heptane	10798.63698		10,799	176	ND	0	183	ND	0	10,799	10.80	1106	5105	5.11E-06	5.11E-06
n-Octane	154.6249977	ND	77	152	ND	0	158	ND	0	77	0.08	8	37	3.66E-08	3.66E-08
C8 as Octane	12278.24718		12,278	152	ND	0	158	ND	0	12,278	12.28	1258	5805	5.80E-06	5.80E-06
n-Nonane	2527.286879		2,527	153	ND	0	160	ND	0	2,527	2.53	259	1195	1.19E-06	1.19E-06
C9 as Nonane	193527.6265		193,528	153	ND	0	160	ND	0	193,528	193.53	19824	91497	9.15E-05	9.15E-05
n-Decane	21906.8814		21,907	155	ND	0	161	ND	0	21,907	21.91	2244	10357	1.04E-05	1.04E-05
C10 as Decane	402196.7501		402,197	155	ND	0	161	ND	0	402,197	402.20	41200	190152	1.90E-04	1.90E-04
n-Undecane	52867.66251		52,868	154	ND	0	161	ND	0	52,868	52.87	5416	24995	2.50E-05	2.50E-05
C11 as Undecane	401351.4732		401,351	154	ND	0	161	ND	0	401,351	401.35	41113	189752	1.90E-04	1.90E-04
n-Dodecane	21850.35851		21,850	153	ND	0	159	ND	0	21,850	21.85	2238	10330	1.03E-05	1.03E-05
C12 as Dodecane	181941.5266		181,942	153	ND	0	159	ND	0	181,942	181.94	18637	86019	8.60E-05	8.60E-05
n-Tridecane	20100.67751		20,101	154	ND	0	160	ND	0	20,101	20.10	2059	9503	9.50E-06	9.50E-06
C13 as Tridecane	62548.25785		62,548	154	ND	0	160	ND	0	62,548	62.55	6407	29572	2.96E-05	2.96E-05
n-Tetradecane	5125.817775		5,126	154	ND	0	160	ND	0	5,126	5.13	525	2423	2.42E-06	2.42E-06
C14 as tetradecane	13625.73092		13,626	154	ND	0	160	ND	0	13,626	13.63	1396	6442	6.44E-06	6.44E-06
n-Pentadecane	1690.228244		1,690	154	ND	0	160	ND	0	1,690	1.69	173	799	7.99E-07	7.99E-07
C15 as Pentadecane	3686.840659		3,687	154	ND	0	160	ND	0	3,687	3.69	378	1743	1.74E-06	1.74E-06
n-Hexadecane	427.171036	J	427	153	ND	0	160	ND	0	427	0.43	44	202	2.02E-07	2.02E-07
C16 as Hexadecane	407.9893362	J	408	153	ND	0	160	ND	0	408	0.41	42	193	1.93E-07	1.93E-07
n-Heptadecane	161.7108423	J	162	152	ND	0	158	ND	0	162	0.16	17	76	7.65E-08	7.65E-08
C17 as Heptadecane	154.0624977	ND	77	152	ND	0	158	ND	0	77	0.08	8	36	3.64E-08	3.64E-08
n-Octadecane	155.7812477	ND	78	153	ND	0	160	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C18 as Octodecane	155.7812477	ND	78	153	ND	0	160	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Nonadecane	156.0937477	ND	78	154	ND	0	160	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
C19 as Nonadecane	156.0937477	ND	78	154	ND	0	160	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
n-Eicosane	155.7187477	ND	78	153	ND	0	159	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
C20 as Eicosane	155.7187477	ND	78	153	ND	0	159	ND	0	78	0.08	8	37	3.68E-08	3.68E-08
n-Heneicosane	157.1874977	ND	79	155	ND	0	161	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
C21 as Heneicosane	157.1874977	ND	79	155	ND	0	161	ND	0	79	0.08	8	37	3.72E-08	3.72E-08
n-Docosane	155.4062477	ND	78	153	ND	0	159	ND	0	78	0.08	8	37	3.67E-08	3.67E-08
C22 as Docosane	155.4062477	ND	78	153	ND	0	159	ND	0	78	0.08	8	37	3.67E-08	3.67E-08
n-Tricosane	156.2499977	ND	78	154	ND	0	160	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
C23 as Tricosane	156.2499977	ND	78	154	ND	0	160	ND	0	78	0.08	8	37	3.69E-08	3.69E-08
n-Tetracosane	156.4687477	ND	78	154	ND	0	160	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
C24 as Tetracosane	156.4687477	ND	78	154	ND	0	160	ND	0	78	0.08	8	37	3.70E-08	3.70E-08
Total Hydrocarbon			1,410,723			0			0		1410.72	144509	666,966	6.67E-04	6.67E-04

Bagging Data Form **Vacuum Method** **Sample Id** E007

Equipment type:	Valve			**Component ID:**	E-2210	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	3/4	*inches*		**Date:**	7-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.76 *inHg*	755.9	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	95.4 *°F*	35.2	*°C*	**TVA ID**	37887	
Component Temp:	174 *°F*	78.9	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Jet*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:20	Background	-2	*ppmv*	8-sec Dwell	402	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	1084 *ppm*
13:53	Initial Bag Vacuum	0.015	*inches H2O*	DGM Vac.	1.6	*inches H2O*	Bag Temp	113.4	*°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:58	14:00	14:02	14:04	14:06	14:08	14:10	14:12	14:14	14:16	14:18	14:20	14:26	
ppmv	83.1	88	92.6	96.7	102	112	114	119	120	123	129	131	132	

Sorbent Tube Sample Collection Parameters

E007A

Time									
14:20	Volume Start	226.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:33	Volume Stop	239.1	*Liters*	Total Vol	12.6 *Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.880	*L/min*

E007B

14:20	Volume Start	221.3	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:33	Volume Stop	234.0	*Liters*	Total Vol	12.7 *Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent $Flow_{STP}$	0.887	*L/min*
	Total ST Vol_{STP}	22.98	*Liters*	DGM Vol_{STP}	68.13 *Liters*		Total Run Vol_{STP}	91.12	*Liters*

Bagging Parameters

Time									
14:22	Vacuum check	0.02	*inches H2O*			DGM_P	1.6 *inches H2O vacuum*	752.9	*mmHg*
14:25	DGM_{10L} Time	01:44.3	*min:sec.frac*	DGM Time	1.733	DGM Flow	5.77	DGM $Flow_{STP}$ 5.24	*liters/minute*
14:22	Bag Temp.	121	*°F*	49.4	*°C*	$Sample_T$	118 *°F*	47.8	*°C*

Post-Sample Data

14:43 Post Test M21	Background	2 *ppmv*	8-sec Dwell	780 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	2115 *ppm*
							Leak @	Stem
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A *ml*						
Density of organic condensate		N/A *g/ml*						

Average THC emissions =	2.31E-04	kg/hr
Percent difference THC ER =	2%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.39E-08
C5 as Pentane	2.39E-08
n-Hexane	3.43E-08
C6 as Hexane	3.43E-08
n-Heptane	2.85E-08
C7 as Heptane	2.85E-08
n-Octane	4.82E-07
C8 as Octane	4.56E-06
n-Nonane	2.32E-06
C9 as Nonane	1.27E-05
n-Decane	5.04E-06
C10 as Decane	2.45E-05
n-Undecane	8.40E-06
C11 as Undecane	3.87E-05
n-Dodecane	1.32E-05
C12 as Dodecane	4.90E-05
n-Tridecane	1.26E-05
C13 as Tridecane	3.85E-05
n-Tetradecane	7.62E-06
C14 as tetradecane	1.13E-05
n-Pentadecane	8.68E-07
C15 as Pentadecane	1.58E-07
n-Hexadecane	6.59E-08
C16 as Hexadecane	4.90E-08
n-Heptadecane	2.46E-08
C17 as Heptadecane	2.46E-08
n-Octadecane	2.48E-08
C18 as Octodecane	2.48E-08
n-Nonadecane	2.49E-08
C19 as Nonadecane	2.49E-08
n-Eicosane	2.48E-08
C20 as Eicosane	2.48E-08
n-Heneicosane	2.51E-08
C21 as Heneicosane	2.51E-08
n-Docosane	2.48E-08
C22 as Docosane	2.48E-08
n-Tricosane	2.49E-08
C23 as Tricosane	2.49E-08
n-Tetracosane	2.49E-08
C24 as Tetracosane	2.49E-08
Total Hydrocarbon	2.31E-04

THC:	**1.22E-02**	**lbs/day**	**2.23E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E007A	E007A		ND Adj	E008A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.2413	ND	38	151.28	ND	0	154	ND	0	38	0.04	3	16	1.60E-08	0	0	0.00E+00	1.60E-08
C5 as Pentane	76.2413	ND	38	151.28	ND	0	154	ND	0	38	0.04	3	16	1.60E-08	0	0	0.00E+00	1.60E-08
n-Hexane	109.2508	ND	55	216.78	ND	0	220	ND	0	55	0.05	5	23	2.30E-08	0	0	0.00E+00	2.30E-08
C6 as Hexane	109.2508	ND	55	216.78	ND	0	220	ND	0	55	0.05	5	23	2.30E-08	0	0	0.00E+00	2.30E-08
n-Heptane	90.7619	ND	45	180.09	ND	0	183	ND	0	45	0.05	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C7 as Heptane	90.7619	ND	45	180.09	ND	0	183	ND	0	45	0.05	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Octane	1151.3147		1,151	155.84	ND	0	158	ND	0	1,151	1.15	105	484	4.84E-07	0	0	0.00E+00	4.84E-07
C8 as Octane	10661.6039		10,662	155.84	ND	0	158	ND	0	10,662	10.66	971	4484	4.48E-06	0	0	0.00E+00	4.48E-06
n-Nonane	5426.5402		5,427	157.01	ND	0	160	ND	0	5,427	5.43	494	2282	2.28E-06	0	0	0.00E+00	2.28E-06
C9 as Nonane	29673.0436		29,673	157.01	ND	0	160	ND	0	29,673	29.67	2704	12479	1.25E-05	0	0	0.00E+00	1.25E-05
n-Decane	11803.3085		11,803	158.43	ND	0	161	ND	0	11,803	11.80	1075	4964	4.96E-06	0	0	0.00E+00	4.96E-06
C10 as Decane	57616.6997		57,617	158.43	ND	0	161	ND	0	57,617	57.62	5250	24230	2.42E-05	0	0	0.00E+00	2.42E-05
n-Undecane	19644.1130		19,644	158.02	ND	0	161	ND	0	19,644	19.64	1790	8261	8.26E-06	0	0	0.00E+00	8.26E-06
C11 as Undecane	90847.1470		90,847	158.02	ND	0	161	ND	0	90,847	90.85	8278	38205	3.82E-05	0	0	0.00E+00	3.82E-05
n-Dodecane	30949.5568		30,950	156.94	ND	0	159	ND	0	30,950	30.95	2820	13015	1.30E-05	0	0	0.00E+00	1.30E-05
C12 as Dodecane	115212.5748		115,213	156.94	ND	0	159	ND	0	115,213	115.21	10498	48451	4.85E-05	0	0	0.00E+00	4.85E-05
n-Tridecane	29495.5081		29,496	157.32	ND	0	160	ND	0	29,496	29.50	2688	12404	1.24E-05	0	0	0.00E+00	1.24E-05
C13 as Tridecane	90963.4543		90,963	157.32	ND	0	160	ND	0	90,963	90.96	8288	38254	3.83E-05	0	0	0.00E+00	3.83E-05
n-Tetradecane	17680.2907		17,680	157.17	ND	0	160	ND	0	17,680	17.68	1611	7435	7.44E-06	0	0	0.00E+00	7.44E-06
C14 as tetradecane	27540.2688		27,540	157.17	ND	0	160	ND	0	27,540	27.54	2509	11582	1.16E-05	0	0	0.00E+00	1.16E-05
n-Pentadecane	2169.2219		2,169	157.95	ND	0	160	ND	0	2,169	2.17	198	912	9.12E-07	0	0	0.00E+00	9.12E-07
C15 as Pentadecane	551.3475	J	551	157.95	ND	0	160	ND	0	551	0.55	50	232	2.32E-07	0	0	0.00E+00	2.32E-07
n-Hexadecane	146.5006	J	147	157.1	ND	0	160	ND	0	147	0.15	13	62	6.16E-08	0	0	0.00E+00	6.16E-08
C16 as Hexadecane	154.5326	J	155	157.1	ND	0	160	ND	0	155	0.15	14	65	6.50E-08	0	0	0.00E+00	6.50E-08
n-Heptadecane	78.2540	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	16	1.65E-08	0	0	0.00E+00	1.65E-08
C17 as Heptadecane	78.2540	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	16	1.65E-08	0	0	0.00E+00	1.65E-08
n-Octadecane	79.1270	ND	40	157.01	ND	0	160	ND	0	40	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
C18 as Octodecane	79.1270	ND	40	157.01	ND	0	160	ND	0	40	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
n-Nonadecane	79.2857	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
C19 as Nonadecane	79.2857	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
n-Eicosane	79.0952	ND	40	156.94	ND	0	159	ND	0	40	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
C20 as Eicosane	79.0952	ND	40	156.94	ND	0	159	ND	0	40	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
n-Heneicosane	79.8413	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	17	1.68E-08	0	0	0.00E+00	1.68E-08
C21 as Heneicosane	79.8413	ND	40	158.43	ND	0	161	ND	0	40	0.04	4	17	1.68E-08	0	0	0.00E+00	1.68E-08
n-Docosane	78.9365	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
C22 as Docosane	78.9365	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
n-Tricosane	79.3651	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
C23 as Tricosane	79.3651	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
n-Tetracosane	79.4762	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
C24 as Tetracosane	79.4762	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
Total Hydrocarbon			542,597			0			0		542.60	49440	228,183	2.28E-04	0	0	0.00E+00	2.28E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E007B	E007B		ND Adj	E008A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.281892	ND	76	151	ND	0	154	ND	0	76	0.08	7	32	3.18E-08	3.18E-08
C5 as Pentane	151.281892	ND	76	151	ND	0	154	ND	0	76	0.08	7	32	3.18E-08	3.18E-08
n-Hexane	216.7811056	ND	108	217	ND	0	220	ND	0	108	0.11	10	46	4.56E-08	4.56E-08
C6 as Hexane	216.7811056	ND	108	217	ND	0	220	ND	0	108	0.11	10	46	4.56E-08	4.56E-08
n-Heptane	180.0944909	ND	90	180	ND	0	183	ND	0	90	0.09	8	38	3.79E-08	3.79E-08
C7 as Heptane	180.0944909	ND	90	180	ND	0	183	ND	0	90	0.09	8	38	3.79E-08	3.79E-08
n-Octane	1141.851314	J	1,142	156	ND	0	158	ND	0	1,142	1.14	104	480	4.80E-07	4.80E-07
C8 as Octane	11027.44845		11,027	156	ND	0	158	ND	0	11,027	11.03	1005	4637	4.64E-06	4.64E-06
n-Nonane	5612.49067		5,612	157	ND	0	160	ND	0	5,612	5.61	511	2360	2.36E-06	2.36E-06
C9 as Nonane	30645.43445		30,645	157	ND	0	160	ND	0	30,645	30.65	2792	12888	1.29E-05	1.29E-05
n-Decane	12175.97872		12,176	158	ND	0	161	ND	0	12,176	12.18	1109	5120	5.12E-06	5.12E-06
C10 as Decane	58893.99928		58,894	158	ND	0	161	ND	0	58,894	58.89	5366	24767	2.48E-05	2.48E-05
n-Undecane	20321.41335		20,321	158	ND	0	161	ND	0	20,321	20.32	1852	8546	8.55E-06	8.55E-06
C11 as Undecane	93122.96581		93,123	158	ND	0	161	ND	0	93,123	93.12	8485	39162	3.92E-05	3.92E-05
n-Dodecane	31662.7856		31,663	157	ND	0	159	ND	0	31,663	31.66	2885	13315	1.33E-05	1.33E-05
C12 as Dodecane	117651.9525		117,652	157	ND	0	159	ND	0	117,652	117.65	10720	49477	4.95E-05	4.95E-05
n-Tridecane	30574.16203		30,574	157	ND	0	160	ND	0	30,574	30.57	2786	12858	1.29E-05	1.29E-05
C13 as Tridecane	92173.69202		92,174	157	ND	0	160	ND	0	92,174	92.17	8399	38763	3.88E-05	3.88E-05
n-Tetradecane	18547.6048		18,548	157	ND	0	160	ND	0	18,548	18.55	1690	7800	7.80E-06	7.80E-06
C14 as tetradecane	26013.17998		26,013	157	ND	0	160	ND	0	26,013	26.01	2370	10940	1.09E-05	1.09E-05
n-Pentadecane	1960.878121		1,961	158	ND	0	160	ND	0	1,961	1.96	179	825	8.25E-07	8.25E-07
C15 as Pentadecane	200.9390283	J	201	158	ND	0	160	ND	0	201	0.20	18	85	8.45E-08	8.45E-08
n-Hexadecane	166.9094593	J	167	157	ND	0	160	ND	0	167	0.17	15	70	7.02E-08	7.02E-08
C16 as Hexadecane	157.1023646	ND	79	157	ND	0	160	ND	0	79	0.08	7	33	3.30E-08	3.30E-08
n-Heptadecane	155.2755929	ND	78	155	ND	0	158	ND	0	78	0.08	7	33	3.26E-08	3.26E-08
C17 as Heptadecane	155.2755929	ND	78	155	ND	0	158	ND	0	78	0.08	7	33	3.26E-08	3.26E-08
n-Octadecane	157.0078764	ND	79	157	ND	0	160	ND	0	79	0.08	7	33	3.30E-08	3.30E-08
C18 as Octodecane	157.0078764	ND	79	157	ND	0	160	ND	0	79	0.08	7	33	3.30E-08	3.30E-08
n-Nonadecane	157.322837	ND	79	157	ND	0	160	ND	0	79	0.08	7	33	3.31E-08	3.31E-08
C19 as Nonadecane	157.322837	ND	79	157	ND	0	160	ND	0	79	0.08	7	33	3.31E-08	3.31E-08
n-Eicosane	156.9448842	ND	78	157	ND	0	159	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
C20 as Eicosane	156.9448842	ND	78	157	ND	0	159	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
n-Heneicosane	158.4251992	ND	79	158	ND	0	161	ND	0	79	0.08	7	33	3.33E-08	3.33E-08
C21 as Heneicosane	158.4251992	ND	79	158	ND	0	161	ND	0	79	0.08	7	33	3.33E-08	3.33E-08
n-Docosane	156.6299236	ND	78	157	ND	0	159	ND	0	78	0.08	7	33	3.29E-08	3.29E-08
C22 as Docosane	156.6299236	ND	78	157	ND	0	159	ND	0	78	0.08	7	33	3.29E-08	3.29E-08
n-Tricosane	157.4803173	ND	79	157	ND	0	160	ND	0	79	0.08	7	33	3.31E-08	3.31E-08
C23 as Tricosane	157.4803173	ND	79	157	ND	0	160	ND	0	79	0.08	7	33	3.31E-08	3.31E-08
n-Tetracosane	157.7007898	ND	79	158	ND	0	160	ND	0	79	0.08	7	33	3.32E-08	3.32E-08
C24 as Tetracosane	157.7007898	ND	79	158	ND	0	160	ND	0	79	0.08	7	33	3.32E-08	3.32E-08
Total Hydrocarbon			553,777			0			0		553.78	50458	232,885	2.33E-04	2.33E-04

Bagging Data Form — Vacuum Method

Sample Id: E010

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	E-2226	
Equipment Subtype:	Globe		**Unit:**	Refinery E	
Line Size:	1 *inches*		**Date:**	8-Aug-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.85 *inHg*	758.2 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	80 °F	26.7 °C	**TVA ID**	36502	
Component Temp:	150 °F	65.6 °C	**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Jet JFHF*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
9:03	Background	6 *ppmv*	8-sec Dwell	86 *ppmv*	Total Dwell	2:30 *min:sec*	Final M21	702 *ppm*
9:42	Initial Bag Vacuum	0.015 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	98 °F	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:45	9:47	9:49	9:51	9:53	9:55	9:57	9:59	10:01	10:03	10:05	10:07	10:09	10:11
ppmv	26.7	32.1	35.4	38.7	42.6	43	43.8	44.9	46.4	48.7	50.5	52	53.5	54.3
Time	10:17	10:23												
ppmv	52.6	53.7												

Sorbent Tube Sample Collection Parameters

E010A

Time							
10:12	Volume Start	243.1 *Liters*		Design Sample Flow Rate = 1 liter/min			
10:25	Volume Stop	255.9 *Liters*	Total Vol	12.8 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.956 *L/min*

E010B

10:12	Volume Start	235.7 *Liters*		Design Sample Flow Rate = 1 liter/min			
10:25	Volume Stop	248.4 *Liters*	Total Vol	12.7 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.949 *L/min*

Total ST Vol$_{STP}$ 24.77 *Liters* | DGM Vol$_{STP}$ 82.35 *Liters* | Total Run Vol$_{STP}$ 107.12 *Liters*

Bagging Parameters

Time								
10:16	Vacuum check	0.01 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*		754.8 *mmHg*
10:15	DGM$_{10L}$ Time	01:32.3 *min:sec.frac*	DGM Time	1.533	DGM Flow	6.52	DGM Flow$_{STP}$	6.33 *liters/minute*
10:17	Bag Temp.	119.5 °F		48.6 °C	Sample$_T$	82 °F		27.8 °C

Post-Sample Data

10:50	Post Test M21	Background	13 *ppmv*	8-sec Dwell	451 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21 953 *ppm*
								Leak @ Packing

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	8.26E-05 kg/hr
Percent difference THC ER =	1%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.80E-08
C5 as Pentane	2.80E-08
n-Hexane	4.01E-08
C6 as Hexane	4.01E-08
n-Heptane	3.33E-08
C7 as Heptane	6.91E-08
n-Octane	2.34E-07
C8 as Octane	1.78E-06
n-Nonane	9.83E-07
C9 as Nonane	5.16E-06
n-Decane	2.16E-06
C10 as Decane	1.05E-05
n-Undecane	3.82E-06
C11 as Undecane	1.69E-05
n-Dodecane	5.54E-06
C12 as Dodecane	1.80E-05
n-Tridecane	4.00E-06
C13 as Tridecane	9.81E-06
n-Tetradecane	1.37E-06
C14 as tetradecane	1.48E-06
n-Pentadecane	1.17E-07
C15 as Pentadecane	2.92E-08
n-Hexadecane	2.91E-08
C16 as Hexadecane	2.91E-08
n-Heptadecane	2.87E-08
C17 as Heptadecane	2.87E-08
n-Octadecane	2.90E-08
C18 as Octodecane	2.90E-08
n-Nonadecane	2.91E-08
C19 as Nonadecane	2.91E-08
n-Eicosane	2.90E-08
C20 as Eicosane	2.90E-08
n-Heneicosane	2.93E-08
C21 as Heneicosane	2.93E-08
n-Docosane	2.90E-08
C22 as Docosane	2.90E-08
n-Tricosane	2.91E-08
C23 as Tricosane	2.91E-08
n-Tetracosane	2.92E-08
C24 as Tetracosane	2.92E-08
Total Hydrocarbon	8.26E-05

THC:	4.37E-03	lbs/day	7.97E-04 tons/yr

E010A

E010A Component	ANALYTICAL RESULTS E010A µg/m³	Flag	ND Adj µg/m³	BACKGROUND E011A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#E0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	75.0500	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C5 as Pentane	75.0500	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Hexane	107.5437	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	27	2.66E-08	0	0	0.00E+00	2.66E-08
C6 as Hexane	107.5437	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	27	2.66E-08	0	0	0.00E+00	2.66E-08
n-Heptane	89.3437	ND	45	177.3	ND	0	183	ND	0	45	0.04	5	22	2.21E-08	0	0	0.00E+00	2.21E-08
C7 as Heptane	189.2925	J	189	177.3	ND	0	183	ND	0	189	0.19	20	94	9.36E-08	0	0	0.00E+00	9.36E-08
n-Octane	481.9815	J	482	153.43	ND	0	158	ND	0	482	0.48	52	238	2.38E-07	0	0	0.00E+00	2.38E-07
C8 as Octane	3619.9995		3,620	153.43	ND	0	158	ND	0	3,620	3.62	388	1790	1.79E-06	0	0	0.00E+00	1.79E-06
n-Nonane	2005.0547		2,005	154.57	ND	0	160	ND	0	2,005	2.01	215	991	9.91E-07	0	0	0.00E+00	9.91E-07
C9 as Nonane	10525.5260		10,526	154.57	ND	0	160	ND	0	10,526	10.53	1127	5204	5.20E-06	0	0	0.00E+00	5.20E-06
n-Decane	4360.8343		4,361	155.97	ND	0	161	ND	0	4,361	4.36	467	2156	2.16E-06	0	0	0.00E+00	2.16E-06
C10 as Decane	21247.3878		21,247	155.97	ND	0	161	ND	0	21,247	21.25	2276	10505	1.05E-05	0	0	0.00E+00	1.05E-05
n-Undecane	7654.0900		7,654	155.57	ND	0	161	ND	0	7,654	7.65	820	3784	3.78E-06	0	0	0.00E+00	3.78E-06
C11 as Undecane	34025.7271		34,026	155.57	ND	0	161	ND	0	34,026	34.03	3645	16822	1.68E-05	0	0	0.00E+00	1.68E-05
n-Dodecane	11064.5598		11,065	154.51	ND	0	159	ND	0	11,065	11.06	1185	5470	5.47E-06	0	0	0.00E+00	5.47E-06
C12 as Dodecane	36203.6398		36,204	154.51	ND	0	159	ND	0	36,204	36.20	3878	17899	1.79E-05	0	0	0.00E+00	1.79E-05
n-Tridecane	7956.3905		7,956	154.88	ND	0	160	ND	0	7,956	7.96	852	3934	3.93E-06	0	0	0.00E+00	3.93E-06
C13 as Tridecane	19894.0421		19,894	154.88	ND	0	160	ND	0	19,894	19.89	2131	9835	9.84E-06	0	0	0.00E+00	9.84E-06
n-Tetradecane	2709.7596		2,710	154.73	ND	0	160	ND	0	2,710	2.71	290	1340	1.34E-06	0	0	0.00E+00	1.34E-06
C14 as tetradecane	3365.7083		3,366	154.73	ND	0	160	ND	0	3,366	3.37	361	1664	1.66E-06	0	0	0.00E+00	1.66E-06
n-Pentadecane	261.8020	J	262	155.5	ND	0	160	ND	0	262	0.26	28	129	1.29E-07	0	0	0.00E+00	1.29E-07
C15 as Pentadecane	78.3594	ND	39	155.5	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexadecane	77.9375	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C16 as Hexadecane	77.9375	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heptadecane	77.0312	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C17 as Heptadecane	77.0312	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Octadecane	77.8906	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C18 as Octodecane	77.8906	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Nonadecane	78.0469	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C19 as Nonadecane	78.0469	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Eicosane	77.8594	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C20 as Eicosane	77.8594	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heneicosane	78.5937	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C21 as Heneicosane	78.5937	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Docosane	77.7031	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C22 as Docosane	77.7031	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Tricosane	78.1250	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C23 as Tricosane	78.1250	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tetracosane	78.2344	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C24 as Tetracosane	78.2344	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
Total Hydrocarbon			166,534			0			0		166.53	17839	82,333	8.23E-05	0	0	0.00E+00	8.23E-05

E010B

E010B Component	ANALYTICAL RESULTS E010B µg/m³	Flag	ND Adj µg/m³	BACKGROUND E011A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	151.28189	ND	76	149	ND	0	154	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
C5 as Pentane	151.28189	ND	76	149	ND	0	154	ND	0	76	0.08	8	37	3.74E-08	3.74E-08
n-Hexane	216.78111	ND	108	213	ND	0	220	ND	0	108	0.11	12	54	5.36E-08	5.36E-08
C6 as Hexane	216.78111	ND	108	213	ND	0	220	ND	0	108	0.11	12	54	5.36E-08	5.36E-08
n-Heptane	180.09449	ND	90	177	ND	0	183	ND	0	90	0.09	10	45	4.45E-08	4.45E-08
C7 as Heptane	180.09449	ND	90	177	ND	0	183	ND	0	90	0.09	10	45	4.45E-08	4.45E-08
n-Octane	466.40283	J	466	153	ND	0	158	ND	0	466	0.47	50	231	2.31E-07	2.31E-07
C8 as Octane	3568.6954		3,569	153	ND	0	158	ND	0	3,569	3.57	382	1764	1.76E-06	1.76E-06
n-Nonane	1973.2403		1,973	155	ND	0	160	ND	0	1,973	1.97	211	976	9.76E-07	9.76E-07
C9 as Nonane	10354.973		10,355	155	ND	0	160	ND	0	10,355	10.35	1109	5119	5.12E-06	5.12E-06
n-Decane	4381.3818		4,381	156	ND	0	161	ND	0	4,381	4.38	469	2166	2.17E-06	2.17E-06
C10 as Decane	21046.088		21,046	156	ND	0	161	ND	0	21,046	21.05	2254	10405	1.04E-05	1.04E-05
n-Undecane	7779.4464		7,779	156	ND	0	161	ND	0	7,779	7.78	833	3846	3.85E-06	3.85E-06
C11 as Undecane	34238.347		34,238	156	ND	0	161	ND	0	34,238	34.24	3668	16927	1.69E-05	1.69E-05
n-Dodecane	11331.565		11,332	155	ND	0	159	ND	0	11,332	11.33	1214	5602	5.60E-06	5.60E-06
C12 as Dodecane	36568.746		36,569	155	ND	0	159	ND	0	36,569	36.57	3917	18079	1.81E-05	1.81E-05
n-Tridecane	8238.1897		8,238	155	ND	0	160	ND	0	8,238	8.24	882	4073	4.07E-06	4.07E-06
C13 as Tridecane	19791.722		19,792	155	ND	0	160	ND	0	19,792	19.79	2120	9785	9.78E-06	9.78E-06
n-Tetradecane	2822.4796		2,822	155	ND	0	160	ND	0	2,822	2.82	302	1395	1.40E-06	1.40E-06
C14 as tetradecane	2627.0828		2,627	155	ND	0	160	ND	0	2,627	2.63	281	1299	1.30E-06	1.30E-06
n-Pentadecane	213.06443	J	213	156	ND	0	160	ND	0	213	0.21	23	105	1.05E-07	1.05E-07
C15 as Pentadecane	157.95276	ND	79	156	ND	0	160	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
n-Hexadecane	157.10236	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C16 as Hexadecane	157.10236	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Heptadecane	155.27559	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C17 as Heptadecane	155.27559	ND	78	153	ND	0	158	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Octadecane	157.00788	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
C18 as Octodecane	157.00788	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.88E-08	3.88E-08
n-Nonadecane	157.32284	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C19 as Nonadecane	157.32284	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Eicosane	156.94488	ND	78	155	ND	0	159	ND	0	78	0.08	8	39	3.88E-08	3.88E-08
C20 as Eicosane	156.94488	ND	78	155	ND	0	159	ND	0	78	0.08	8	39	3.88E-08	3.88E-08
n-Heneicosane	158.4252	ND	79	156	ND	0	161	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
C21 as Heneicosane	158.4252	ND	79	156	ND	0	161	ND	0	79	0.08	8	39	3.92E-08	3.92E-08
n-Docosane	156.62992	ND	78	154	ND	0	159	ND	0	78	0.08	8	39	3.87E-08	3.87E-08
C22 as Docosane	156.62992	ND	78	154	ND	0	159	ND	0	78	0.08	8	39	3.87E-08	3.87E-08
n-Tricosane	157.48032	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
C23 as Tricosane	157.48032	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.89E-08	3.89E-08
n-Tetracosane	157.70079	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
C24 as Tetracosane	157.70079	ND	79	155	ND	0	160	ND	0	79	0.08	8	39	3.90E-08	3.90E-08
Total Hydrocarbon			167,442			0			0		167.44	17936	82,782	8.28E-05	8.28E-05

Bagging Data Form	Vacuum Method	Sample Id	E013
Equipment type:	Valve	Component ID:	E-2244
Equipment Subtype:	Globe	Unit:	Refinery E
Line Size:	1 1/2 inches	Date:	8-Aug-18
Phase (G, LL, HL):	HL	Analysis team:	EG/DR
Barometric pressure	29.81 inHg / 757.2 mmHg	Sample Pump A	LP52979
		Sample Pump B	LP52975
Ambient Temp:	96 °F / 35.6 °C	TVA ID	37887
Component Temp:	212 °F / 100.0 °C	Stream Pressure/Temp:	psig / °F
Stream Description:	Jet		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:58	Background	-12	ppmv	8-sec Dwell	3175	ppmv	Total Dwell	4:00	min:sec	Final M21	4142 ppm
13:44	Initial Bag Vacuum	0.03	inches H2O	DGM Vac.	1.6	inches H2O	Bag Temp	190	°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:45	13:49	13:51	13:53	13:55	13:57	13:59	14:01	14:03	14:05	14:07	14:09	14:16	14:19
ppmv	243	329	361	411	430	451	467	490	505	531	571	597	766	801

Sorbent Tube Sample Collection Parameters

E013A

Time									
14:09	Volume Start	255.9	Liters		Design Sample Flow Rate = 1 liter/min				
14:22	Volume Stop	268.8	Liters	Total Vol	12.9	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.992 L/min	Sorbent Flow$_{STP}$	0.947	L/min

E013B

14:09	Volume Start	248.4	Liters		Design Sample Flow Rate = 1 liter/min				
14:22	Volume Stop	261.3	Liters	Total Vol	12.9	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.992 L/min	Sorbent Flow$_{STP}$	0.947	L/min
	Total ST Vol$_{STP}$	24.63	Liters	DGM Vol$_{STP}$	74.46	Liters	Total Run Vol$_{STP}$	99.09	Liters

Bagging Parameters

Time										
14:11	Vacuum check	0.03	inches H2O			DGM$_P$	1.6	inches H2O vacuum	754.2	mmHg
14:13	DGM$_{10L}$ Time	01:39.7	min:sec.frac	DGM Time	1.667	DGM Flow	6.00	DGM Flow$_{STP}$	5.73	liters/minute
14:11	Bag Temp.	174	°F	78.9	°C	Sample$_T$	91	°F	32.8	°C

Post-Sample Data

14:40	Post Test M21	Background	29	ppmv	8-sec Dwell	4120 ppmv	Total Dwell	2:00 min:sec	Final M21	5231 ppm
									Leak @	Stem
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions =	1.22E-03	kg/hr
Percent difference THC ER =	7%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.55E-08
C5 as Pentane	2.55E-08
n-Hexane	3.66E-08
C6 as Hexane	3.66E-08
n-Heptane	1.51E-07
C7 as Heptane	1.04E-06
n-Octane	3.64E-06
C8 as Octane	3.49E-05
n-Nonane	1.83E-05
C9 as Nonane	1.01E-04
n-Decane	4.10E-05
C10 as Decane	1.85E-04
n-Undecane	6.33E-05
C11 as Undecane	2.81E-04
n-Dodecane	7.47E-05
C12 as Dodecane	2.25E-04
n-Tridecane	4.47E-05
C13 as Tridecane	1.07E-04
n-Tetradecane	1.34E-05
C14 as tetradecane	1.98E-05
n-Pentadecane	6.66E-07
C15 as Pentadecane	7.06E-08
n-Hexadecane	2.65E-08
C16 as Hexadecane	2.65E-08
n-Heptadecane	2.62E-08
C17 as Heptadecane	2.62E-08
n-Octadecane	2.65E-08
C18 as Octodecane	2.65E-08
n-Nonadecane	2.66E-08
C19 as Nonadecane	2.66E-08
n-Eicosane	2.65E-08
C20 as Eicosane	2.65E-08
n-Heneicosane	2.67E-08
C21 as Heneicosane	2.67E-08
n-Docosane	2.64E-08
C22 as Docosane	2.64E-08
n-Tricosane	2.66E-08
C23 as Tricosane	2.66E-08
n-Tetracosane	2.66E-08
C24 as Tetracosane	2.66E-08
Total Hydrocarbon	1.22E-03

THC:	6.44E-02	lbs/day	1.17E-02	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E013A	E013A		ND Adj	E014A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	17	1.70E-08	0	0	0.00E+00	1.70E-08
C5 as Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	17	1.70E-08	0	0	0.00E+00	1.70E-08
n-Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	5	24	2.44E-08	0	0	0.00E+00	2.44E-08
C6 as Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	5	24	2.44E-08	0	0	0.00E+00	2.44E-08
n-Heptane	571.7511	J	572	177.3	ND	0	183	ND	0	572	0.57	57	261	2.61E-07	0	0	0.00E+00	2.61E-07
C7 as Heptane	2406.3792		2,406	177.3	ND	0	183	ND	0	2,406	2.41	238	1101	1.10E-06	0	0	0.00E+00	1.10E-06
n-Octane	7687.5630		7,688	153.43	ND	0	158	ND	0	7,688	7.69	762	3516	3.52E-06	0	0	0.00E+00	3.52E-06
C8 as Octane	73191.3126		73,191	153.43	ND	0	158	ND	0	73,191	73.19	7252	33473	3.35E-05	0	0	0.00E+00	3.35E-05
n-Nonane	38997.8021		38,998	154.57	ND	0	160	ND	0	38,998	39.00	3864	17835	1.78E-05	0	0	0.00E+00	1.78E-05
C9 as Nonane	212331.2179		212,331	154.57	ND	0	160	ND	0	212,331	212.33	21040	97106	9.71E-05	0	0	0.00E+00	9.71E-05
n-Decane	85681.8846		85,682	155.97	ND	0	161	ND	0	85,682	85.68	8490	39185	3.92E-05	0	0	0.00E+00	3.92E-05
C10 as Decane	385650.0945		385,650	155.97	ND	0	161	ND	0	385,650	385.65	38214	176370	1.76E-04	0	0	0.00E+00	1.76E-04
n-Undecane	130794.2072		130,794	155.57	ND	0	161	ND	0	130,794	130.79	12960	59816	5.98E-05	0	0	0.00E+00	5.98E-05
C11 as Undecane	640503.7815		640,504	155.57	ND	0	161	ND	0	640,504	640.50	63467	292923	2.93E-04	0	0	0.00E+00	2.93E-04
n-Dodecane	152270.1619		152,270	154.51	ND	0	159	ND	0	152,270	152.27	15088	69638	6.96E-05	0	0	0.00E+00	6.96E-05
C12 as Dodecane	460103.7521		460,104	154.51	ND	0	159	ND	0	460,104	460.10	45591	210421	2.10E-04	0	0	0.00E+00	2.10E-04
n-Tridecane	89316.3912		89,316	154.88	ND	0	160	ND	0	89,316	89.32	8850	40847	4.08E-05	0	0	0.00E+00	4.08E-05
C13 as Tridecane	212314.4703		212,314	154.88	ND	0	160	ND	0	212,314	212.31	21038	97098	9.71E-05	0	0	0.00E+00	9.71E-05
n-Tetradecane	25695.0589		25,695	154.73	ND	0	160	ND	0	25,695	25.70	2546	11751	1.18E-05	0	0	0.00E+00	1.18E-05
C14 as tetradecane	41513.5006		41,514	154.73	ND	0	160	ND	0	41,514	41.51	4114	18985	1.90E-05	0	0	0.00E+00	1.90E-05
n-Pentadecane	1143.6801		1,144	155.5	ND	0	160	ND	0	1,144	1.14	113	523	5.23E-07	0	0	0.00E+00	5.23E-07
C15 as Pentadecane	77.7519	ND	39	155.5	ND	0	160	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Hexadecane	77.3333	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C16 as Hexadecane	77.3333	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Heptadecane	76.4341	ND	38	152.87	ND	0	158	ND	0	38	0.04	4	17	1.75E-08	0	0	0.00E+00	1.75E-08
C17 as Heptadecane	76.4341	ND	38	152.87	ND	0	158	ND	0	38	0.04	4	17	1.75E-08	0	0	0.00E+00	1.75E-08
n-Octadecane	77.2868	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C18 as Octodecane	77.2868	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Nonadecane	77.4419	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C19 as Nonadecane	77.4419	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Eicosane	77.2558	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C20 as Eicosane	77.2558	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C21 as Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Docosane	77.1008	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	18	1.76E-08	0	0	0.00E+00	1.76E-08
C22 as Docosane	77.1008	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	18	1.76E-08	0	0	0.00E+00	1.76E-08
n-Tricosane	77.5194	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C23 as Tricosane	77.5194	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Tetracosane	77.6279	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C24 as Tetracosane	77.6279	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
Total Hydrocarbon			2,561,089			0			0		2561.09	253775	#######	1.17E-03	0	0	0.00E+00	1.17E-03

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E013B	E013B		ND Adj	E014A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.9364385	ND	74	149	ND	0	154	ND	0	74	0.07	7	34	3.41E-08	3.41E-08
C5 as Pentane	148.9364385	ND	74	149	ND	0	154	ND	0	74	0.07	7	34	3.41E-08	3.41E-08
n-Hexane	213.4201613	ND	107	213	ND	0	220	ND	0	107	0.11	11	49	4.88E-08	4.88E-08
C6 as Hexane	213.4201613	ND	107	213	ND	0	220	ND	0	107	0.11	11	49	4.88E-08	4.88E-08
n-Heptane	177.3023308	ND	89	177	ND	0	183	ND	0	89	0.09	9	41	4.05E-08	4.05E-08
C7 as Heptane	2140.16523		2,140	177	ND	0	183	ND	0	2,140	2.14	212	979	9.79E-07	9.79E-07
n-Octane	8226.13342		8,226	153	ND	0	158	ND	0	8,226	8.23	815	3762	3.76E-06	3.76E-06
C8 as Octane	79265.80854		79,266	153	ND	0	158	ND	0	79,266	79.27	7854	36251	3.63E-05	3.63E-05
n-Nonane	41177.78666		41,178	155	ND	0	160	ND	0	41,178	41.18	4080	18832	1.88E-05	1.88E-05
C9 as Nonane	231160.3049		231,160	155	ND	0	160	ND	0	231,160	231.16	22905	105717	1.06E-04	1.06E-04
n-Decane	93545.73698		93,546	156	ND	0	161	ND	0	93,546	93.55	9269	42782	4.28E-05	4.28E-05
C10 as Decane	423119.5163		423,120	156	ND	0	161	ND	0	423,120	423.12	41926	193506	1.94E-04	1.94E-04
n-Undecane	145929.3067		145,929	156	ND	0	161	ND	0	145,929	145.93	14460	66738	6.67E-05	6.67E-05
C11 as Undecane	589296.8362		589,297	156	ND	0	161	ND	0	589,297	589.30	58393	269505	2.70E-04	2.70E-04
n-Dodecane	174520.4614		174,520	155	ND	0	159	ND	0	174,520	174.52	17293	79814	7.98E-05	7.98E-05
C12 as Dodecane	525627.1848		525,627	155	ND	0	159	ND	0	525,627	525.63	52084	240387	2.40E-04	2.40E-04
n-Tridecane	106358.3243		106,358	155	ND	0	160	ND	0	106,358	106.36	10539	48641	4.86E-05	4.86E-05
C13 as Tridecane	257082.7441		257,083	155	ND	0	160	ND	0	257,083	257.08	25474	117572	1.18E-04	1.18E-04
n-Tetradecane	33085.78418		33,086	155	ND	0	160	ND	0	33,086	33.09	3278	15131	1.51E-05	1.51E-05
C14 as tetradecane	44886.10229		44,886	155	ND	0	160	ND	0	44,886	44.89	4448	20528	2.05E-05	2.05E-05
n-Pentadecane	1767.634989		1,768	156	ND	0	160	ND	0	1,768	1.77	175	808	8.08E-07	8.08E-07
C15 as Pentadecane	269.8228963	J	270	156	ND	0	160	ND	0	270	0.27	27	123	1.23E-07	1.23E-07
n-Hexadecane	154.6666712	ND	77	155	ND	0	160	ND	0	77	0.08	8	35	3.54E-08	3.54E-08
C16 as Hexadecane	154.6666712	ND	77	155	ND	0	160	ND	0	77	0.08	8	35	3.54E-08	3.54E-08
n-Heptadecane	152.8682216	ND	76	153	ND	0	158	ND	0	76	0.08	8	35	3.50E-08	3.50E-08
C17 as Heptadecane	152.8682216	ND	76	153	ND	0	158	ND	0	76	0.08	8	35	3.50E-08	3.50E-08
n-Octadecane	154.573648	ND	77	155	ND	0	160	ND	0	77	0.08	8	35	3.53E-08	3.53E-08
C18 as Octodecane	154.573648	ND	77	155	ND	0	160	ND	0	77	0.08	8	35	3.53E-08	3.53E-08
n-Nonadecane	154.8837255	ND	77	155	ND	0	160	ND	0	77	0.08	8	35	3.54E-08	3.54E-08
C19 as Nonadecane	154.8837255	ND	77	155	ND	0	160	ND	0	77	0.08	8	35	3.54E-08	3.54E-08
n-Eicosane	154.5116325	ND	77	155	ND	0	159	ND	0	77	0.08	8	35	3.53E-08	3.53E-08
C20 as Eicosane	154.5116325	ND	77	155	ND	0	159	ND	0	77	0.08	8	35	3.53E-08	3.53E-08
n-Heneicosane	155.9689969	ND	78	156	ND	0	161	ND	0	78	0.08	8	36	3.57E-08	3.57E-08
C21 as Heneicosane	155.9689969	ND	78	156	ND	0	161	ND	0	78	0.08	8	36	3.57E-08	3.57E-08
n-Docosane	154.2015549	ND	77	154	ND	0	159	ND	0	77	0.08	8	35	3.53E-08	3.53E-08
C22 as Docosane	154.2015549	ND	77	154	ND	0	159	ND	0	77	0.08	8	35	3.53E-08	3.53E-08
n-Tricosane	155.0387643	ND	78	155	ND	0	160	ND	0	78	0.08	8	35	3.55E-08	3.55E-08
C23 as Tricosane	155.0387643	ND	78	155	ND	0	160	ND	0	78	0.08	8	35	3.55E-08	3.55E-08
n-Tetracosane	155.2558185	ND	78	155	ND	0	160	ND	0	78	0.08	8	36	3.55E-08	3.55E-08
C24 as Tetracosane	155.2558185	ND	78	155	ND	0	160	ND	0	78	0.08	8	36	3.55E-08	3.55E-08
Total Hydrocarbon			2,759,303			0			0		2759.30	273416	#######	1.26E-03	1.26E-03

Bagging Data Form — Vacuum Method

Sample Id: E016

WSPA — Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	E-295	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	3	*inches*		**Date:**	9-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.84	*inHg*	757.9 *mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	76.5	*°F*	24.7 *°C*	**TVA ID**	34251	
Component Temp:	170	*°F*	76.7 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*DSL*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:40	Background	7	*ppmv*	8-sec Dwell	58	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	967 *ppm*
9:28	Initial Bag Vacuum	0.09	*inches H2O*	DGM Vac.	1.9	*inches H2O*	Bag Temp	84	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:33	9:35	9:38	9:40	9:42	9:44	9:46	9:48	9:50	9:56	10:01			
ppmv	53.5	69.2	84	94.1	99.5	107	111	115	121	128	134			

Sorbent Tube Sample Collection Parameters

E016A

Time									
9:50	Volume Start	271.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:03	Volume Stop	284.7	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*	Sorbent Flow	0.985	*L/min*	Sorbent Flow$_{STP}$	0.981	*L/min*

E016B

Time									
9:50	Volume Start	264.3	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:03	Volume Stop	277.1	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*	Sorbent Flow	0.985	*L/min*	Sorbent Flow$_{STP}$	0.981	*L/min*
	Total ST Vol$_{STP}$	25.51	*Liters*	DGM Vol$_{STP}$	80.13	*Liters*	Total Run Vol$_{STP}$	105.64	*Liters*

Bagging Parameters

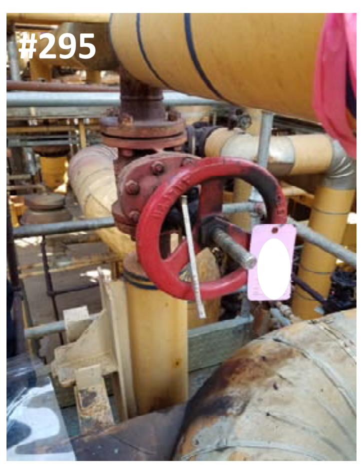
Time										
9:51	Vacuum check	0.065	*inches H2O*			DGM$_P$	1.9	*inches H2O vacuum*	754.4	*mmHg*
9:55	DGM$_{10L}$ Time	01:37.1	*min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM Flow$_{STP}$	6.16	*liters/minute*
9:52	Bag Temp.	58.3	*°F*	14.6	*°C*	Sample$_T$	68	*°F*	20.0	*°C*

Post-Sample Data

10:14	Post Test M21	Background	13 *ppmv*	8-sec Dwell	288 *ppmv*	Total Dwell	3:00 *min:sec*		Final M21	881 *ppm*
									Leak @	Packing

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*
Organic condensate collected	N/A	*ml*					
Density of organic condensate	N/A	*g/ml*					

Average THC emissions =	2.36E-04	kg/hr
Percent difference THC ER =	2%	
Acceptable?	Yes	



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.74E-08
C5 as Pentane	2.74E-08
n-Hexane	3.93E-08
C6 as Hexane	3.93E-08
n-Heptane	3.27E-08
C7 as Heptane	3.27E-08
n-Octane	2.83E-08
C8 as Octane	2.11E-06
n-Nonane	3.25E-07
C9 as Nonane	2.78E-05
n-Decane	3.76E-06
C10 as Decane	7.03E-05
n-Undecane	8.82E-06
C11 as Undecane	6.15E-05
n-Dodecane	3.05E-06
C12 as Dodecane	2.82E-05
n-Tridecane	3.90E-06
C13 as Tridecane	1.52E-05
n-Tetradecane	3.10E-06
C14 as tetradecane	6.17E-06
n-Pentadecane	5.34E-07
C15 as Pentadecane	3.87E-07
n-Hexadecane	2.85E-08
C16 as Hexadecane	2.85E-08
n-Heptadecane	2.82E-08
C17 as Heptadecane	4.15E-08
n-Octadecane	2.85E-08
C18 as Octodecane	2.85E-08
n-Nonadecane	2.85E-08
C19 as Nonadecane	2.85E-08
n-Eicosane	2.85E-08
C20 as Eicosane	2.85E-08
n-Heneicosane	2.87E-08
C21 as Heneicosane	2.87E-08
n-Docosane	2.84E-08
C22 as Docosane	2.84E-08
n-Tricosane	2.86E-08
C23 as Tricosane	2.86E-08
n-Tetracosane	2.86E-08
C24 as Tetracosane	2.86E-08
Total Hydrocarbon	2.36E-04

THC:	**1.25E-02**	**lbs/day**	**2.28E-03**	**tons/yr**

E016A

Component	ANALYTICAL RESULTS E016A µg/m³	Flag	ND Adj µg/m³	BACKGROUND E017A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#E0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	75.0500	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C5 as Pentane	75.0500	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Hexane	107.5437	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	26	2.62E-08	0	0	0.00E+00	2.62E-08
C6 as Hexane	107.5437	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	26	2.62E-08	0	0	0.00E+00	2.62E-08
n-Heptane	89.3437	ND	45	177.3	ND	0	183	ND	0	45	0.04	5	22	2.18E-08	0	0	0.00E+00	2.18E-08
C7 as Heptane	89.3437	ND	45	177.3	ND	0	183	ND	0	45	0.04	5	22	2.18E-08	0	0	0.00E+00	2.18E-08
n-Octane	77.3125	ND	39	153.43	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C8 as Octane	4229.9649		4,230	153.43	ND	0	158	ND	0	4,230	4.23	447	2062	2.06E-06	0	0	0.00E+00	2.06E-06
n-Nonane	665.8253	J	666	154.57	ND	0	160	ND	0	666	0.67	70	325	3.25E-07	0	0	0.00E+00	3.25E-07
C9 as Nonane	#########		55,159	154.57	ND	0	160	ND	0	55,159	55.16	5827	26895	2.69E-05	0	0	0.00E+00	2.69E-05
n-Decane	7629.9930		7,630	155.97	ND	0	161	ND	0	7,630	7.63	806	3720	3.72E-06	0	0	0.00E+00	3.72E-06
C10 as Decane	#########		139,953	155.97	ND	0	161	ND	0	139,953	139.95	14785	68238	6.82E-05	0	0	0.00E+00	6.82E-05
n-Undecane	#########		17,520	155.57	ND	0	161	ND	0	17,520	17.52	1851	8542	8.54E-06	0	0	0.00E+00	8.54E-06
C11 as Undecane	#########		120,706	155.57	ND	0	161	ND	0	120,706	120.71	12752	58854	5.89E-05	0	0	0.00E+00	5.89E-05
n-Dodecane	5981.9287		5,982	154.51	ND	0	159	ND	0	5,982	5.98	632	2917	2.92E-06	0	0	0.00E+00	2.92E-06
C12 as Dodecane	#########		55,072	154.51	ND	0	159	ND	0	55,072	55.07	5818	26852	2.69E-05	0	0	0.00E+00	2.69E-05
n-Tridecane	8813.5657		8,814	154.88	ND	0	160	ND	0	8,814	8.81	931	4297	4.30E-06	0	0	0.00E+00	4.30E-06
C13 as Tridecane	#########		38,693	154.88	ND	0	160	ND	0	38,693	38.69	4088	18866	1.89E-05	0	0	0.00E+00	1.89E-05
n-Tetradecane	#########		10,280	154.73	ND	0	160	ND	0	10,280	10.28	1086	5012	5.01E-06	0	0	0.00E+00	5.01E-06
C14 as tetradecane	#########		20,160	154.73	ND	0	160	ND	0	20,160	20.16	2130	9830	9.83E-06	0	0	0.00E+00	9.83E-06
n-Pentadecane	1499.0969		1,499	155.5	ND	0	160	ND	0	1,499	1.50	158	731	7.31E-07	0	0	0.00E+00	7.31E-07
C15 as Pentadecane	1303.4751		1,303	155.5	ND	0	160	ND	0	1,303	1.30	138	636	6.36E-07	0	0	0.00E+00	6.36E-07
n-Hexadecane	77.9375	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C16 as Hexadecane	77.9375	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptadecane	77.0312	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C17 as Heptadecane	93.0385	J	93	152.87	ND	0	158	ND	0	93	0.09	10	45	4.54E-08	0	0	0.00E+00	4.54E-08
n-Octadecane	77.8906	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C18 as Octodecane	77.8906	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Nonadecane	78.0469	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C19 as Nonadecane	78.0469	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Eicosane	77.8594	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C20 as Eicosane	77.8594	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heneicosane	78.5937	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C21 as Heneicosane	78.5937	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Docosane	77.7031	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	77.7031	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	78.1250	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	78.1250	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Tetracosane	78.2344	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C24 as Tetracosane	78.2344	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
Total Hydrocarbon			488,734			0			0		488.73	51631	238,297	2.38E-04	0	0	0.00E+00	2.38E-04

E016B

Component	ANALYTICAL RESULTS E016B µg/m³	Flag	ND Adj µg/m³	BACKGROUND E017A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	150.1	ND	75	149	ND	0	154	ND	0	75	0.08	8	37	3.66E-08	3.66E-08
C5 as Pentane	150.1	ND	75	149	ND	0	154	ND	0	75	0.08	8	37	3.66E-08	3.66E-08
n-Hexane	215.0875	ND	108	213	ND	0	220	ND	0	108	0.11	11	52	5.24E-08	5.24E-08
C6 as Hexane	215.0875	ND	108	213	ND	0	220	ND	0	108	0.11	11	52	5.24E-08	5.24E-08
n-Heptane	178.6875	ND	89	177	ND	0	183	ND	0	89	0.09	9	44	4.36E-08	4.36E-08
C7 as Heptane	178.6875	ND	89	177	ND	0	183	ND	0	89	0.09	9	44	4.36E-08	4.36E-08
n-Octane	154.625	ND	77	153	ND	0	158	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C8 as Octane	4441.696		4,442	153	ND	0	158	ND	0	4,442	4.44	469	2166	2.17E-06	2.17E-06
n-Nonane	667.94936	J	668	155	ND	0	160	ND	0	668	0.67	71	326	3.26E-07	3.26E-07
C9 as Nonane	58979.845		58,980	155	ND	0	160	ND	0	58,980	58.98	6231	28757	2.88E-05	2.88E-05
n-Decane	7812.023		7,812	156	ND	0	161	ND	0	7,812	7.81	825	3809	3.81E-06	3.81E-06
C10 as Decane	148421.48		148,421	156	ND	0	161	ND	0	148,421	148.42	15680	72367	7.24E-05	7.24E-05
n-Undecane	18669.934		18,670	156	ND	0	161	ND	0	18,670	18.67	1972	9103	9.10E-06	9.10E-06
C11 as Undecane	131435.03		131,435	156	ND	0	161	ND	0	131,435	131.44	13885	64085	6.41E-05	6.41E-05
n-Dodecane	6530.7623		6,531	155	ND	0	159	ND	0	6,531	6.53	690	3184	3.18E-06	3.18E-06
C12 as Dodecane	60403.511		60,404	155	ND	0	159	ND	0	60,404	60.40	6381	29452	2.95E-05	2.95E-05
n-Tridecane	7190.4494		7,190	155	ND	0	160	ND	0	7,190	7.19	760	3506	3.51E-06	3.51E-06
C13 as Tridecane	23818.718		23,819	155	ND	0	160	ND	0	23,819	23.82	2516	11614	1.16E-05	1.16E-05
n-Tetradecane	2427.3618		2,427	155	ND	0	160	ND	0	2,427	2.43	256	1184	1.18E-06	1.18E-06
C14 as tetradecane	5163.1516		5,163	155	ND	0	160	ND	0	5,163	5.16	545	2517	2.52E-06	2.52E-06
n-Pentadecane	690.65573	J	691	156	ND	0	160	ND	0	691	0.69	73	337	3.37E-07	3.37E-07
C15 as Pentadecane	284.15871	J	284	156	ND	0	160	ND	0	284	0.28	30	139	1.39E-07	1.39E-07
n-Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C16 as Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C17 as Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Octadecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C18 as Octodecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C19 as Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C20 as Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
C21 as Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
n-Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C22 as Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C23 as Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C24 as Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
Total Hydrocarbon			478,961			0			0		478.96	50599	233,532	2.34E-04	2.34E-04

Bagging Data Form — Vacuum Method

Sample Id: E018

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	E-2114	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	4	*inches*		**Date:**	9-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.83 *inHg*	757.7	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	94 *°F*	34.4	*°C*	**TVA ID**	34251	
Component Temp:	278 *°F*	136.7	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Jet*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:52	Background	14	*ppmv*	8-sec Dwell	932	*ppmv*	Total Dwell	3:30	*min:sec*	Final M21	1601 *ppm*
11:23	Initial Bag Vacuum	0.07	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	176.4	*°F*	Leak @	Packing

Bag Concentrations (ppmv) Vented Bag/Plugged Bag

Time	11:29	11:32	11:34	11:38	11:42	11:46	11:48	11:50	11:57	12:01				
ppmv	468	540	574	639	678	838	801	791	742	748				

Sorbent Tube Sample Collection Parameters

E018A

Time									
11:50	Volume Start	284.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:03	Volume Stop	297.1	*Liters*	Total Vol	12.4	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.954 *L/min*	Sorbent $Flow_{STP}$	0.906	*L/min*

E018B

11:50	Volume Start	277.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
12:03	Volume Stop	289.7	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.921	*L/min*
	Total ST Vol_{STP}	23.75	*Liters*	DGM Vol_{STP}	71.93	*Liters*	Total Run Vol_{STP}	95.68	*Liters*

Bagging Parameters

Time									
11:55	Vacuum check	0.06	*inches H2O*			DGM_P	1.7	*inches H2O vacuum*	754.5 *mmHg*
11:54	DGM_{10L} Time	01:43.3	*min:sec.frac*	DGM Time	1.717	DGM Flow	5.83	DGM $Flow_{STP}$	5.53 *liters/minute*
11:56	Bag Temp.	190.4	*°F*	88.0	*°C*	$Sample_T$	94	*°F*	34.4 *°C*

Post-Sample Data

12:35	Post Test M21	Background	76	*ppmv*	8-sec Dwell	1886 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	2672 *ppm*
									Leak @	Packing
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A	*ml*						
Density of organic condensate			N/A	*g/ml*						

Average THC emissions =	1.05E-03 kg/hr
Percent difference THC ER =	1%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.52E-08
C5 as Pentane	2.52E-08
n-Hexane	3.61E-08
C6 as Hexane	3.61E-08
n-Heptane	1.28E-07
C7 as Heptane	6.36E-07
n-Octane	2.28E-06
C8 as Octane	2.12E-05
n-Nonane	1.18E-05
C9 as Nonane	6.52E-05
n-Decane	2.80E-05
C10 as Decane	1.29E-04
n-Undecane	4.99E-05
C11 as Undecane	2.42E-04
n-Dodecane	7.49E-05
C12 as Dodecane	2.38E-04
n-Tridecane	4.88E-05
C13 as Tridecane	1.12E-04
n-Tetradecane	1.17E-05
C14 as tetradecane	1.59E-05
n-Pentadecane	4.01E-07
C15 as Pentadecane	2.63E-08
n-Hexadecane	2.62E-08
C16 as Hexadecane	2.62E-08
n-Heptadecane	2.58E-08
C17 as Heptadecane	2.58E-08
n-Octadecane	2.61E-08
C18 as Octodecane	2.61E-08
n-Nonadecane	2.62E-08
C19 as Nonadecane	2.62E-08
n-Eicosane	2.61E-08
C20 as Eicosane	2.61E-08
n-Heneicosane	2.64E-08
C21 as Heneicosane	2.64E-08
n-Docosane	2.61E-08
C22 as Docosane	2.61E-08
n-Tricosane	2.62E-08
C23 as Tricosane	2.62E-08
n-Tetracosane	2.63E-08
C24 as Tetracosane	2.63E-08
Total Hydrocarbon	1.05E-03

THC: **5.57E-02** **lbs/day** **1.02E-02 tons/yr**

E018A	ANALYTICAL RESULTS E018A		ND Adj	BACKGROUND E019A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
C5 as Pentane	75.6409	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	17	1.67E-08	0	0	0.00E+00	1.67E-08
n-Hexane	108.3906	ND	54	213.42	ND	0	220	ND	0	54	0.05	5	24	2.39E-08	0	0	0.00E+00	2.39E-08
C6 as Hexane	108.3906	ND	54	213.42	ND	0	220	ND	0	54	0.05	5	24	2.39E-08	0	0	0.00E+00	2.39E-08
n-Heptane	490.5078	J	491	177.3	ND	0	183	ND	0	491	0.49	47	217	2.17E-07	0	0	0.00E+00	2.17E-07
C7 as Heptane	1835.0486		1,835	177.3	ND	0	183	ND	0	1,835	1.84	176	810	8.10E-07	0	0	0.00E+00	8.10E-07
n-Octane	5145.4249		5,145	153.43	ND	0	158	ND	0	5,145	5.15	492	2272	2.27E-06	0	0	0.00E+00	2.27E-06
C8 as Octane	47574.1176		47,574	153.43	ND	0	158	ND	0	47,574	47.57	4552	21008	2.10E-05	0	0	0.00E+00	2.10E-05
n-Nonane	26412.3820		26,412	154.57	ND	0	160	ND	0	26,412	26.41	2527	11663	1.17E-05	0	0	0.00E+00	1.17E-05
C9 as Nonane	#########		145,395	154.57	ND	0	160	ND	0	145,395	145.39	13911	64203	6.42E-05	0	0	0.00E+00	6.42E-05
n-Decane	64360.5495		64,361	155.97	ND	0	161	ND	0	64,361	64.36	6158	28420	2.84E-05	0	0	0.00E+00	2.84E-05
C10 as Decane	#########		287,236	155.97	ND	0	161	ND	0	287,236	287.24	27482	126838	1.27E-04	0	0	0.00E+00	1.27E-04
n-Undecane	#########		112,892	155.57	ND	0	161	ND	0	112,892	112.89	10801	49851	4.99E-05	0	0	0.00E+00	4.99E-05
C11 as Undecane	#########		599,185	155.57	ND	0	161	ND	0	599,185	599.18	57327	264588	2.65E-04	0	0	0.00E+00	2.65E-04
n-Dodecane	#########		168,724	154.51	ND	0	159	ND	0	168,724	168.72	16143	74505	7.45E-05	0	0	0.00E+00	7.45E-05
C12 as Dodecane	#########		524,729	154.51	ND	0	159	ND	0	524,729	524.73	50204	231710	2.32E-04	0	0	0.00E+00	2.32E-04
n-Tridecane	#########		109,166	154.88	ND	0	160	ND	0	109,166	109.17	10445	48206	4.82E-05	0	0	0.00E+00	4.82E-05
C13 as Tridecane	#########		243,243	154.88	ND	0	160	ND	0	243,243	243.24	23272	107411	1.07E-04	0	0	0.00E+00	1.07E-04
n-Tetradecane	24752.1300		24,752	154.73	ND	0	160	ND	0	24,752	24.75	2368	10930	1.09E-05	0	0	0.00E+00	1.09E-05
C14 as tetradecane	37467.6813		37,468	154.73	ND	0	160	ND	0	37,468	37.47	3585	16545	1.65E-05	0	0	0.00E+00	1.65E-05
n-Pentadecane	805.1914		805	155.5	ND	0	160	ND	0	805	0.81	77	356	3.56E-07	0	0	0.00E+00	3.56E-07
C15 as Pentadecane	78.9764	ND	39	155.5	ND	0	160	ND	0	39	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
n-Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
C16 as Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
n-Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
C17 as Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	17	1.71E-08	0	0	0.00E+00	1.71E-08
n-Octadecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
C18 as Octodecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
n-Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
C19 as Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
n-Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
C20 as Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
n-Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	17	1.75E-08	0	0	0.00E+00	1.75E-08
C21 as Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	17	1.75E-08	0	0	0.00E+00	1.75E-08
n-Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
C22 as Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
n-Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
C23 as Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
n-Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
C24 as Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	17	1.74E-08	0	0	0.00E+00	1.74E-08
Total Hydrocarbon			2,400,344			0			0		2400.34	229655	#######	1.06E-03	0	0	0.00E+00	1.06E-03

E018B	ANALYTICAL RESULTS E018B		ND Adj	BACKGROUND E019A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	Flag	$\mu g/m^3$	$\mu g/m^3$	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	152.48254	ND	76	149	ND	0	154	ND	0	76	0.08	7	34	3.37E-08	3.37E-08
C5 as Pentane	152.48254	ND	76	149	ND	0	154	ND	0	76	0.08	7	34	3.37E-08	3.37E-08
n-Hexane	218.50158	ND	109	213	ND	0	220	ND	0	109	0.11	10	48	4.82E-08	4.82E-08
C6 as Hexane	218.50158	ND	109	213	ND	0	220	ND	0	109	0.11	10	48	4.82E-08	4.82E-08
n-Heptane	181.5238	ND	91	177	ND	0	183	ND	0	91	0.09	9	40	4.01E-08	4.01E-08
C7 as Heptane	1044.3317	J	1,044	177	ND	0	183	ND	0	1,044	1.04	100	461	4.61E-07	4.61E-07
n-Octane	5172.7245		5,173	153	ND	0	158	ND	0	5,173	5.17	495	2284	2.28E-06	2.28E-06
C8 as Octane	48490.215		48,490	153	ND	0	158	ND	0	48,490	48.49	4639	21412	2.14E-05	2.14E-05
n-Nonane	26877.893		26,878	155	ND	0	160	ND	0	26,878	26.88	2572	11869	1.19E-05	1.19E-05
C9 as Nonane	149762.83		149,763	155	ND	0	160	ND	0	149,763	149.76	14329	66132	6.61E-05	6.61E-05
n-Decane	62570.452		62,570	156	ND	0	161	ND	0	62,570	62.57	5986	27630	2.76E-05	2.76E-05
C10 as Decane	297331.98		297,332	156	ND	0	161	ND	0	297,332	297.33	28447	131296	1.31E-04	1.31E-04
n-Undecane	113190.73		113,191	156	ND	0	161	ND	0	113,191	113.19	10830	49983	5.00E-05	5.00E-05
C11 as Undecane	497292.37		497,292	156	ND	0	161	ND	0	497,292	497.29	47579	219595	2.20E-04	2.20E-04
n-Dodecane	170665.48		170,665	155	ND	0	159	ND	0	170,665	170.67	16329	75363	7.54E-05	7.54E-05
C12 as Dodecane	552824.04		552,824	155	ND	0	159	ND	0	552,824	552.82	52892	244116	2.44E-04	2.44E-04
n-Tridecane	112037.11		112,037	155	ND	0	160	ND	0	112,037	112.04	10719	49473	4.95E-05	4.95E-05
C13 as Tridecane	265326.88		265,327	155	ND	0	160	ND	0	265,327	265.33	25385	117163	1.17E-04	1.17E-04
n-Tetradecane	28359.459		28,359	155	ND	0	160	ND	0	28,359	28.36	2713	12523	1.25E-05	1.25E-05
C14 as tetradecane	34705.321		34,705	155	ND	0	160	ND	0	34,705	34.71	3320	15325	1.53E-05	1.53E-05
n-Pentadecane	1011.3243	J	1,011	156	ND	0	160	ND	0	1,011	1.01	97	447	4.47E-07	4.47E-07
C15 as Pentadecane	159.20634	ND	80	156	ND	0	160	ND	0	80	0.08	8	35	3.52E-08	3.52E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.50E-08	3.50E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.50E-08	3.50E-08
n-Heptadecane	156.50793	ND	78	153	ND	0	158	ND	0	78	0.08	7	35	3.46E-08	3.46E-08
C17 as Heptadecane	156.50793	ND	78	153	ND	0	158	ND	0	78	0.08	7	35	3.46E-08	3.46E-08
n-Octadecane	158.25396	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.49E-08	3.49E-08
C18 as Octodecane	158.25396	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.49E-08	3.49E-08
n-Nonadecane	158.57142	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.50E-08	3.50E-08
C19 as Nonadecane	158.57142	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.50E-08	3.50E-08
n-Eicosane	158.19047	ND	79	155	ND	0	159	ND	0	79	0.08	8	35	3.49E-08	3.49E-08
C20 as Eicosane	158.19047	ND	79	155	ND	0	159	ND	0	79	0.08	8	35	3.49E-08	3.49E-08
n-Heneicosane	159.68253	ND	80	156	ND	0	161	ND	0	80	0.08	8	35	3.53E-08	3.53E-08
C21 as Heneicosane	159.68253	ND	80	156	ND	0	161	ND	0	80	0.08	8	35	3.53E-08	3.53E-08
n-Docosane	157.87301	ND	79	154	ND	0	159	ND	0	79	0.08	8	35	3.49E-08	3.49E-08
C22 as Docosane	157.87301	ND	79	154	ND	0	159	ND	0	79	0.08	8	35	3.49E-08	3.49E-08
n-Tricosane	158.73015	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.50E-08	3.50E-08
C23 as Tricosane	158.73015	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.50E-08	3.50E-08
n-Tetracosane	158.95238	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.51E-08	3.51E-08
C24 as Tetracosane	158.95238	ND	79	155	ND	0	160	ND	0	79	0.08	8	35	3.51E-08	3.51E-08
Total Hydrocarbon			2,368,630			0			0		2368.63	226621	#######	1.05E-03	1.05E-03

Bagging Data Form — Vacuum Method

Sample Id: E021

WSPA Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	E-2204	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	1 1/2	inches		**Date:**	20-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.81 inHg	757.2 mmHg		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	87 °F	30.6 °C		**TVA ID**	36502	
Component Temp:	152 °F	66.7 °C		**Stream Pressure/Temp:**	psig	°F
Stream Description:	JFHF Jet Fuel Hydrofiner					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:36	Background	5	ppmv	8-sec Dwell	11	ppmv	Total Dwell	5:00	min:sec	Final M21	15 ppm
10:23	Initial Bag Vacuum	0.015	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	110.8	°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	10:25	10:27	10:29	10:31	10:33	10:41
ppmv	29.6	32.3	32.8	32.1	31.7	31

Sorbent Tube Sample Collection Parameters

E021A

Time									
10:33	Volume Start	300.1	Liters		Design Sample Flow Rate = 1 liter/min				
10:46	Volume Stop	312.8	Liters	Total Vol	12.7	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.977 L/min	Sorbent Flow$_{STP}$	0.951	L/min

E021B

Time									
10:33	Volume Start	292.1	Liters		Design Sample Flow Rate = 1 liter/min				
10:46	Volume Stop	304.9	Liters	Total Vol	12.8	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.985 L/min	Sorbent Flow$_{STP}$	0.959	L/min

Total ST Vol$_{STP}$ 24.83 Liters — DGM Vol$_{STP}$ 85.33 Liters — Total Run Vol$_{STP}$ 110.15 Liters

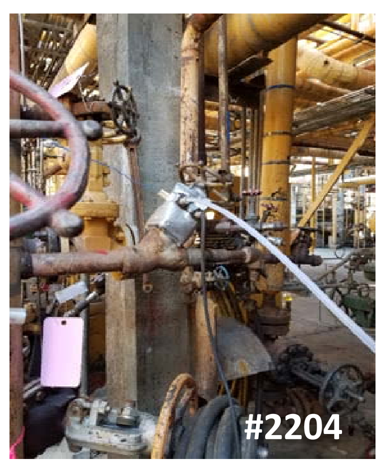
Bagging Parameters

Time										
10:39	Vacuum check	0.015	inches H2O			DGM$_P$	1.8	inches H2O vacuum	753.8	mmHg
10:36	DGM$_{10L}$ Time	01:29.5	min:sec.frac	DGM Time	1.483	DGM Flow	6.74	DGM Flow$_{STP}$	6.56	liters/minute
10:39	Bag Temp.	119.1	°F	48.4	°C	Sample$_T$	80	°F	26.7	°C

Post-Sample Data

10:54	Post Test M21	Background	11	ppmv	8-sec Dwell	16	ppmv	Total Dwell	3:00 min:sec	Final M21 30 ppm, Leak @ Stem
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A	hour:min		0:00 hours:min	
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions = 1.34E-05 kg/hr
Percent difference THC ER = 108%
Acceptable? No



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.87E-08
C5 as Pentane	2.87E-08
n-Hexane	4.11E-08
C6 as Hexane	4.11E-08
n-Heptane	3.42E-08
C7 as Heptane	3.42E-08
n-Octane	2.96E-08
C8 as Octane	4.37E-08
n-Nonane	2.98E-08
C9 as Nonane	8.88E-08
n-Decane	6.27E-08
C10 as Decane	2.35E-07
n-Undecane	1.40E-07
C11 as Undecane	3.86E-07
n-Dodecane	3.70E-07
C12 as Dodecane	1.05E-06
n-Tridecane	9.46E-07
C13 as Tridecane	4.06E-06
n-Tetradecane	1.64E-06
C14 as tetradecane	3.22E-06
n-Pentadecane	2.82E-07
C15 as Pentadecane	9.35E-08
n-Hexadecane	2.98E-08
C16 as Hexadecane	2.98E-08
n-Heptadecane	2.94E-08
C17 as Heptadecane	2.94E-08
n-Octadecane	2.98E-08
C18 as Octodecane	2.98E-08
n-Nonadecane	2.98E-08
C19 as Nonadecane	2.98E-08
n-Eicosane	2.98E-08
C20 as Eicosane	2.98E-08
n-Heneicosane	3.00E-08
C21 as Heneicosane	3.00E-08
n-Docosane	2.97E-08
C22 as Docosane	2.97E-08
n-Tricosane	2.99E-08
C23 as Tricosane	2.99E-08
n-Tetracosane	2.99E-08
C24 as Tetracosane	2.99E-08
Total Hydrocarbon	1.34E-05

THC: 7.10E-04 lbs/day 1.30E-04 tons/yr

E021A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E021A	E021A		ND Adj	E022A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	145.15	ND	0	154	ND	0	38	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C5 as Pentane	75.6409	ND	38	145.15	ND	0	154	ND	0	38	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Hexane	108.3906	ND	54	150.79	ND	0	220	ND	0	54	0.05	6	28	2.76E-08	0	0	0.00E+00	2.76E-08
C6 as Hexane	108.3906	ND	54	150.79	ND	0	220	ND	0	54	0.05	6	28	2.76E-08	0	0	0.00E+00	2.76E-08
n-Heptane	90.0472	ND	45	157.58	ND	0	183	ND	0	45	0.05	5	23	2.29E-08	0	0	0.00E+00	2.29E-08
C7 as Heptane	90.0472	ND	45	157.58	ND	0	183	ND	0	45	0.05	5	23	2.29E-08	0	0	0.00E+00	2.29E-08
n-Octane	77.9213	ND	39	153.43	ND	0	158	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C8 as Octane	94.4633	J	94	153.43	ND	0	158	ND	0	94	0.09	10	48	4.80E-08	0	0	0.00E+00	4.80E-08
n-Nonane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C9 as Nonane	271.2947	J	271	154.57	ND	0	160	ND	0	271	0.27	30	138	1.38E-07	0	0	0.00E+00	1.38E-07
n-Decane	168.1447	J	168	155.97	ND	0	161	ND	0	168	0.17	19	85	8.55E-08	0	0	0.00E+00	8.55E-08
C10 as Decane	650.8476	J	651	155.97	ND	0	161	ND	0	651	0.65	72	331	3.31E-07	0	0	0.00E+00	3.31E-07
n-Undecane	279.4571	J	279	155.57	ND	0	161	ND	0	279	0.28	31	142	1.42E-07	0	0	0.00E+00	1.42E-07
C11 as Undecane	813.6752		814	155.57	ND	0	161	ND	0	814	0.81	90	414	4.14E-07	0	0	0.00E+00	4.14E-07
n-Dodecane	675.6159	J	676	154.51	ND	0	159	ND	0	676	0.68	74	343	3.43E-07	0	0	0.00E+00	3.43E-07
C12 as Dodecane	2343.5282		2,344	154.51	ND	0	159	ND	0	2,344	2.34	258	1191	1.19E-06	0	0	0.00E+00	1.19E-06
n-Tridecane	2280.9863		2,281	154.88	ND	0	160	ND	0	2,281	2.28	251	1160	1.16E-06	0	0	0.00E+00	1.16E-06
C13 as Tridecane	#########		13,613	154.88	ND	0	160	ND	0	13,613	13.61	1499	6921	6.92E-06	0	0	0.00E+00	6.92E-06
n-Tetradecane	5243.5342		5,244	154.73	ND	0	160	ND	0	5,244	5.24	578	2666	2.67E-06	0	0	0.00E+00	2.67E-06
C14 as tetradecane	#########		11,961	154.73	ND	0	160	ND	0	11,961	11.96	1317	6081	6.08E-06	0	0	0.00E+00	6.08E-06
n-Pentadecane	920.8374		921	155.5	ND	0	160	ND	0	921	0.92	101	468	4.68E-07	0	0	0.00E+00	4.68E-07
C15 as Pentadecane	289.4187	J	289	155.5	ND	0	160	ND	0	289	0.29	32	147	1.47E-07	0	0	0.00E+00	1.47E-07
n-Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C16 as Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C17 as Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Octadecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C18 as Octodecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C19 as Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C20 as Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C21 as Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C22 as Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C23 as Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C24 as Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
Total Hydrocarbon			40,664			0			0		40.66	4479	20,674	2.07E-05	0	0	0.00E+00	2.07E-05

E021B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E021B	E021B		ND Adj	E022A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	145	ND	0	154	ND	0	75	0.08	8	38	3.82E-08	3.82E-08
C5 as Pentane	150.1	ND	75	145	ND	0	154	ND	0	75	0.08	8	38	3.82E-08	3.82E-08
n-Hexane	215.0875	ND	108	151	ND	0	220	ND	0	108	0.11	12	55	5.47E-08	5.47E-08
C6 as Hexane	215.0875	ND	108	151	ND	0	220	ND	0	108	0.11	12	55	5.47E-08	5.47E-08
n-Heptane	178.6875	ND	89	158	ND	0	183	ND	0	89	0.09	10	45	4.54E-08	4.54E-08
C7 as Heptane	178.6875	ND	89	158	ND	0	183	ND	0	89	0.09	10	45	4.54E-08	4.54E-08
n-Octane	154.625	ND	77	153	ND	0	158	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C8 as Octane	154.625	ND	77	153	ND	0	158	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Nonane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C9 as Nonane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Decane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
C10 as Decane	275.29401	J	275	156	ND	0	161	ND	0	275	0.28	30	140	1.40E-07	1.40E-07
n-Undecane	273.22189	J	273	156	ND	0	161	ND	0	273	0.27	30	139	1.39E-07	1.39E-07
C11 as Undecane	703.21775	J	703	156	ND	0	161	ND	0	703	0.70	77	358	3.58E-07	3.58E-07
n-Dodecane	778.92341	J	779	155	ND	0	159	ND	0	779	0.78	86	396	3.96E-07	3.96E-07
C12 as Dodecane	1775.7165		1,776	155	ND	0	159	ND	0	1,776	1.78	196	903	9.03E-07	9.03E-07
n-Tridecane	1440.0866	J	1,440	155	ND	0	160	ND	0	1,440	1.44	159	732	7.32E-07	7.32E-07
C13 as Tridecane	2369.7683		2,370	155	ND	0	160	ND	0	2,370	2.37	261	1205	1.20E-06	1.20E-06
n-Tetradecane	1223.8389	J	1,224	155	ND	0	160	ND	0	1,224	1.22	135	622	6.22E-07	6.22E-07
C14 as tetradecane	700.08474	J	700	155	ND	0	160	ND	0	700	0.70	77	356	3.56E-07	3.56E-07
n-Pentadecane	187.00474	J	187	156	ND	0	160	ND	0	187	0.19	21	95	9.51E-08	9.51E-08
C15 as Pentadecane	156.71875	ND	78	156	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
n-Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C16 as Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
C17 as Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
n-Octadecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C18 as Octodecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
C19 as Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
n-Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C20 as Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
C21 as Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
n-Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
C22 as Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
n-Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
C23 as Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
n-Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
C24 as Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
Total Hydrocarbon			12,141			0			0		12.14	1337	6,173	6.17E-06	6.17E-06

Bagging Data Form **Vacuum Method** **Sample Id** E023

Equipment type:	Valve			**Component ID:**	E-2248	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	3	*inches*		**Date:**	20-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.79 *inHg*	756.7	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	90 °F	32.2	°C	**TVA ID**	37887	
Component Temp:	118 °F	47.8	°C	**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Jet*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:14	Background	-15	*ppmv*	8-sec Dwell	38	*ppmv*	Total Dwell	4:00	*min:sec*	Final M21	617 *ppm*
12:43	Initial Bag Vacuum	0.03	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	92.3	°F	Leak @	Stem

Bag Concentrations (ppmv) (hed to vent bag)

Time	12:45	12:47	12:49	12:51	12:53	13:00								
ppmv	43.7	45.2	45.5	44.5	43.8	41.5								

Sorbent Tube Sample Collection Parameters

E023A

Time									
12:53	Volume Start	312.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:06	Volume Stop	325.2	*Liters*	Total Vol	12.4	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.954 *L/min*	Sorbent Flow$_{STP}$	0.918	*L/min*

E023B

12:53	Volume Start	304.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:06	Volume Stop	317.3	*Liters*	Total Vol	12.4	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.954 *L/min*	Sorbent Flow$_{STP}$	0.918	*L/min*
	Total ST Vol$_{STP}$	23.86	*Liters*	DGM Vol$_{STP}$	81.58	*Liters*	Total Run Vol$_{STP}$	105.44	*Liters*

Bagging Parameters

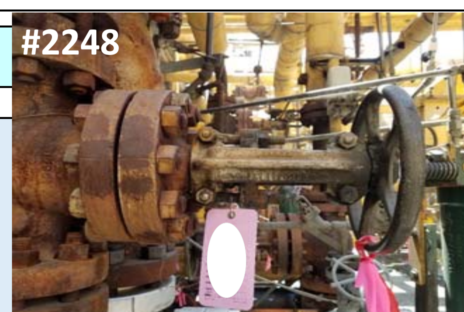
Time									
12:58	Vacuum check	0.035	*inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	753.3	*mmHg*
12:57	DGM$_{10L}$ Time	01:32.3	*min:sec.frac*	DGM Time	1.533	DGM Flow	6.52	DGM Flow$_{STP}$ 6.28	*liters/minute*
12:59	Bag Temp.	94.8	°F	34.9	°C	Sample$_T$	86 °F	30.0	°C

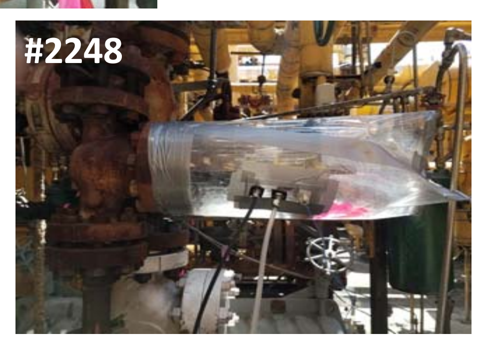
Post-Sample Data

13:14	Post Test M21	Background	12	*ppmv*	8-sec Dwell	326	*ppmv*	Total Dwell	3:00 *min:sec*	Final M21	704 *ppm*
										Leak @	Stem

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	3.09E-05	kg/hr
Percent difference THC ER =	8%	
Acceptable?	Yes	





AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.83E-08
C5 as Pentane	2.83E-08
n-Hexane	4.05E-08
C6 as Hexane	4.05E-08
n-Heptane	3.37E-08
C7 as Heptane	3.37E-08
n-Octane	1.28E-07
C8 as Octane	1.03E-06
n-Nonane	5.78E-07
C9 as Nonane	2.99E-06
n-Decane	1.14E-06
C10 as Decane	4.62E-06
n-Undecane	1.51E-06
C11 as Undecane	5.30E-06
n-Dodecane	1.87E-06
C12 as Dodecane	5.43E-06
n-Tridecane	1.47E-06
C13 as Tridecane	2.85E-06
n-Tetradecane	7.24E-07
C14 as tetradecane	3.91E-07
n-Pentadecane	6.57E-08
C15 as Pentadecane	2.95E-08
n-Hexadecane	2.94E-08
C16 as Hexadecane	2.94E-08
n-Heptadecane	2.90E-08
C17 as Heptadecane	2.90E-08
n-Octadecane	2.93E-08
C18 as Octodecane	2.93E-08
n-Nonadecane	2.94E-08
C19 as Nonadecane	2.94E-08
n-Eicosane	2.93E-08
C20 as Eicosane	2.93E-08
n-Heneicosane	2.96E-08
C21 as Heneicosane	2.96E-08
n-Docosane	2.93E-08
C22 as Docosane	2.93E-08
n-Tricosane	2.94E-08
C23 as Tricosane	2.94E-08
n-Tetracosane	2.95E-08
C24 as Tetracosane	2.95E-08
Total Hydrocarbon	3.09E-05

THC:	**1.63E-03**	**lbs/day**	**2.98E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E023A	E023A		ND Adj	E024A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	77.4710	ND	39	147.43	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C5 as Pentane	77.4710	ND	39	147.43	ND	0	154	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Hexane	111.0129	ND	56	153.17	ND	0	220	ND	0	56	0.06	6	27	2.70E-08	0	0	0.00E+00	2.70E-08
C6 as Hexane	111.0129	ND	56	153.17	ND	0	220	ND	0	56	0.06	6	27	2.70E-08	0	0	0.00E+00	2.70E-08
n-Heptane	92.2258	ND	46	160.06	ND	0	183	ND	0	46	0.05	5	22	2.24E-08	0	0	0.00E+00	2.24E-08
C7 as Heptane	92.2258	ND	46	160.06	ND	0	183	ND	0	46	0.05	5	22	2.24E-08	0	0	0.00E+00	2.24E-08
n-Octane	276.2483	J	276	155.84	ND	0	158	ND	0	276	0.28	29	134	1.34E-07	0	0	0.00E+00	1.34E-07
C8 as Octane	2170.7830		2,171	155.84	ND	0	158	ND	0	2,171	2.17	229	1056	1.06E-06	0	0	0.00E+00	1.06E-06
n-Nonane	1308.6631		1,309	157.01	ND	0	160	ND	0	1,309	1.31	138	637	6.37E-07	0	0	0.00E+00	6.37E-07
C9 as Nonane	6260.2402		6,260	157.01	ND	0	160	ND	0	6,260	6.26	660	3047	3.05E-06	0	0	0.00E+00	3.05E-06
n-Decane	2485.4744		2,485	158.43	ND	0	161	ND	0	2,485	2.49	262	1210	1.21E-06	0	0	0.00E+00	1.21E-06
C10 as Decane	#########		10,252	158.43	ND	0	161	ND	0	10,252	10.25	1081	4989	4.99E-06	0	0	0.00E+00	4.99E-06
n-Undecane	3201.7681		3,202	158.02	ND	0	161	ND	0	3,202	3.20	338	1558	1.56E-06	0	0	0.00E+00	1.56E-06
C11 as Undecane	#########		11,291	158.02	ND	0	161	ND	0	11,291	11.29	1191	5495	5.50E-06	0	0	0.00E+00	5.50E-06
n-Dodecane	3822.2084		3,822	156.94	ND	0	159	ND	0	3,822	3.82	403	1860	1.86E-06	0	0	0.00E+00	1.86E-06
C12 as Dodecane	#########		11,375	156.94	ND	0	159	ND	0	11,375	11.37	1199	5536	5.54E-06	0	0	0.00E+00	5.54E-06
n-Tridecane	3053.1808		3,053	157.32	ND	0	160	ND	0	3,053	3.05	322	1486	1.49E-06	0	0	0.00E+00	1.49E-06
C13 as Tridecane	6316.1989		6,316	157.32	ND	0	160	ND	0	6,316	6.32	666	3074	3.07E-06	0	0	0.00E+00	3.07E-06
n-Tetradecane	1680.1242		1,680	157.17	ND	0	160	ND	0	1,680	1.68	177	818	8.18E-07	0	0	0.00E+00	8.18E-07
C14 as tetradecane	1121.6127		1,122	157.17	ND	0	160	ND	0	1,122	1.12	118	546	5.46E-07	0	0	0.00E+00	5.46E-07
n-Pentadecane	189.2234	J	189	157.95	ND	0	160	ND	0	189	0.19	20	92	9.21E-08	0	0	0.00E+00	9.21E-08
C15 as Pentadecane	80.8871	ND	40	157.95	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Hexadecane	80.4516	ND	40	157.1	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C16 as Hexadecane	80.4516	ND	40	157.1	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heptadecane	79.5161	ND	40	155.28	ND	0	158	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C17 as Heptadecane	79.5161	ND	40	155.28	ND	0	158	ND	0	40	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Octadecane	80.4032	ND	40	157.01	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C18 as Octodecane	80.4032	ND	40	157.01	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Nonadecane	80.5645	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C19 as Nonadecane	80.5645	ND	40	157.32	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Eicosane	80.3710	ND	40	156.94	ND	0	159	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C20 as Eicosane	80.3710	ND	40	156.94	ND	0	159	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heneicosane	81.1290	ND	41	158.43	ND	0	161	ND	0	41	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C21 as Heneicosane	81.1290	ND	41	158.43	ND	0	161	ND	0	41	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Docosane	80.2097	ND	40	156.63	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C22 as Docosane	80.2097	ND	40	156.63	ND	0	159	ND	0	40	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tricosane	80.6452	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C23 as Tricosane	80.6452	ND	40	157.48	ND	0	160	ND	0	40	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetracosane	80.7581	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C24 as Tetracosane	80.7581	ND	40	157.7	ND	0	160	ND	0	40	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
Total Hydrocarbon			65,849			0			0		65.85	6943	32,047	3.20E-05	0	0	0.00E+00	3.20E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E023B	E023B		ND Adj	E024A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	154.94194	ND	77	147	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C5 as Pentane	154.94194	ND	77	147	ND	0	154	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Hexane	222.02581	ND	111	153	ND	0	220	ND	0	111	0.11	12	54	5.40E-08	5.40E-08
C6 as Hexane	222.02581	ND	111	153	ND	0	220	ND	0	111	0.11	12	54	5.40E-08	5.40E-08
n-Heptane	184.45162	ND	92	160	ND	0	183	ND	0	92	0.09	10	45	4.49E-08	4.49E-08
C7 as Heptane	184.45162	ND	92	160	ND	0	183	ND	0	92	0.09	10	45	4.49E-08	4.49E-08
n-Octane	248.3225	J	248	156	ND	0	158	ND	0	248	0.25	26	121	1.21E-07	1.21E-07
C8 as Octane	2070.3521		2,070	156	ND	0	158	ND	0	2,070	2.07	218	1008	1.01E-06	1.01E-06
n-Nonane	1068.6575	J	1,069	157	ND	0	160	ND	0	1,069	1.07	113	520	5.20E-07	5.20E-07
C9 as Nonane	6034.0194		6,034	157	ND	0	160	ND	0	6,034	6.03	636	2937	2.94E-06	2.94E-06
n-Decane	2209.195		2,209	158	ND	0	161	ND	0	2,209	2.21	233	1075	1.08E-06	1.08E-06
C10 as Decane	8729.2118		8,729	158	ND	0	161	ND	0	8,729	8.73	920	4248	4.25E-06	4.25E-06
n-Undecane	2990.9642		2,991	158	ND	0	161	ND	0	2,991	2.99	315	1456	1.46E-06	1.46E-06
C11 as Undecane	10492.062		10,492	158	ND	0	161	ND	0	10,492	10.49	1106	5106	5.11E-06	5.11E-06
n-Dodecane	3878.9394		3,879	157	ND	0	159	ND	0	3,879	3.88	409	1888	1.89E-06	1.89E-06
C12 as Dodecane	10927.013		10,927	157	ND	0	159	ND	0	10,927	10.93	1152	5318	5.32E-06	5.32E-06
n-Tridecane	3001.4895		3,001	157	ND	0	160	ND	0	3,001	3.00	316	1461	1.46E-06	1.46E-06
C13 as Tridecane	5390.4353		5,390	157	ND	0	160	ND	0	5,390	5.39	568	2623	2.62E-06	2.62E-06
n-Tetradecane	1296.6079	J	1,297	157	ND	0	160	ND	0	1,297	1.30	137	631	6.31E-07	6.31E-07
C14 as tetradecane	484.82724	J	485	157	ND	0	160	ND	0	485	0.48	51	236	2.36E-07	2.36E-07
n-Pentadecane	161.7742	ND	81	158	ND	0	160	ND	0	81	0.08	9	39	3.94E-08	3.94E-08
C15 as Pentadecane	161.7742	ND	81	158	ND	0	160	ND	0	81	0.08	9	39	3.94E-08	3.94E-08
n-Hexadecane	160.90323	ND	80	157	ND	0	160	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
C16 as Hexadecane	160.90323	ND	80	157	ND	0	160	ND	0	80	0.08	8	39	3.92E-08	3.92E-08
n-Heptadecane	159.03226	ND	80	155	ND	0	158	ND	0	80	0.08	8	39	3.87E-08	3.87E-08
C17 as Heptadecane	159.03226	ND	80	155	ND	0	158	ND	0	80	0.08	8	39	3.87E-08	3.87E-08
n-Octadecane	160.80646	ND	80	157	ND	0	160	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
C18 as Octodecane	160.80646	ND	80	157	ND	0	160	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
n-Nonadecane	161.12904	ND	81	157	ND	0	160	ND	0	81	0.08	8	39	3.92E-08	3.92E-08
C19 as Nonadecane	161.12904	ND	81	157	ND	0	160	ND	0	81	0.08	8	39	3.92E-08	3.92E-08
n-Eicosane	160.74194	ND	80	157	ND	0	159	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
C20 as Eicosane	160.74194	ND	80	157	ND	0	159	ND	0	80	0.08	8	39	3.91E-08	3.91E-08
n-Heneicosane	162.25807	ND	81	158	ND	0	161	ND	0	81	0.08	9	39	3.95E-08	3.95E-08
C21 as Heneicosane	162.25807	ND	81	158	ND	0	161	ND	0	81	0.08	9	39	3.95E-08	3.95E-08
n-Docosane	160.41936	ND	80	157	ND	0	159	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
C22 as Docosane	160.41936	ND	80	157	ND	0	159	ND	0	80	0.08	8	39	3.90E-08	3.90E-08
n-Tricosane	161.29033	ND	81	157	ND	0	160	ND	0	81	0.08	9	39	3.92E-08	3.92E-08
C23 as Tricosane	161.29033	ND	81	157	ND	0	160	ND	0	81	0.08	9	39	3.92E-08	3.92E-08
n-Tetracosane	161.51613	ND	81	158	ND	0	160	ND	0	81	0.08	9	39	3.93E-08	3.93E-08
C24 as Tetracosane	161.51613	ND	81	158	ND	0	160	ND	0	81	0.08	9	39	3.93E-08	3.93E-08
Total Hydrocarbon			60,993			0			0		60.99	6431	29,683	2.97E-05	2.97E-05

Bagging Data Form — Vacuum Method

Sample Id E025

WSPA

Equipment type:	Valve		**Component ID:**	E-1755	
Equipment Subtype:	Gate		**Unit:**	Refinery E	
Line Size:	2	*inches*	**Date:**	20-Aug-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.79 *inHg*	756.7 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	90.5 °F	32.5 °C	**TVA ID**	37887	
Component Temp:	87 °F	30.6 °C	**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Jet low Flow Recycle*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
13:40	Background	-15 *ppmv*	8-sec Dwell	114 *ppmv*	Total Dwell	4:00 *min:sec*	Final M21	2303 *ppm*
13:59	Initial Bag Vacuum	0.035 *inches H2O*	DGM Vac.	1.6 *inches H2O*	Bag Temp	98.2 °F	Leak @	Stem

Bag Concentrations (ppmv)

Time	14:02	14:06	14:08	14:10	14:12	14:14	14:16	14:18	14:27					
ppmv	35.6	43.7	47.1	49.3	52.2	54.8	55.8	55.4	62.5					

Sorbent Tube Sample Collection Parameters

E025A

Time							
14:18	Volume Start	325.2 *Liters*		Design Sample Flow Rate = 1 liter/min			
14:31	Volume Stop	338.0 *Liters*	Total Vol	12.8 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.955 *L/min*

E025B

14:18	Volume Start	317.3 *Liters*		Design Sample Flow Rate = 1 liter/min			
14:31	Volume Stop	330.4 *Liters*	Total Vol	13.1 *Liters*			
	Sample Run Time	13 *Minutes*		Sorbent Flow	1.008 *L/min*	Sorbent Flow$_{STP}$	0.977 *L/min*
	Total ST Vol$_{STP}$	25.12 *Liters*	DGM Vol$_{STP}$	75.65 *Liters*	Total Run Vol$_{STP}$	100.77 *Liters*	

Bagging Parameters

Time							
14:24	Vacuum check	0.015 *inches H2O*			DGM$_P$	1.6 *inches H2O vacuum*	753.7 *mmHg*
14:22	DGM$_{10L}$ Time	01:39.6 *min:sec.frac*	DGM Time	1.667	DGM Flow	6.00	DGM Flow$_{STP}$ 5.82 *liters/minute*
14:25	Bag Temp.	102.2 °F		39.0 °C	Sample$_T$	82 °F	27.8 °C

Post-Sample Data

14:40	Post Test M21	Background 0 *ppmv*	8-sec Dwell	804 *ppmv*	Total Dwell	4:00 *min:sec*	Final M21	1817 *ppm*
							Leak @	Stem

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	7.87E-05 kg/hr
Percent difference THC ER =	2%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.58E-08
C5 as Pentane	2.58E-08
n-Hexane	3.69E-08
C6 as Hexane	3.69E-08
n-Heptane	5.36E-08
C7 as Heptane	8.63E-08
n-Octane	6.17E-07
C8 as Octane	4.18E-06
n-Nonane	1.98E-06
C9 as Nonane	9.48E-06
n-Decane	3.23E-06
C10 as Decane	1.28E-05
n-Undecane	3.56E-06
C11 as Undecane	1.32E-05
n-Dodecane	3.80E-06
C12 as Dodecane	1.20E-05
n-Tridecane	2.60E-06
C13 as Tridecane	7.24E-06
n-Tetradecane	1.33E-06
C14 as tetradecane	1.80E-06
n-Pentadecane	1.41E-07
C15 as Pentadecane	2.69E-08
n-Hexadecane	2.68E-08
C16 as Hexadecane	2.68E-08
n-Heptadecane	2.65E-08
C17 as Heptadecane	2.65E-08
n-Octadecane	2.68E-08
C18 as Octodecane	2.68E-08
n-Nonadecane	2.68E-08
C19 as Nonadecane	2.68E-08
n-Eicosane	2.67E-08
C20 as Eicosane	2.67E-08
n-Heneicosane	2.70E-08
C21 as Heneicosane	2.70E-08
n-Docosane	2.67E-08
C22 as Docosane	2.67E-08
n-Tricosane	2.68E-08
C23 as Tricosane	2.68E-08
n-Tetracosane	2.69E-08
C24 as Tetracosane	2.69E-08
Total Hydrocarbon	7.87E-05

THC:	4.17E-03	lbs/day	7.60E-04 tons/yr

E025A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E025A	E025A		ND Adj	E026A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.0500	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	17	1.75E-08	0	0	0.00E+00	1.75E-08
C5 as Pentane	75.0500	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	17	1.75E-08	0	0	0.00E+00	1.75E-08
n-Hexane	107.5437	ND	54	149.63	ND	0	220	ND	0	54	0.05	5	25	2.50E-08	0	0	0.00E+00	2.50E-08
C6 as Hexane	107.5437	ND	54	149.63	ND	0	220	ND	0	54	0.05	5	25	2.50E-08	0	0	0.00E+00	2.50E-08
n-Heptane	143.0043	J	143	156.37	ND	0	183	ND	0	143	0.14	14	67	6.65E-08	0	0	0.00E+00	6.65E-08
C7 as Heptane	283.6550	J	284	156.37	ND	0	183	ND	0	284	0.28	29	132	1.32E-07	0	0	0.00E+00	1.32E-07
n-Octane	1265.7932		1,266	152.25	ND	0	158	ND	0	1,266	1.27	128	589	5.89E-07	0	0	0.00E+00	5.89E-07
C8 as Octane	9270.1137		9,270	152.25	ND	0	158	ND	0	9,270	9.27	934	4311	4.31E-06	0	0	0.00E+00	4.31E-06
n-Nonane	4557.3503		4,557	153.38	ND	0	160	ND	0	4,557	4.56	459	2119	2.12E-06	0	0	0.00E+00	2.12E-06
C9 as Nonane	#########		20,117	153.38	ND	0	160	ND	0	20,117	20.12	2027	9356	9.36E-06	0	0	0.00E+00	9.36E-06
n-Decane	7084.0807		7,084	154.77	ND	0	161	ND	0	7,084	7.08	714	3295	3.29E-06	0	0	0.00E+00	3.29E-06
C10 as Decane	#########		28,512	154.77	ND	0	161	ND	0	28,512	28.51	2873	13260	1.33E-05	0	0	0.00E+00	1.33E-05
n-Undecane	7601.2051		7,601	154.37	ND	0	161	ND	0	7,601	7.60	766	3535	3.54E-06	0	0	0.00E+00	3.54E-06
C11 as Undecane	#########		28,336	154.37	ND	0	161	ND	0	28,336	28.34	2855	13178	1.32E-05	0	0	0.00E+00	1.32E-05
n-Dodecane	7917.8927		7,918	153.32	ND	0	159	ND	0	7,918	7.92	798	3682	3.68E-06	0	0	0.00E+00	3.68E-06
C12 as Dodecane	#########		25,635	153.32	ND	0	159	ND	0	25,635	25.63	2583	11922	1.19E-05	0	0	0.00E+00	1.19E-05
n-Tridecane	5633.8447		5,634	153.69	ND	0	160	ND	0	5,634	5.63	568	2620	2.62E-06	0	0	0.00E+00	2.62E-06
C13 as Tridecane	#########		15,939	153.69	ND	0	160	ND	0	15,939	15.94	1606	7413	7.41E-06	0	0	0.00E+00	7.41E-06
n-Tetradecane	3080.1619		3,080	153.54	ND	0	160	ND	0	3,080	3.08	310	1432	1.43E-06	0	0	0.00E+00	1.43E-06
C14 as tetradecane	4180.2344		4,180	153.54	ND	0	160	ND	0	4,180	4.18	421	1944	1.94E-06	0	0	0.00E+00	1.94E-06
n-Pentadecane	394.1809	J	394	154.31	ND	0	160	ND	0	394	0.39	40	183	1.83E-07	0	0	0.00E+00	1.83E-07
C15 as Pentadecane	78.3594	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C16 as Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Heptadecane	77.0312	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C17 as Heptadecane	77.0312	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Octadecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C18 as Octodecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Nonadecane	78.0469	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C19 as Nonadecane	78.0469	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C20 as Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Heneicosane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C21 as Heneicosane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C22 as Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C23 as Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C24 as Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
Total Hydrocarbon			170,873			0			0		170.87	17218	79,468	7.95E-05	0	0	0.00E+00	7.95E-05

E025B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
E025B	E025B		ND Adj	E026A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	146.66259	ND	73	144	ND	0	154	ND	0	73	0.07	7	34	3.41E-08		3.41E-08
C5 as Pentane	146.66259	ND	73	144	ND	0	154	ND	0	73	0.07	7	34	3.41E-08		3.41E-08
n-Hexane	210.16183	ND	105	150	ND	0	220	ND	0	105	0.11	11	49	4.89E-08		4.89E-08
C6 as Hexane	210.16183	ND	105	150	ND	0	220	ND	0	105	0.11	11	49	4.89E-08		4.89E-08
n-Heptane	174.59541	ND	87	156	ND	0	183	ND	0	87	0.09	9	41	4.06E-08		4.06E-08
C7 as Heptane	174.59541	ND	87	156	ND	0	183	ND	0	87	0.09	9	41	4.06E-08		4.06E-08
n-Octane	1385.8252	J	1,386	152	ND	0	158	ND	0	1,386	1.39	140	645	6.45E-07		6.45E-07
C8 as Octane	8699.3447		8,699	152	ND	0	158	ND	0	8,699	8.70	877	4046	4.05E-06		4.05E-06
n-Nonane	3940.996		3,941	153	ND	0	160	ND	0	3,941	3.94	397	1833	1.83E-06		1.83E-06
C9 as Nonane	20661.143		20,661	153	ND	0	160	ND	0	20,661	20.66	2082	9609	9.61E-06		9.61E-06
n-Decane	6799.9621		6,800	155	ND	0	161	ND	0	6,800	6.80	685	3162	3.16E-06		3.16E-06
C10 as Decane	26480.926		26,481	155	ND	0	161	ND	0	26,481	26.48	2668	12315	1.23E-05		1.23E-05
n-Undecane	7726.4731		7,726	154	ND	0	161	ND	0	7,726	7.73	779	3593	3.59E-06		3.59E-06
C11 as Undecane	28427.227		28,427	154	ND	0	161	ND	0	28,427	28.43	2864	13221	1.32E-05		1.32E-05
n-Dodecane	8410.4082		8,410	153	ND	0	159	ND	0	8,410	8.41	847	3911	3.91E-06		3.91E-06
C12 as Dodecane	26009.003		26,009	153	ND	0	159	ND	0	26,009	26.01	2621	12096	1.21E-05		1.21E-05
n-Tridecane	5546.9389		5,547	154	ND	0	160	ND	0	5,547	5.55	559	2580	2.58E-06		2.58E-06
C13 as Tridecane	15193.264		15,193	154	ND	0	160	ND	0	15,193	15.19	1531	7066	7.07E-06		7.07E-06
n-Tetradecane	2618.5708		2,619	154	ND	0	160	ND	0	2,619	2.62	264	1218	1.22E-06		1.22E-06
C14 as tetradecane	3560.1451		3,560	154	ND	0	160	ND	0	3,560	3.56	359	1656	1.66E-06		1.66E-06
n-Pentadecane	211.52667	J	212	154	ND	0	160	ND	0	212	0.21	21	98	9.84E-08		9.84E-08
C15 as Pentadecane	153.12977	ND	77	154	ND	0	160	ND	0	77	0.08	8	36	3.56E-08		3.56E-08
n-Hexadecane	152.30534	ND	76	153	ND	0	160	ND	0	76	0.08	8	35	3.54E-08		3.54E-08
C16 as Hexadecane	152.30534	ND	76	153	ND	0	160	ND	0	76	0.08	8	35	3.54E-08		3.54E-08
n-Heptadecane	150.53435	ND	75	152	ND	0	158	ND	0	75	0.08	8	35	3.50E-08		3.50E-08
C17 as Heptadecane	150.53435	ND	75	152	ND	0	158	ND	0	75	0.08	8	35	3.50E-08		3.50E-08
n-Octadecane	152.21374	ND	76	153	ND	0	160	ND	0	76	0.08	8	35	3.54E-08		3.54E-08
C18 as Octodecane	152.21374	ND	76	153	ND	0	160	ND	0	76	0.08	8	35	3.54E-08		3.54E-08
n-Nonadecane	152.51908	ND	76	154	ND	0	160	ND	0	76	0.08	8	35	3.55E-08		3.55E-08
C19 as Nonadecane	152.51908	ND	76	154	ND	0	160	ND	0	76	0.08	8	35	3.55E-08		3.55E-08
n-Eicosane	152.15267	ND	76	153	ND	0	159	ND	0	76	0.08	8	35	3.54E-08		3.54E-08
C20 as Eicosane	152.15267	ND	76	153	ND	0	159	ND	0	76	0.08	8	35	3.54E-08		3.54E-08
n-Heneicosane	153.58778	ND	77	155	ND	0	161	ND	0	77	0.08	8	36	3.57E-08		3.57E-08
C21 as Heneicosane	153.58778	ND	77	155	ND	0	161	ND	0	77	0.08	8	36	3.57E-08		3.57E-08
n-Docosane	151.84732	ND	76	153	ND	0	159	ND	0	76	0.08	8	35	3.53E-08		3.53E-08
C22 as Docosane	151.84732	ND	76	153	ND	0	159	ND	0	76	0.08	8	35	3.53E-08		3.53E-08
n-Tricosane	152.67175	ND	76	154	ND	0	160	ND	0	76	0.08	8	36	3.55E-08		3.55E-08
C23 as Tricosane	152.67175	ND	76	154	ND	0	160	ND	0	76	0.08	8	36	3.55E-08		3.55E-08
n-Tetracosane	152.88549	ND	76	154	ND	0	160	ND	0	76	0.08	8	36	3.56E-08		3.56E-08
C24 as Tetracosane	152.88549	ND	76	154	ND	0	160	ND	0	76	0.08	8	36	3.56E-08		3.56E-08
Total Hydrocarbon			167,650			0			0		167.65	16893	77,969	7.80E-05		7.80E-05

Bagging Data Form	Vacuum Method	Sample Id	E027
Equipment type:	Valve	Component ID:	E-2236
Equipment Subtype:	Gate	Unit:	Refinery E
Line Size:	6 inches	Date:	21-Aug-18
Phase (G, LL, HL):	HL	Analysis team:	EG/DR
Barometric pressure	29.88 inHg; 759.0 mmHg	Sample Pump A	LP52979
		Sample Pump B	LP52975
Ambient Temp:	75 °F; 23.9 °C	TVA ID	34251
Component Temp:	280 °F; 137.8 °C	Stream Pressure/Temp:	psig; °F
Stream Description:	Jet to HP		

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:05	Background	0	ppmv	8-sec Dwell	342	ppmv	Total Dwell	2:30	min:sec	Final M21	1071 ppm
9:47	Initial Bag Vacuum	0.025	inches H2O	DGM Vac.	1.9	inches H2O	Bag Temp	111	°F	Leak @	Packing

Bag Concentrations (ppmv) (had to vent bag)

Time	9:49	9:51	9:53	9:55	9:57	9:59	10:01	10:03	10:05	10:07	10:09	10:16	10:18	
ppmv	87.8	98.8	105	112	118	124	128	138	141	143	145	141	139	

Sorbent Tube Sample Collection Parameters

E027A

Time									
10:09	Volume Start	340.9	Liters		Design Sample Flow Rate = 1 liter/min				
10:22	Volume Stop	353.6	Liters	Total Vol	12.7	Liters			
	Sample Run Time	13	Minutes	Sorbent Flow	0.977	L/min	Sorbent Flow$_{STP}$	0.957	L/min

E027B

10:09	Volume Start	333.6	Liters		Design Sample Flow Rate = 1 liter/min				
10:22	Volume Stop	346.4	Liters	Total Vol	12.8	Liters			
	Sample Run Time	13	Minutes	Sorbent Flow	0.985	L/min	Sorbent Flow$_{STP}$	0.964	L/min
	Total ST Vol$_{STP}$	24.98	Liters	DGM Vol$_{STP}$	85.85	Liters	Total Run Vol$_{STP}$	110.82	Liters

Bagging Parameters

Time										
10:14	Vacuum check	0.025	inches H2O			DGM$_P$	1.8	inches H2O vacuum	755.6	mmHg
10:12	DGM$_{10L}$ Time	01:28.6	min:sec.frac	DGM Time	1.483	DGM Flow	6.74	DGM Flow$_{STP}$	6.60	liters/minute
10:13	Bag Temp.	129.7	°F	54.3	°C	Sample$_T$	78	°F	25.6	°C

Post-Sample Data

10:52	Post Test M21	Background	25	ppmv	8-sec Dwell	378	ppmv	Total Dwell	3:00 min:sec	Final M21	1124 ppm
										Leak @	Packing

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min; 0:00 hours:min
Organic condensate collected	N/A	ml			
Density of organic condensate	N/A	g/ml			

Average THC emissions =	1.79E-04 kg/hr
Percent difference THC ER =	104%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.89E-08
C5 as Pentane	2.89E-08
n-Hexane	4.14E-08
C6 as Hexane	4.14E-08
n-Heptane	5.14E-08
C7 as Heptane	3.00E-07
n-Octane	3.71E-07
C8 as Octane	3.31E-06
n-Nonane	1.74E-06
C9 as Nonane	9.93E-06
n-Decane	3.99E-06
C10 as Decane	2.00E-05
n-Undecane	6.95E-06
C11 as Undecane	3.08E-05
n-Dodecane	1.11E-05
C12 as Dodecane	4.03E-05
n-Tridecane	9.95E-06
C13 as Tridecane	2.82E-05
n-Tetradecane	4.69E-06
C14 as tetradecane	6.12E-06
n-Pentadecane	2.29E-07
C15 as Pentadecane	3.01E-08
n-Hexadecane	3.00E-08
C16 as Hexadecane	3.00E-08
n-Heptadecane	2.96E-08
C17 as Heptadecane	2.96E-08
n-Octadecane	3.00E-08
C18 as Octodecane	3.00E-08
n-Nonadecane	3.00E-08
C19 as Nonadecane	3.00E-08
n-Eicosane	2.99E-08
C20 as Eicosane	2.99E-08
n-Heneicosane	3.02E-08
C21 as Heneicosane	3.02E-08
n-Docosane	2.99E-08
C22 as Docosane	2.99E-08
n-Tricosane	3.00E-08
C23 as Tricosane	3.00E-08
n-Tetracosane	3.01E-08
C24 as Tetracosane	3.01E-08
Total Hydrocarbon	1.79E-04

THC:	9.46E-03	lbs/day	1.73E-03	tons/yr

E027A	ANALYTICAL RESULTS E027A		ND Adj	BACKGROUND E028A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C5 as Pentane	75.6409	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Hexane	108.3906	ND	54	149.63	ND	0	220	ND	0	54	0.05	6	28	2.77E-08	0	0	0.00E+00	2.77E-08
C6 as Hexane	108.3906	ND	54	149.63	ND	0	220	ND	0	54	0.05	6	28	2.77E-08	0	0	0.00E+00	2.77E-08
n-Heptane	111.6891	J	112	156.37	ND	0	183	ND	0	112	0.11	12	57	5.71E-08	0	0	0.00E+00	5.71E-08
C7 as Heptane	1082.6401		1,083	156.37	ND	0	183	ND	0	1,083	1.08	120	554	5.54E-07	0	0	0.00E+00	5.54E-07
n-Octane	1095.8128		1,096	152.25	ND	0	158	ND	0	1,096	1.10	121	561	5.61E-07	0	0	0.00E+00	5.61E-07
C8 as Octane	9821.5164		9,822	152.25	ND	0	158	ND	0	9,822	9.82	1088	5024	5.02E-06	0	0	0.00E+00	5.02E-06
n-Nonane	5251.2494		5,251	153.38	ND	0	160	ND	0	5,251	5.25	582	2686	2.69E-06	0	0	0.00E+00	2.69E-06
C9 as Nonane	28737.2031		28,737	153.38	ND	0	160	ND	0	28,737	28.74	3185	14699	1.47E-05	0	0	0.00E+00	1.47E-05
n-Decane	11834.2756		11,834	154.77	ND	0	161	ND	0	11,834	11.83	1312	6053	6.05E-06	0	0	0.00E+00	6.05E-06
C10 as Decane	59771.7925		59,772	154.77	ND	0	161	ND	0	59,772	59.77	6624	30573	3.06E-05	0	0	0.00E+00	3.06E-05
n-Undecane	20499.6953		20,500	154.37	ND	0	161	ND	0	20,500	20.50	2272	10485	1.05E-05	0	0	0.00E+00	1.05E-05
C11 as Undecane	90472.7615		90,473	154.37	ND	0	161	ND	0	90,473	90.47	10027	46276	4.63E-05	0	0	0.00E+00	4.63E-05
n-Dodecane	32554.4077		32,554	153.32	ND	0	159	ND	0	32,554	32.55	3608	16651	1.67E-05	0	0	0.00E+00	1.67E-05
C12 as Dodecane	118563.2456		118,563	153.32	ND	0	159	ND	0	118,563	118.56	13140	60645	6.06E-05	0	0	0.00E+00	6.06E-05
n-Tridecane	30099.5338		30,100	153.69	ND	0	160	ND	0	30,100	30.10	3336	15396	1.54E-05	0	0	0.00E+00	1.54E-05
C13 as Tridecane	85387.2443		85,387	153.69	ND	0	160	ND	0	85,387	85.39	9463	43675	4.37E-05	0	0	0.00E+00	4.37E-05
n-Tetradecane	14479.4708		14,479	153.54	ND	0	160	ND	0	14,479	14.48	1605	7406	7.41E-06	0	0	0.00E+00	7.41E-06
C14 as tetradecane	18933.3805		18,933	153.54	ND	0	160	ND	0	18,933	18.93	2098	9684	9.68E-06	0	0	0.00E+00	9.68E-06
n-Pentadecane	817.8639		818	154.31	ND	0	160	ND	0	818	0.82	91	418	4.18E-07	0	0	0.00E+00	4.18E-07
C15 as Pentadecane	78.9764	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C16 as Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C17 as Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Octadecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C18 as Octodecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C19 as Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C20 as Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C21 as Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C22 as Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C23 as Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C24 as Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
Total Hydrocarbon			530,444			0			0		530.44	58786	271,320	2.71E-04	0	0	0.00E+00	2.71E-04

E027B	ANALYTICAL RESULTS E027B		ND Adj	BACKGROUND E028A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.0999978	ND	75	144	ND	0	154	ND	0	75	0.08	8	38	3.84E-08	3.84E-08
C5 as Pentane	150.0999978	ND	75	144	ND	0	154	ND	0	75	0.08	8	38	3.84E-08	3.84E-08
n-Hexane	215.0874968	ND	108	150	ND	0	220	ND	0	108	0.11	12	55	5.50E-08	5.50E-08
C6 as Hexane	215.0874968	ND	108	150	ND	0	220	ND	0	108	0.11	12	55	5.50E-08	5.50E-08
n-Heptane	178.6874973	ND	89	156	ND	0	183	ND	0	89	0.09	10	46	4.57E-08	4.57E-08
C7 as Heptane	178.6874973	ND	89	156	ND	0	183	ND	0	89	0.09	10	46	4.57E-08	4.57E-08
n-Octane	354.8341994	J	355	152	ND	0	158	ND	0	355	0.35	39	181	1.81E-07	1.81E-07
C8 as Octane	3116.193342		3,116	152	ND	0	158	ND	0	3,116	3.12	345	1594	1.59E-06	1.59E-06
n-Nonane	1549.017337	J	1,549	153	ND	0	160	ND	0	1,549	1.55	172	792	7.92E-07	7.92E-07
C9 as Nonane	10094.27981		10,094	153	ND	0	160	ND	0	10,094	10.09	1119	5163	5.16E-06	5.16E-06
n-Decane	3772.011112		3,772	155	ND	0	161	ND	0	3,772	3.77	418	1929	1.93E-06	1.93E-06
C10 as Decane	18350.07208		18,350	155	ND	0	161	ND	0	18,350	18.35	2034	9386	9.39E-06	9.39E-06
n-Undecane	6695.017907		6,695	154	ND	0	161	ND	0	6,695	6.70	742	3424	3.42E-06	3.42E-06
C11 as Undecane	29994.75437		29,995	154	ND	0	161	ND	0	29,995	29.99	3324	15342	1.53E-05	1.53E-05
n-Dodecane	10991.76741		10,992	153	ND	0	159	ND	0	10,992	10.99	1218	5622	5.62E-06	5.62E-06
C12 as Dodecane	38855.67206		38,856	153	ND	0	159	ND	0	38,856	38.86	4306	19874	1.99E-05	1.99E-05
n-Tridecane	8789.98364		8,790	154	ND	0	160	ND	0	8,790	8.79	974	4496	4.50E-06	4.50E-06
C13 as Tridecane	25001.4069		25,001	154	ND	0	160	ND	0	25,001	25.00	2771	12788	1.28E-05	1.28E-05
n-Tetradecane	3848.198515		3,848	154	ND	0	160	ND	0	3,848	3.85	426	1968	1.97E-06	1.97E-06
C14 as tetradecane	5004.272877		5,004	154	ND	0	160	ND	0	5,004	5.00	555	2560	2.56E-06	2.56E-06
n-Pentadecane	156.7187477	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	4.01E-08	4.01E-08
C15 as Pentadecane	156.7187477	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	4.01E-08	4.01E-08
n-Hexadecane	155.8749977	ND	78	153	ND	0	160	ND	0	78	0.08	9	40	3.99E-08	3.99E-08
C16 as Hexadecane	155.8749977	ND	78	153	ND	0	160	ND	0	78	0.08	9	40	3.99E-08	3.99E-08
n-Heptadecane	154.0624977	ND	77	152	ND	0	158	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
C17 as Heptadecane	154.0624977	ND	77	152	ND	0	158	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
n-Octadecane	155.7812477	ND	78	153	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
C18 as Octodecane	155.7812477	ND	78	153	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
n-Nonadecane	156.0937477	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	3.99E-08	3.99E-08
C19 as Nonadecane	156.0937477	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	3.99E-08	3.99E-08
n-Eicosane	155.7187477	ND	78	153	ND	0	159	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
C20 as Eicosane	155.7187477	ND	78	153	ND	0	159	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
n-Heneicosane	157.1874977	ND	79	155	ND	0	161	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
C21 as Heneicosane	157.1874977	ND	79	155	ND	0	161	ND	0	79	0.08	9	40	4.02E-08	4.02E-08
n-Docosane	155.4062477	ND	78	153	ND	0	159	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
C22 as Docosane	155.4062477	ND	78	153	ND	0	159	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
n-Tricosane	156.2499977	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	4.00E-08	4.00E-08
C23 as Tricosane	156.2499977	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	4.00E-08	4.00E-08
n-Tetracosane	156.4687477	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	4.00E-08	4.00E-08
C24 as Tetracosane	156.4687477	ND	78	154	ND	0	160	ND	0	78	0.08	9	40	4.00E-08	4.00E-08
Total Hydrocarbon			168,521			0			0		168.52	18676	86,198	8.62E-05	8.62E-05

Bagging Data Form — Vacuum Method

Sample Id: E030

WSPA — Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	E-2200		
Equipment Subtype:	Plug		**Unit:**	Refinery E		
Line Size:	3/4	inches	**Date:**	21-Aug-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	29.87 inHg	758.7 mmHg	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	77.8 °F	25.4 °C	**TVA ID**	36502		
Component Temp:	97 °F	36.1 °C	**Stream Pressure/Temp:**		psig	°F
Stream Description:	Jet					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
13:36	Background	-5	ppmv	8-sec Dwell	166	ppmv	Total Dwell	3:00 min:sec	Final M21	864 ppm
13:55	Initial Bag Vacuum	0.095	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	92.8 °F	Leak @	Threaded Connector 3 o'clock

Bag Concentrations (ppmv) (had to vent bag)

Time	14:00	14:02	14:04	14:06	14:08	14:10	14:12	14:14	14:16	14:22	14:24			
ppmv	72.5	78.7	81.2	86.3	87.9	89.9	91.6	91.7	92.2	94.2	94.4			

Sorbent Tube Sample Collection Parameters

E030A

Time									
14:16	Volume Start	353.6	Liters		Design Sample Flow Rate = 1 liter/min				
14:29	Volume Stop	366.2	Liters	Total Vol	12.6	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.969 L/min	$\text{Sorbent Flow}_{STP}$	0.954	L/min

E030B

Time									
14:16	Volume Start	346.4	Liters		Design Sample Flow Rate = 1 liter/min				
14:29	Volume Stop	359.1	Liters	Total Vol	12.7	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.977 L/min	$\text{Sorbent Flow}_{STP}$	0.962	L/min

$\text{Total ST Vol}_{STP}$ 24.91 Liters — DGM Vol_{STP} 74.57 Liters — $\text{Total Run Vol}_{STP}$ 99.48 Liters

Bagging Parameters

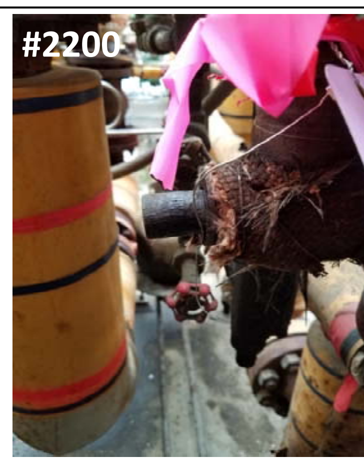
Time										
14:20	Vacuum check	0.9	inches H2O			DGM_P	1.8	inches H2O vacuum	755.3	mmHg
14:19	DGM_{10L} Time	01:43.3	min:sec.frac	DGM Time	1.717	DGM Flow	5.83	DGM Flow_{STP}	5.74	liters/minute
14:21	Bag Temp.	102.4	°F	39.1	°C	Sample_T	75	°F	23.9	°C

Post-Sample Data

14:54	Post Test M21	Background	20 ppmv	8-sec Dwell	374	ppmv	Total Dwell	4:00 min:sec	Final M21	814 ppm
									Leak @	Threaded Connector 3 o'clock

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A	hour:min	0:00 hours:min
Organic condensate collected	N/A	ml				
Density of organic condensate	N/A	g/ml				

Average THC emissions =	1.79E-04 kg/hr
Percent difference THC ER =	6%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.61E-08
C5 as Pentane	2.61E-08
n-Hexane	3.74E-08
C6 as Hexane	3.74E-08
n-Heptane	3.11E-08
C7 as Heptane	5.81E-08
n-Octane	2.54E-07
C8 as Octane	2.64E-06
n-Nonane	1.19E-06
C9 as Nonane	8.25E-06
n-Decane	2.84E-06
C10 as Decane	1.69E-05
n-Undecane	5.76E-06
C11 as Undecane	3.11E-05
n-Dodecane	1.11E-05
C12 as Dodecane	4.54E-05
n-Tridecane	9.43E-06
C13 as Tridecane	3.02E-05
n-Tetradecane	4.37E-06
C14 as tetradecane	8.67E-06
n-Pentadecane	5.47E-07
C15 as Pentadecane	9.62E-08
n-Hexadecane	2.71E-08
C16 as Hexadecane	2.71E-08
n-Heptadecane	2.68E-08
C17 as Heptadecane	2.68E-08
n-Octadecane	2.71E-08
C18 as Octodecane	2.71E-08
n-Nonadecane	2.72E-08
C19 as Nonadecane	2.72E-08
n-Eicosane	2.71E-08
C20 as Eicosane	2.71E-08
n-Heneicosane	2.73E-08
C21 as Heneicosane	2.73E-08
n-Docosane	2.70E-08
C22 as Docosane	2.70E-08
n-Tricosane	2.72E-08
C23 as Tricosane	2.72E-08
n-Tetracosane	2.72E-08
C24 as Tetracosane	2.72E-08
Total Hydrocarbon	1.79E-04

THC:	9.50E-03	lbs/day	1.73E-03	tons/yr

E030A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E030A	E030A		ND Adj	E031A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.2413	ND	38	145.15	ND	0	154	ND	0	38	0.04	4	18	1.75E-08	0	0	0.00E+00	1.75E-08
C5 as Pentane	76.2413	ND	38	145.15	ND	0	154	ND	0	38	0.04	4	18	1.75E-08	0	0	0.00E+00	1.75E-08
n-Hexane	109.2508	ND	55	150.79	ND	0	220	ND	0	55	0.05	5	25	2.51E-08	0	0	0.00E+00	2.51E-08
C6 as Hexane	109.2508	ND	55	150.79	ND	0	220	ND	0	55	0.05	5	25	2.51E-08	0	0	0.00E+00	2.51E-08
n-Heptane	90.7619	ND	45	157.58	ND	0	183	ND	0	45	0.05	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C7 as Heptane	163.1795	J	163	157.58	ND	0	183	ND	0	163	0.16	16	75	7.49E-08	0	0	0.00E+00	7.49E-08
n-Octane	541.5717	J	542	153.43	ND	0	158	ND	0	542	0.54	54	249	2.49E-07	0	0	0.00E+00	2.49E-07
C8 as Octane	5869.1460		5,869	153.43	ND	0	158	ND	0	5,869	5.87	584	2695	2.69E-06	0	0	0.00E+00	2.69E-06
n-Nonane	2823.7369		2,824	154.57	ND	0	160	ND	0	2,824	2.82	281	1297	1.30E-06	0	0	0.00E+00	1.30E-06
C9 as Nonane	17389.9973		17,390	154.57	ND	0	160	ND	0	17,390	17.39	1730	7985	7.98E-06	0	0	0.00E+00	7.98E-06
n-Decane	6333.7565		6,334	155.97	ND	0	161	ND	0	6,334	6.33	630	2908	2.91E-06	0	0	0.00E+00	2.91E-06
C10 as Decane	37858.5503		37,859	155.97	ND	0	161	ND	0	37,859	37.86	3766	17383	1.74E-05	0	0	0.00E+00	1.74E-05
n-Undecane	12461.3528		12,461	155.57	ND	0	161	ND	0	12,461	12.46	1240	5722	5.72E-06	0	0	0.00E+00	5.72E-06
C11 as Undecane	66543.5209		66,544	155.57	ND	0	161	ND	0	66,544	66.54	6620	30553	3.06E-05	0	0	0.00E+00	3.06E-05
n-Dodecane	23360.9237		23,361	154.51	ND	0	159	ND	0	23,361	23.36	2324	10726	1.07E-05	0	0	0.00E+00	1.07E-05
C12 as Dodecane	95719.7717		95,720	154.51	ND	0	159	ND	0	95,720	95.72	9522	43949	4.39E-05	0	0	0.00E+00	4.39E-05
n-Tridecane	20569.0594		20,569	154.88	ND	0	160	ND	0	20,569	20.57	2046	9444	9.44E-06	0	0	0.00E+00	9.44E-06
C13 as Tridecane	63552.7213		63,553	154.88	ND	0	160	ND	0	63,553	63.55	6322	29180	2.92E-05	0	0	0.00E+00	2.92E-05
n-Tetradecane	9003.5258		9,004	154.73	ND	0	160	ND	0	9,004	9.00	896	4134	4.13E-06	0	0	0.00E+00	4.13E-06
C14 as tetradecane	15748.2913		15,748	154.73	ND	0	160	ND	0	15,748	15.75	1567	7231	7.23E-06	0	0	0.00E+00	7.23E-06
n-Pentadecane	1046.9146		1,047	155.5	ND	0	160	ND	0	1,047	1.05	104	481	4.81E-07	0	0	0.00E+00	4.81E-07
C15 as Pentadecane	129.4836	J	129	155.5	ND	0	160	ND	0	129	0.13	13	59	5.95E-08	0	0	0.00E+00	5.95E-08
n-Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C16 as Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Heptadecane	78.2540	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C17 as Heptadecane	78.2540	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Octadecane	79.1270	ND	40	154.57	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C18 as Octodecane	79.1270	ND	40	154.57	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Nonadecane	79.2857	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C19 as Nonadecane	79.2857	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Eicosane	79.0952	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C20 as Eicosane	79.0952	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Heneicosane	79.8413	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C21 as Heneicosane	79.8413	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Docosane	78.9365	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C22 as Docosane	78.9365	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Tricosane	79.3651	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C23 as Tricosane	79.3651	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Tetracosane	79.4762	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C24 as Tetracosane	79.4762	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
Total Hydrocarbon			380,059			0			0		380.06	37809	174,503	1.75E-04	0	0	0.00E+00	1.75E-04

E030B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
E030B	E030B		ND Adj	E031A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	151.281892	ND	76	145	ND	0	154	ND	0	76	0.08	8	35	3.47E-08		3.47E-08
C5 as Pentane	151.281892	ND	76	145	ND	0	154	ND	0	76	0.08	8	35	3.47E-08		3.47E-08
n-Hexane	216.7811056	ND	108	151	ND	0	220	ND	0	108	0.11	11	50	4.98E-08		4.98E-08
C6 as Hexane	216.7811056	ND	108	151	ND	0	220	ND	0	108	0.11	11	50	4.98E-08		4.98E-08
n-Heptane	180.0944909	ND	90	158	ND	0	183	ND	0	90	0.09	9	41	4.13E-08		4.13E-08
C7 as Heptane	180.0944909	ND	90	158	ND	0	183	ND	0	90	0.09	9	41	4.13E-08		4.13E-08
n-Octane	564.6219949	J	565	153	ND	0	158	ND	0	565	0.56	56	259	2.59E-07		2.59E-07
C8 as Octane	5649.482619		5,649	153	ND	0	158	ND	0	5,649	5.65	562	2594	2.59E-06		2.59E-06
n-Nonane	2365.477527		2,365	155	ND	0	160	ND	0	2,365	2.37	235	1086	1.09E-06		1.09E-06
C9 as Nonane	18553.64953		18,554	155	ND	0	160	ND	0	18,554	18.55	1846	8519	8.52E-06		8.52E-06
n-Decane	6041.549444		6,042	156	ND	0	161	ND	0	6,042	6.04	601	2774	2.77E-06		2.77E-06
C10 as Decane	35733.83298		35,734	156	ND	0	161	ND	0	35,734	35.73	3555	16407	1.64E-05		1.64E-05
n-Undecane	12609.31198		12,609	156	ND	0	161	ND	0	12,609	12.61	1254	5790	5.79E-06		5.79E-06
C11 as Undecane	68766.01237		68,766	156	ND	0	161	ND	0	68,766	68.77	6841	31574	3.16E-05		3.16E-05
n-Dodecane	25115.83868		25,116	155	ND	0	159	ND	0	25,116	25.12	2499	11532	1.15E-05		1.15E-05
C12 as Dodecane	102133.8572		102,134	155	ND	0	159	ND	0	102,134	102.13	10160	46894	4.69E-05		4.69E-05
n-Tridecane	20515.65594		20,516	155	ND	0	160	ND	0	20,516	20.52	2041	9420	9.42E-06		9.42E-06
C13 as Tridecane	68061.32787		68,061	155	ND	0	160	ND	0	68,061	68.06	6771	31250	3.13E-05		3.13E-05
n-Tetradecane	10019.51322		10,020	155	ND	0	160	ND	0	10,020	10.02	997	4600	4.60E-06		4.60E-06
C14 as tetradecane	22003.89334		22,004	155	ND	0	160	ND	0	22,004	22.00	2189	10103	1.01E-05		1.01E-05
n-Pentadecane	1335.992811	J	1,336	156	ND	0	160	ND	0	1,336	1.34	133	613	6.13E-07		6.13E-07
C15 as Pentadecane	289.5916846	J	290	156	ND	0	160	ND	0	290	0.29	29	133	1.33E-07		1.33E-07
n-Hexadecane	157.1023646	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.61E-08		3.61E-08
C16 as Hexadecane	157.1023646	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.61E-08		3.61E-08
n-Heptadecane	155.2755929	ND	78	153	ND	0	158	ND	0	78	0.08	8	36	3.56E-08		3.56E-08
C17 as Heptadecane	155.2755929	ND	78	153	ND	0	158	ND	0	78	0.08	8	36	3.56E-08		3.56E-08
n-Octadecane	157.0078764	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.60E-08		3.60E-08
C18 as Octodecane	157.0078764	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.60E-08		3.60E-08
n-Nonadecane	157.322837	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.61E-08		3.61E-08
C19 as Nonadecane	157.322837	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.61E-08		3.61E-08
n-Eicosane	156.9448842	ND	78	155	ND	0	159	ND	0	78	0.08	8	36	3.60E-08		3.60E-08
C20 as Eicosane	156.9448842	ND	78	155	ND	0	159	ND	0	78	0.08	8	36	3.60E-08		3.60E-08
n-Heneicosane	158.4251992	ND	79	156	ND	0	161	ND	0	79	0.08	8	36	3.64E-08		3.64E-08
C21 as Heneicosane	158.4251992	ND	79	156	ND	0	161	ND	0	79	0.08	8	36	3.64E-08		3.64E-08
n-Docosane	156.6299236	ND	78	154	ND	0	159	ND	0	78	0.08	8	36	3.60E-08		3.60E-08
C22 as Docosane	156.6299236	ND	78	154	ND	0	159	ND	0	78	0.08	8	36	3.60E-08		3.60E-08
n-Tricosane	157.4803173	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.62E-08		3.62E-08
C23 as Tricosane	157.4803173	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.62E-08		3.62E-08
n-Tetracosane	157.7007898	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.62E-08		3.62E-08
C24 as Tetracosane	157.7007898	ND	79	155	ND	0	160	ND	0	79	0.08	8	36	3.62E-08		3.62E-08
Total Hydrocarbon			401,722			0			0		401.72	39964	184,449	1.84E-04		1.84E-04

Bagging Data Form — Vacuum Method

Sample Id E033

Equipment type:	Pump			**Component ID:**	E-331	
Equipment Subtype:	Seal - back (farthest from motor)			**Unit:**	Refinery E	
Line Size:	6	inches		**Date:**	22-Aug-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.96 inHg	761.0	mmHg	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	76.8 °F	24.9	°C	**TVA ID**	34251	
Component Temp:	207 °F	97.2	°C	**Stream Pressure/Temp:**	psig	°F
Stream Description:	Jet (Pump On)					

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
8:53	Background	6	ppmv	8-sec Dwell	243	ppmv	Total Dwell	1:00	min:sec	Final M21	372 ppm
9:54	Initial Bag Vacuum	0.01	inches H2O	DGM Vac.	1.8	inches H2O	Bag Temp	135.7	°F	Leak @	Seal - Rear

Bag Concentrations (ppmv)

Time	9:58	10:00	10:02	10:04	10:06	10:08	10:10	10:15
ppmv	1144	1267	1374	1425	1474	1564	1639	2542

Sorbent Tube Sample Collection Parameters

E033A

Time									
10:16	Volume Start	368.4	Liters		Design Sample Flow Rate = 1 liter/min				
10:29	Volume Stop	381.2	Liters	Total Vol	12.8	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.985 L/min	Sorbent $Flow_{STP}$	0.962	L/min

E033B

10:16	Volume Start	361.3	Liters		Design Sample Flow Rate = 1 liter/min				
10:29	Volume Stop	374.3	Liters	Total Vol	13.0	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	1.000 L/min	Sorbent $Flow_{STP}$	0.977	L/min
	Total ST Vol_{STP}	25.20	Liters	DGM Vol_{STP}	73.96	Liters	Total Run Vol_{STP}	99.16	Liters

Bagging Parameters

Time										
10:20	Vacuum check	0.01	inches H2O			DGM_P	1.8	inches H2O vacuum	757.6	mmHg
10:20	DGM_{10L} Time	01:42.5	min:sec.frac	DGM Time	1.717	DGM Flow	5.83	DGM $Flow_{STP}$	5.69	liters/minute
10:21	Bag Temp.	141.6	°F	60.9	°C	$Sample_T$	81	°F	27.2	°C

Post-Sample Data

11:00	Post Test M21	Background	17	ppmv	8-sec Dwell	177	ppmv	Total Dwell	2:00 min:sec	Final M21	822 ppm
										Leak @	Seal - Rear

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A hour:min	0:00 hours:min
Organic condensate collected	N/A	ml			
Density of organic condensate	N/A	g/ml			

Average THC emissions =	4.01E-03	kg/hr
Percent difference THC ER =	8%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.55E-08
C5 as Pentane	2.55E-08
n-Hexane	5.01E-08
C6 as Hexane	5.40E-08
n-Heptane	1.35E-06
C7 as Heptane	3.05E-06
n-Octane	1.96E-05
C8 as Octane	1.64E-04
n-Nonane	9.51E-05
C9 as Nonane	4.70E-04
n-Decane	1.71E-04
C10 as Decane	6.61E-04
n-Undecane	2.23E-04
C11 as Undecane	7.79E-04
n-Dodecane	2.40E-04
C12 as Dodecane	6.42E-04
n-Tridecane	1.40E-04
C13 as Tridecane	2.94E-04
n-Tetradecane	5.12E-05
C14 as tetradecane	4.98E-05
n-Pentadecane	3.29E-06
C15 as Pentadecane	3.65E-07
n-Hexadecane	3.63E-07
C16 as Hexadecane	3.63E-07
n-Heptadecane	3.59E-07
C17 as Heptadecane	3.59E-07
n-Octadecane	3.63E-07
C18 as Octodecane	3.63E-07
n-Nonadecane	3.63E-07
C19 as Nonadecane	3.63E-07
n-Eicosane	3.63E-07
C20 as Eicosane	3.63E-07
n-Heneicosane	3.66E-07
C21 as Heneicosane	3.66E-07
n-Docosane	3.62E-07
C22 as Docosane	3.62E-07
n-Tricosane	3.64E-07
C23 as Tricosane	3.64E-07
n-Tetracosane	2.06E-07
C24 as Tetracosane	3.64E-07
Total Hydrocarbon	4.01E-03

THC:	2.12E-01	lbs/day	3.88E-02	tons/yr

E033A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E033A	E033A		ND Adj	E034A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.0500	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
C5 as Pentane	75.0500	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
n-Hexane	113.1723	J	113	149.63	ND	0	220	ND	0	113	0.11	11	52	5.18E-08	0	0	0.00E+00	5.18E-08
C6 as Hexane	130.2257	J	130	149.63	ND	0	220	ND	0	130	0.13	13	60	5.96E-08	0	0	0.00E+00	5.96E-08
n-Heptane	3318.7542		3,319	156.37	ND	0	183	ND	0	3,319	3.32	329	1519	1.52E-06	0	0	0.00E+00	1.52E-06
C7 as Heptane	6145.4592		6,145	156.37	ND	0	183	ND	0	6,145	6.15	609	2813	2.81E-06	0	0	0.00E+00	2.81E-06
n-Octane	44239.6612		44,240	152.25	ND	0	158	ND	0	44,240	44.24	4387	20247	2.02E-05	0	0	0.00E+00	2.02E-05
C8 as Octane	368837.0495		368,837	152.25	ND	0	158	ND	0	368,837	368.84	36575	168808	1.69E-04	0	0	0.00E+00	1.69E-04
n-Nonane	214396.8557		214,397	153.38	ND	0	160	ND	0	214,397	214.40	21260	98124	9.81E-05	0	0	0.00E+00	9.81E-05
C9 as Nonane	1053758.2185		1,053,758	153.38	ND	0	160	ND	0	1,053,758	1053.76	104494	482281	4.82E-04	0	0	0.00E+00	4.82E-04
n-Decane	384898.0556		384,898	154.77	ND	0	161	ND	0	384,898	384.90	38168	176159	1.76E-04	0	0	0.00E+00	1.76E-04
C10 as Decane	1488784.9553		1,488,785	154.77	ND	0	161	ND	0	1,488,785	1488.78	147633	681382	6.81E-04	0	0	0.00E+00	6.81E-04
n-Undecane	502602.7303		502,603	154.37	ND	0	161	ND	0	502,603	502.60	49840	230030	2.30E-04	0	0	0.00E+00	2.30E-04
C11 as Undecane	1754854.2285		1,754,854	154.37	ND	0	161	ND	0	1,754,854	1754.85	174017	803156	8.03E-04	0	0	0.00E+00	8.03E-04
n-Dodecane	544157.4201		544,157	153.32	ND	0	159	ND	0	544,157	544.16	53960	249048	2.49E-04	0	0	0.00E+00	2.49E-04
C12 as Dodecane	1468916.9666		1,468,917	153.32	ND	0	159	ND	0	1,468,917	1468.92	145663	672289	6.72E-04	0	0	0.00E+00	6.72E-04
n-Tridecane	321986.2679		321,986	153.69	ND	0	160	ND	0	321,986	321.99	31929	147366	1.47E-04	0	0	0.00E+00	1.47E-04
C13 as Tridecane	678455.5476		678,456	153.69	ND	0	160	ND	0	678,456	678.46	67278	310513	3.11E-04	0	0	0.00E+00	3.11E-04
n-Tetradecane	125167.7754		125,168	153.54	ND	0	160	ND	0	125,168	125.17	12412	57286	5.73E-05	0	0	0.00E+00	5.73E-05
C14 as tetradecane	118806.9470		118,807	153.54	ND	0	160	ND	0	118,807	118.81	11781	54375	5.44E-05	0	0	0.00E+00	5.44E-05
n-Pentadecane	7309.1814		7,309	154.31	ND	0	160	ND	0	7,309	7.31	725	3345	3.35E-06	0	0	0.00E+00	3.35E-06
C15 as Pentadecane	1645.5469	ND	823	154.31	ND	0	160	ND	0	823	0.82	82	377	3.77E-07	0	0	0.00E+00	3.77E-07
n-Hexadecane	1636.6875	ND	818	153.48	ND	0	160	ND	0	818	0.82	81	375	3.75E-07	0	0	0.00E+00	3.75E-07
C16 as Hexadecane	1636.6875	ND	818	153.48	ND	0	160	ND	0	818	0.82	81	375	3.75E-07	0	0	0.00E+00	3.75E-07
n-Heptadecane	1617.6562	ND	809	151.69	ND	0	158	ND	0	809	0.81	80	370	3.70E-07	0	0	0.00E+00	3.70E-07
C17 as Heptadecane	1617.6562	ND	809	151.69	ND	0	158	ND	0	809	0.81	80	370	3.70E-07	0	0	0.00E+00	3.70E-07
n-Octadecane	1635.7031	ND	818	153.38	ND	0	160	ND	0	818	0.82	81	374	3.74E-07	0	0	0.00E+00	3.74E-07
C18 as Octodecane	1635.7031	ND	818	153.38	ND	0	160	ND	0	818	0.82	81	374	3.74E-07	0	0	0.00E+00	3.74E-07
n-Nonadecane	1638.9844	ND	819	153.69	ND	0	160	ND	0	819	0.82	81	375	3.75E-07	0	0	0.00E+00	3.75E-07
C19 as Nonadecane	1638.9844	ND	819	153.69	ND	0	160	ND	0	819	0.82	81	375	3.75E-07	0	0	0.00E+00	3.75E-07
n-Eicosane	1635.0469	ND	818	153.32	ND	0	159	ND	0	818	0.82	81	374	3.74E-07	0	0	0.00E+00	3.74E-07
C20 as Eicosane	1635.0469	ND	818	153.32	ND	0	159	ND	0	818	0.82	81	374	3.74E-07	0	0	0.00E+00	3.74E-07
n-Heneicosane	1650.4687	ND	825	154.77	ND	0	161	ND	0	825	0.83	82	378	3.78E-07	0	0	0.00E+00	3.78E-07
C21 as Heneicosane	1650.4687	ND	825	154.77	ND	0	161	ND	0	825	0.83	82	378	3.78E-07	0	0	0.00E+00	3.78E-07
n-Docosane	1631.7656	ND	816	153.02	ND	0	159	ND	0	816	0.82	81	373	3.73E-07	0	0	0.00E+00	3.73E-07
C22 as Docosane	1631.7656	ND	816	153.02	ND	0	159	ND	0	816	0.82	81	373	3.73E-07	0	0	0.00E+00	3.73E-07
n-Tricosane	1640.6250	ND	820	153.85	ND	0	160	ND	0	820	0.82	81	375	3.75E-07	0	0	0.00E+00	3.75E-07
C23 as Tricosane	1640.6250	ND	820	153.85	ND	0	160	ND	0	820	0.82	81	375	3.75E-07	0	0	0.00E+00	3.75E-07
n-Tetracosane	128.3637	J	128	154.06	ND	0	160	ND	0	128	0.13	13	59	5.87E-08	0	0	0.00E+00	5.87E-08
C24 as Tetracosane	1642.9219	ND	821	154.06	ND	0	160	ND	0	821	0.82	81	376	3.76E-07	0	0	0.00E+00	3.76E-07
Total Hydrocarbon			9,101,814			0			0		9101.81	902566	#######	4.17E-03	0	0	0.00E+00	4.17E-03

E033B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E033B	E033B		ND Adj	E034A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	Flag	µg/m3	µg/m3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.7907692	ND	74	144	ND	0	154	ND	0	74	0.07	7	34	3.38E-08	3.38E-08
C5 as Pentane	147.7907692	ND	74	144	ND	0	154	ND	0	74	0.07	7	34	3.38E-08	3.38E-08
n-Hexane	211.7784615	ND	106	150	ND	0	220	ND	0	106	0.11	11	48	4.85E-08	4.85E-08
C6 as Hexane	211.7784615	ND	106	150	ND	0	220	ND	0	106	0.11	11	48	4.85E-08	4.85E-08
n-Heptane	2568.262211		2,568	156	ND	0	183	ND	0	2,568	2.57	255	1175	1.18E-06	1.18E-06
C7 as Heptane	7195.44267		7,195	156	ND	0	183	ND	0	7,195	7.20	714	3293	3.29E-06	3.29E-06
n-Octane	41357.7247		41,358	152	ND	0	158	ND	0	41,358	41.36	4101	18928	1.89E-05	1.89E-05
C8 as Octane	348584.5353		348,585	152	ND	0	158	ND	0	348,585	348.58	34567	159539	1.60E-04	1.60E-04
n-Nonane	201104.8604		201,105	153	ND	0	160	ND	0	201,105	201.10	19942	92041	9.20E-05	9.20E-05
C9 as Nonane	1001428.174		1,001,428	153	ND	0	160	ND	0	1,001,428	1001.43	99305	458330	4.58E-04	4.58E-04
n-Decane	361616.2467		361,616	155	ND	0	161	ND	0	361,616	361.62	35859	165503	1.66E-04	1.66E-04
C10 as Decane	1400495.187		1,400,495	155	ND	0	161	ND	0	1,400,495	1400.50	138878	640974	6.41E-04	6.41E-04
n-Undecane	473847.7535		473,848	154	ND	0	161	ND	0	473,848	473.85	46988	216869	2.17E-04	2.17E-04
C11 as Undecane	1647761.707		1,647,762	154	ND	0	161	ND	0	1,647,762	1647.76	163397	754142	7.54E-04	7.54E-04
n-Dodecane	504091.3387		504,091	153	ND	0	159	ND	0	504,091	504.09	49987	230711	2.31E-04	2.31E-04
C12 as Dodecane	1337104.069		1,337,104	153	ND	0	159	ND	0	1,337,104	1337.10	132592	611961	6.12E-04	6.12E-04
n-Tridecane	288269.6351		288,270	154	ND	0	160	ND	0	288,270	288.27	28586	131934	1.32E-04	1.32E-04
C13 as Tridecane	606052.8703		606,053	154	ND	0	160	ND	0	606,053	606.05	60098	277376	2.77E-04	2.77E-04
n-Tetradecane	98395.21204		98,395	154	ND	0	160	ND	0	98,395	98.40	9757	45033	4.50E-05	4.50E-05
C14 as tetradecane	98935.30358		98,935	154	ND	0	160	ND	0	98,935	98.94	9811	45280	4.53E-05	4.53E-05
n-Pentadecane	7054.920973	J	7,055	154	ND	0	160	ND	0	7,055	7.05	700	3229	3.23E-06	3.23E-06
C15 as Pentadecane	1543.076923	ND	772	154	ND	0	160	ND	0	772	0.77	77	353	3.53E-07	3.53E-07
n-Hexadecane	1534.769231	ND	767	153	ND	0	160	ND	0	767	0.77	76	351	3.51E-07	3.51E-07
C16 as Hexadecane	1534.769231	ND	767	153	ND	0	160	ND	0	767	0.77	76	351	3.51E-07	3.51E-07
n-Heptadecane	1516.923077	ND	758	152	ND	0	158	ND	0	758	0.76	75	347	3.47E-07	3.47E-07
C17 as Heptadecane	1516.923077	ND	758	152	ND	0	158	ND	0	758	0.76	75	347	3.47E-07	3.47E-07
n-Octadecane	1533.846154	ND	767	153	ND	0	160	ND	0	767	0.77	76	351	3.51E-07	3.51E-07
C18 as Octodecane	1533.846154	ND	767	153	ND	0	160	ND	0	767	0.77	76	351	3.51E-07	3.51E-07
n-Nonadecane	1536.923077	ND	768	154	ND	0	160	ND	0	768	0.77	76	352	3.52E-07	3.52E-07
C19 as Nonadecane	1536.923077	ND	768	154	ND	0	160	ND	0	768	0.77	76	352	3.52E-07	3.52E-07
n-Eicosane	1533.230769	ND	767	153	ND	0	159	ND	0	767	0.77	76	351	3.51E-07	3.51E-07
C20 as Eicosane	1533.230769	ND	767	153	ND	0	159	ND	0	767	0.77	76	351	3.51E-07	3.51E-07
n-Heneicosane	1547.692308	ND	774	155	ND	0	161	ND	0	774	0.77	77	354	3.54E-07	3.54E-07
C21 as Heneicosane	1547.692308	ND	774	155	ND	0	161	ND	0	774	0.77	77	354	3.54E-07	3.54E-07
n-Docosane	1530.153846	ND	765	153	ND	0	159	ND	0	765	0.77	76	350	3.50E-07	3.50E-07
C22 as Docosane	1530.153846	ND	765	153	ND	0	159	ND	0	765	0.77	76	350	3.50E-07	3.50E-07
n-Tricosane	1538.461538	ND	769	154	ND	0	160	ND	0	769	0.77	76	352	3.52E-07	3.52E-07
C23 as Tricosane	1538.461538	ND	769	154	ND	0	160	ND	0	769	0.77	76	352	3.52E-07	3.52E-07
n-Tetracosane	1540.615385	ND	770	154	ND	0	160	ND	0	770	0.77	76	353	3.53E-07	3.53E-07
C24 as Tetracosane	1540.615385	ND	770	154	ND	0	160	ND	0	770	0.77	76	353	3.53E-07	3.53E-07
Total Hydrocarbon			8,440,807			0			0		8440.81	837018	#######	3.86E-03	3.86E-03

Bagging Data Form — Vacuum Method

Sample Id: E036

Equipment type:	Valve			**Component ID:**	E-1583		
Equipment Subtype:	Gate			**Unit:**	Refinery E		
Line Size:	3/4	inches		**Date:**	23-Aug-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.97	inHg	761.2 mmHg	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	70.6	°F	21.4 °C	**TVA ID**	37887		
Component Temp:	110	°F	43.3 °C	**Stream Pressure/Temp:**	1900	psig	°F
Stream Description:	Jet Low Flow Recycle						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:01	Background	0	ppmv	8-sec Dwell	188	ppmv	Total Dwell	2:00	min:sec	Final M21	922 ppm
9:35	Initial Bag Vacuum	0.04	inches H2O	DGM Vac.	1.9	inches H2O	Bag Temp	93.9	°F	Leak @	Packing

Bag Concentrations (ppmv) (bag vented)

Time	9:37	9:39	9:41	9:43	9:45	9:47	9:49	9:51	9:53	9:55	9:57	10:04	10:08	
ppmv	68.3	77	82.5	87.1	92.2	95.5	101	105	107	108	111	119	125	

Sorbent Tube Sample Collection Parameters

E036A

Time									
9:57	Volume Start	383.7	Liters		Design Sample Flow Rate = 1 liter/min				
10:10	Volume Stop	396.4	Liters	Total Vol	12.7	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.977 L/min	Sorbent $Flow_{STP}$	0.962	L/min

E036B

9:57	Volume Start	376.5	Liters		Design Sample Flow Rate = 1 liter/min				
10:10	Volume Stop	389.4	Liters	Total Vol	12.9	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.992 L/min	Sorbent $Flow_{STP}$	0.977	L/min
	Total ST Vol_{STP}	25.20	Liters	DGM Vol_{STP}	83.45	Liters	Total Run Vol_{STP}	108.65	Liters

Bagging Parameters

Time									
10:01	Vacuum check	0.04	inches H2O		DGM_P	1.8	inches H2O vacuum	757.9	mmHg
10:00	DGM_{10L} Time	01:32.0	min:sec.frac	DGM Time 1.533	DGM Flow	6.52	DGM $Flow_{STP}$	6.42	liters/minute
10:02	Bag Temp.	105.8	°F	41.0 °C	$Sample_T$	77	°F	25.0	°C

Post-Sample Data

10:20	Post Test M21	Background	12	ppmv	8-sec Dwell	442 ppmv	Total Dwell	2:00 min:sec	Final M21	1171 ppm
									Leak @	Packing
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions =	1.55E-04 kg/hr
Percent difference THC ER =	0%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.82E-08
C5 as Pentane	2.82E-08
n-Hexane	4.03E-08
C6 as Hexane	4.03E-08
n-Heptane	6.12E-08
C7 as Heptane	1.07E-07
n-Octane	8.01E-07
C8 as Octane	5.71E-06
n-Nonane	2.79E-06
C9 as Nonane	1.36E-05
n-Decane	4.70E-06
C10 as Decane	1.99E-05
n-Undecane	6.74E-06
C11 as Undecane	2.70E-05
n-Dodecane	9.99E-06
C12 as Dodecane	3.16E-05
n-Tridecane	7.67E-06
C13 as Tridecane	1.79E-05
n-Tetradecane	3.01E-06
C14 as tetradecane	2.84E-06
n-Pentadecane	1.03E-07
C15 as Pentadecane	2.94E-08
n-Hexadecane	2.92E-08
C16 as Hexadecane	2.92E-08
n-Heptadecane	2.89E-08
C17 as Heptadecane	2.89E-08
n-Octadecane	2.92E-08
C18 as Octodecane	2.92E-08
n-Nonadecane	2.93E-08
C19 as Nonadecane	2.93E-08
n-Eicosane	2.92E-08
C20 as Eicosane	2.92E-08
n-Heneicosane	2.95E-08
C21 as Heneicosane	2.95E-08
n-Docosane	2.92E-08
C22 as Docosane	2.92E-08
n-Tricosane	2.93E-08
C23 as Tricosane	2.93E-08
n-Tetracosane	2.93E-08
C24 as Tetracosane	2.93E-08
Total Hydrocarbon	1.55E-04

THC:	**8.21E-03**	**lbs/day**	**1.50E-03**	**tons/yr**

E036A

E036A	ANALYTICAL RESULTS E036A		ND Adj	BACKGROUND E037A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C5 as Pentane	75.6409	ND	38	144.03	ND	0	154	ND	0	38	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexane	108.3906	ND	54	149.63	ND	0	220	ND	0	54	0.05	6	27	2.72E-08	0	0	0.00E+00	2.72E-08
C6 as Hexane	108.3906	ND	54	149.63	ND	0	220	ND	0	54	0.05	6	27	2.72E-08	0	0	0.00E+00	2.72E-08
n-Heptane	155.3253	J	155	156.37	ND	0	183	ND	0	155	0.16	17	78	7.79E-08	0	0	0.00E+00	7.79E-08
C7 as Heptane	337.4937	J	337	156.37	ND	0	183	ND	0	337	0.34	37	169	1.69E-07	0	0	0.00E+00	1.69E-07
n-Octane	1540.5027		1,541	152.25	ND	0	158	ND	0	1,541	1.54	167	773	7.73E-07	0	0	0.00E+00	7.73E-07
C8 as Octane	12081.5088		12,082	152.25	ND	0	158	ND	0	12,082	12.08	1313	6059	6.06E-06	0	0	0.00E+00	6.06E-06
n-Nonane	6054.0723		6,054	153.38	ND	0	160	ND	0	6,054	6.05	658	3036	3.04E-06	0	0	0.00E+00	3.04E-06
C9 as Nonane	27081.6599		27,082	153.38	ND	0	160	ND	0	27,082	27.08	2942	13581	1.36E-05	0	0	0.00E+00	1.36E-05
n-Decane	9749.5339		9,750	154.77	ND	0	161	ND	0	9,750	9.75	1059	4889	4.89E-06	0	0	0.00E+00	4.89E-06
C10 as Decane	41660.1174		41,660	154.77	ND	0	161	ND	0	41,660	41.66	4526	20891	2.09E-05	0	0	0.00E+00	2.09E-05
n-Undecane	13616.5992		13,617	154.37	ND	0	161	ND	0	13,617	13.62	1479	6828	6.83E-06	0	0	0.00E+00	6.83E-06
C11 as Undecane	54040.7029		54,041	154.37	ND	0	161	ND	0	54,041	54.04	5872	27100	2.71E-05	0	0	0.00E+00	2.71E-05
n-Dodecane	19548.8821		19,549	153.32	ND	0	159	ND	0	19,549	19.55	2124	9803	9.80E-06	0	0	0.00E+00	9.80E-06
C12 as Dodecane	62044.0863		62,044	153.32	ND	0	159	ND	0	62,044	62.04	6741	31113	3.11E-05	0	0	0.00E+00	3.11E-05
n-Tridecane	15177.7495		15,178	153.69	ND	0	160	ND	0	15,178	15.18	1649	7611	7.61E-06	0	0	0.00E+00	7.61E-06
C13 as Tridecane	34253.5667		34,254	153.69	ND	0	160	ND	0	34,254	34.25	3722	17177	1.72E-05	0	0	0.00E+00	1.72E-05
n-Tetradecane	5763.7265		5,764	153.54	ND	0	160	ND	0	5,764	5.76	626	2890	2.89E-06	0	0	0.00E+00	2.89E-06
C14 as tetradecane	4728.8488		4,729	153.54	ND	0	160	ND	0	4,729	4.73	514	2371	2.37E-06	0	0	0.00E+00	2.37E-06
n-Pentadecane	168.7250	J	169	154.31	ND	0	160	ND	0	169	0.17	18	85	8.46E-08	0	0	0.00E+00	8.46E-08
C15 as Pentadecane	78.9764	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C16 as Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C17 as Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Octadecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C18 as Octodecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C19 as Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C20 as Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C21 as Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C23 as Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C24 as Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
Total Hydrocarbon			308,934			0			0		308.93	33566	154,921	1.55E-04	0	0	0.00E+00	1.55E-04

E036B

E036B	ANALYTICAL RESULTS E036B		ND Adj	BACKGROUND E037A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.9364385	ND	74	144	ND	0	154	ND	0	74	0.07	8	37	3.73E-08	3.73E-08
C5 as Pentane	148.9364385	ND	74	144	ND	0	154	ND	0	74	0.07	8	37	3.73E-08	3.73E-08
n-Hexane	213.4201613	ND	107	150	ND	0	220	ND	0	107	0.11	12	54	5.35E-08	5.35E-08
C6 as Hexane	213.4201613	ND	107	150	ND	0	220	ND	0	107	0.11	12	54	5.35E-08	5.35E-08
n-Heptane	177.3023308	ND	89	156	ND	0	183	ND	0	89	0.09	10	44	4.45E-08	4.45E-08
C7 as Heptane	177.3023308	ND	89	156	ND	0	183	ND	0	89	0.09	10	44	4.45E-08	4.45E-08
n-Octane	1655.309107		1,655	152	ND	0	158	ND	0	1,655	1.66	180	830	8.30E-07	8.30E-07
C8 as Octane	10709.27138		10,709	152	ND	0	158	ND	0	10,709	10.71	1164	5370	5.37E-06	5.37E-06
n-Nonane	5057.805311		5,058	153	ND	0	160	ND	0	5,058	5.06	550	2536	2.54E-06	2.54E-06
C9 as Nonane	27248.3626		27,248	153	ND	0	160	ND	0	27,248	27.25	2961	13664	1.37E-05	1.37E-05
n-Decane	8996.583426		8,997	155	ND	0	161	ND	0	8,997	9.00	977	4512	4.51E-06	4.51E-06
C10 as Decane	37599.90383		37,600	155	ND	0	161	ND	0	37,600	37.60	4085	18855	1.89E-05	1.89E-05
n-Undecane	13264.35406		13,264	154	ND	0	161	ND	0	13,264	13.26	1441	6652	6.65E-06	6.65E-06
C11 as Undecane	53479.33868		53,479	154	ND	0	161	ND	0	53,479	53.48	5811	26818	2.68E-05	2.68E-05
n-Dodecane	20297.80602		20,298	153	ND	0	159	ND	0	20,298	20.30	2205	10179	1.02E-05	1.02E-05
C12 as Dodecane	63946.78082		63,947	153	ND	0	159	ND	0	63,947	63.95	6948	32067	3.21E-05	3.21E-05
n-Tridecane	15398.11752		15,398	154	ND	0	160	ND	0	15,398	15.40	1673	7722	7.72E-06	7.72E-06
C13 as Tridecane	37332.05783		37,332	154	ND	0	160	ND	0	37,332	37.33	4056	18721	1.87E-05	1.87E-05
n-Tetradecane	6256.661962		6,257	154	ND	0	160	ND	0	6,257	6.26	680	3138	3.14E-06	3.14E-06
C14 as tetradecane	6578.345099		6,578	154	ND	0	160	ND	0	6,578	6.58	715	3299	3.30E-06	3.30E-06
n-Pentadecane	242.1062329	J	242	154	ND	0	160	ND	0	242	0.24	26	121	1.21E-07	1.21E-07
C15 as Pentadecane	155.5038806	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.90E-08	3.90E-08
n-Hexadecane	154.6666712	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
C16 as Hexadecane	154.6666712	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
n-Heptadecane	152.8682216	ND	76	152	ND	0	158	ND	0	76	0.08	8	38	3.83E-08	3.83E-08
C17 as Heptadecane	152.8682216	ND	76	152	ND	0	158	ND	0	76	0.08	8	38	3.83E-08	3.83E-08
n-Octadecane	154.573648	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
C18 as Octodecane	154.573648	ND	77	153	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
n-Nonadecane	154.8837255	ND	77	154	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
C19 as Nonadecane	154.8837255	ND	77	154	ND	0	160	ND	0	77	0.08	8	39	3.88E-08	3.88E-08
n-Eicosane	154.5116325	ND	77	153	ND	0	159	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
C20 as Eicosane	154.5116325	ND	77	153	ND	0	159	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
n-Heneicosane	155.9689969	ND	78	155	ND	0	161	ND	0	78	0.08	8	39	3.91E-08	3.91E-08
C21 as Heneicosane	155.9689969	ND	78	155	ND	0	161	ND	0	78	0.08	8	39	3.91E-08	3.91E-08
n-Docosane	154.2015549	ND	77	153	ND	0	159	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
C22 as Docosane	154.2015549	ND	77	153	ND	0	159	ND	0	77	0.08	8	39	3.87E-08	3.87E-08
n-Tricosane	155.0387643	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.89E-08	3.89E-08
C23 as Tricosane	155.0387643	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.89E-08	3.89E-08
n-Tetracosane	155.2558185	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.89E-08	3.89E-08
C24 as Tetracosane	155.2558185	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.89E-08	3.89E-08
Total Hydrocarbon			310,072			0			0		310.07	33690	155,492	1.55E-04	1.55E-04

Bagging Data Form — Vacuum Method

Sample Id: E038

WSPA

Equipment type:	Valve		**Component ID:**	E-1593
Equipment Subtype:	Gate		**Unit:**	Refinery E
Line Size:	3/4 *inches*		**Date:**	23-Aug-18
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR
Barometric pressure	29.94 *inHg*	760.5 *mmHg*	**Sample Pump A**	LP52979
			Sample Pump B	LP52975
Ambient Temp:	80.8 *°F*	27.1 *°C*	**TVA ID**	36502
Component Temp:	174 *°F*	78.9 *°C*	**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*Jet*			

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
12:43	Background	-2 *ppmv*	8-sec Dwell	672 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	1832 *ppm*
13:14	Initial Bag Vacuum	0.08 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	temp probe b *°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:21	13:25	13:27	13:30	13:32	13:34	13:36	13:38	13:40	13:50				
ppmv	13.7	127	150	191	197	196	201	208	220	221				

Sorbent Tube Sample Collection Parameters

E038A

Time						
13:42	Volume Start	396.4 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:55	Volume Stop	408.8 *Liters*	Total Vol	12.4 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	0.954 *L/min*	Sorbent $Flow_{STP}$	0.926 *L/min*

E038B

13:42	Volume Start	389.4 *Liters*		Design Sample Flow Rate = 1 liter/min		
13:55	Volume Stop	401.9 *Liters*	Total Vol	12.5 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	0.962 *L/min*	Sorbent $Flow_{STP}$	0.933 *L/min*
	Total ST Vol_{STP}	24.17 *Liters*	DGM Vol_{STP}	76.48 *Liters*	Total Run Vol_{STP}	100.65 *Liters*

Bagging Parameters

Time								
13:47	Vacuum check	0.4 *inches H2O*			DGM_P	1.8 *inches H2O vacuum*	757.1 *mmHg*	
13:46	DGM_{10L} Time	01:38.9 *min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM $Flow_{STP}$	5.88 *liters/minute*
13:48	Bag Temp.	100.4 *°F*	38.0 *°C*		$Sample_T$	84 *°F*	28.9 *°C*	

Post-Sample Data

14:04 Post Test M21	Background	16 *ppmv*	8-sec Dwell	573 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	1907 *ppm*
							Leak @	Stem

Condensate accumulation: starting time N/A *hour:min* Final time N/A *hour:min* 0:00 *hours:min*
Organic condensate collected N/A *ml*
Density of organic condensate N/A *g/ml*

Average THC emissions =	4.22E-04	kg/hr
Percent difference THC ER =	1%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.68E-08
C5 as Pentane	2.68E-08
n-Hexane	3.85E-08
C6 as Hexane	3.85E-08
n-Heptane	5.92E-08
C7 as Heptane	8.69E-08
n-Octane	9.87E-07
C8 as Octane	7.79E-06
n-Nonane	4.82E-06
C9 as Nonane	2.72E-05
n-Decane	1.17E-05
C10 as Decane	5.05E-05
n-Undecane	2.10E-05
C11 as Undecane	8.06E-05
n-Dodecane	3.16E-05
C12 as Dodecane	9.33E-05
n-Tridecane	2.39E-05
C13 as Tridecane	5.19E-05
n-Tetradecane	7.86E-06
C14 as tetradecane	7.45E-06
n-Pentadecane	1.64E-07
C15 as Pentadecane	3.74E-08
n-Hexadecane	3.72E-08
C16 as Hexadecane	3.72E-08
n-Heptadecane	3.68E-08
C17 as Heptadecane	3.68E-08
n-Octadecane	3.72E-08
C18 as Octodecane	3.72E-08
n-Nonadecane	3.73E-08
C19 as Nonadecane	3.73E-08
n-Eicosane	3.72E-08
C20 as Eicosane	3.72E-08
n-Heneicosane	3.75E-08
C21 as Heneicosane	3.75E-08
n-Docosane	3.71E-08
C22 as Docosane	3.71E-08
n-Tricosane	3.73E-08
C23 as Tricosane	3.73E-08
n-Tetracosane	3.74E-08
C24 as Tetracosane	3.74E-08
Total Hydrocarbon	4.22E-04

THC:	**2.23E-02**	**lbs/day**	**4.07E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E038A	E038A		ND Adj	E039A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	77.4710	ND	39	147.43	ND	0	154	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C5 as Pentane	77.4710	ND	39	147.43	ND	0	154	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Hexane	111.0129	ND	56	153.17	ND	0	220	ND	0	56	0.06	6	26	2.58E-08	0	0	0.00E+00	2.58E-08
C6 as Hexane	111.0129	ND	56	153.17	ND	0	220	ND	0	56	0.06	6	26	2.58E-08	0	0	0.00E+00	2.58E-08
n-Heptane	163.5191	J	164	160.06	ND	0	183	ND	0	164	0.16	16	76	7.60E-08	0	0	0.00E+00	7.60E-08
C7 as Heptane	282.8629	J	283	160.06	ND	0	183	ND	0	283	0.28	28	131	1.31E-07	0	0	0.00E+00	1.31E-07
n-Octane	2081.0104		2,081	155.84	ND	0	158	ND	0	2,081	2.08	209	967	9.67E-07	0	0	0.00E+00	9.67E-07
C8 as Octane	17698.2837		17,698	155.84	ND	0	158	ND	0	17,698	17.70	1781	8221	8.22E-06	0	0	0.00E+00	8.22E-06
n-Nonane	11368.8608		11,369	157.01	ND	0	160	ND	0	11,369	11.37	1144	5281	5.28E-06	0	0	0.00E+00	5.28E-06
C9 as Nonane	61625.8238		61,626	157.01	ND	0	160	ND	0	61,626	61.63	6202	28626	2.86E-05	0	0	0.00E+00	2.86E-05
n-Decane	26411.6759		26,412	158.43	ND	0	161	ND	0	26,412	26.41	2658	12269	1.23E-05	0	0	0.00E+00	1.23E-05
C10 as Decane	113085.6649		113,086	158.43	ND	0	161	ND	0	113,086	113.09	11382	52531	5.25E-05	0	0	0.00E+00	5.25E-05
n-Undecane	46299.8423		46,300	158.02	ND	0	161	ND	0	46,300	46.30	4660	21507	2.15E-05	0	0	0.00E+00	2.15E-05
C11 as Undecane	175502.2013		175,502	158.02	ND	0	161	ND	0	175,502	175.50	17664	81524	8.15E-05	0	0	0.00E+00	8.15E-05
n-Dodecane	67766.0673		67,766	156.94	ND	0	159	ND	0	67,766	67.77	6820	31479	3.15E-05	0	0	0.00E+00	3.15E-05
C12 as Dodecane	197627.4737		197,627	156.94	ND	0	159	ND	0	197,627	197.63	19890	91802	9.18E-05	0	0	0.00E+00	9.18E-05
n-Tridecane	51009.6152		51,010	157.32	ND	0	160	ND	0	51,010	51.01	5134	23695	2.37E-05	0	0	0.00E+00	2.37E-05
C13 as Tridecane	102959.9214		102,960	157.32	ND	0	160	ND	0	102,960	102.96	10363	47827	4.78E-05	0	0	0.00E+00	4.78E-05
n-Tetradecane	15377.1653		15,377	157.17	ND	0	160	ND	0	15,377	15.38	1548	7143	7.14E-06	0	0	0.00E+00	7.14E-06
C14 as tetradecane	10250.9103		10,251	157.17	ND	0	160	ND	0	10,251	10.25	1032	4762	4.76E-06	0	0	0.00E+00	4.76E-06
n-Pentadecane	224.8888	J	225	157.95	ND	0	160	ND	0	225	0.22	23	104	1.04E-07	0	0	0.00E+00	1.04E-07
C15 as Pentadecane	161.7742	ND	81	157.95	ND	0	160	ND	0	81	0.08	8	38	3.76E-08	0	0	0.00E+00	3.76E-08
n-Hexadecane	160.9032	ND	80	157.1	ND	0	160	ND	0	80	0.08	8	37	3.74E-08	0	0	0.00E+00	3.74E-08
C16 as Hexadecane	160.9032	ND	80	157.1	ND	0	160	ND	0	80	0.08	8	37	3.74E-08	0	0	0.00E+00	3.74E-08
n-Heptadecane	159.0323	ND	80	155.28	ND	0	158	ND	0	80	0.08	8	37	3.69E-08	0	0	0.00E+00	3.69E-08
C17 as Heptadecane	159.0323	ND	80	155.28	ND	0	158	ND	0	80	0.08	8	37	3.69E-08	0	0	0.00E+00	3.69E-08
n-Octadecane	160.8065	ND	80	157.01	ND	0	160	ND	0	80	0.08	8	37	3.73E-08	0	0	0.00E+00	3.73E-08
C18 as Octodecane	160.8065	ND	80	157.01	ND	0	160	ND	0	80	0.08	8	37	3.73E-08	0	0	0.00E+00	3.73E-08
n-Nonadecane	161.1290	ND	81	157.32	ND	0	160	ND	0	81	0.08	8	37	3.74E-08	0	0	0.00E+00	3.74E-08
C19 as Nonadecane	161.1290	ND	81	157.32	ND	0	160	ND	0	81	0.08	8	37	3.74E-08	0	0	0.00E+00	3.74E-08
n-Eicosane	160.7419	ND	80	156.94	ND	0	159	ND	0	80	0.08	8	37	3.73E-08	0	0	0.00E+00	3.73E-08
C20 as Eicosane	160.7419	ND	80	156.94	ND	0	159	ND	0	80	0.08	8	37	3.73E-08	0	0	0.00E+00	3.73E-08
n-Heneicosane	162.2581	ND	81	158.43	ND	0	161	ND	0	81	0.08	8	38	3.77E-08	0	0	0.00E+00	3.77E-08
C21 as Heneicosane	162.2581	ND	81	158.43	ND	0	161	ND	0	81	0.08	8	38	3.77E-08	0	0	0.00E+00	3.77E-08
n-Docosane	160.4194	ND	80	156.63	ND	0	159	ND	0	80	0.08	8	37	3.73E-08	0	0	0.00E+00	3.73E-08
C22 as Docosane	160.4194	ND	80	156.63	ND	0	159	ND	0	80	0.08	8	37	3.73E-08	0	0	0.00E+00	3.73E-08
n-Tricosane	161.2903	ND	81	157.48	ND	0	160	ND	0	81	0.08	8	37	3.75E-08	0	0	0.00E+00	3.75E-08
C23 as Tricosane	161.2903	ND	81	157.48	ND	0	160	ND	0	81	0.08	8	37	3.75E-08	0	0	0.00E+00	3.75E-08
n-Tetracosane	161.5161	ND	81	157.7	ND	0	160	ND	0	81	0.08	8	38	3.75E-08	0	0	0.00E+00	3.75E-08
C24 as Tetracosane	161.5161	ND	81	157.7	ND	0	160	ND	0	81	0.08	8	38	3.75E-08	0	0	0.00E+00	3.75E-08
Total Hydrocarbon			901,453			0			0		901.45	90728	418,743	4.19E-04	0	0	0.00E+00	4.19E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E038B	E038B		ND Adj	E039A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	153.7024	ND	77	147	ND	0	154	ND	0	77	0.08	8	36	3.57E-08	3.57E-08
C5 as Pentane	153.7024	ND	77	147	ND	0	154	ND	0	77	0.08	8	36	3.57E-08	3.57E-08
n-Hexane	220.2496	ND	110	153	ND	0	220	ND	0	110	0.11	11	51	5.12E-08	5.12E-08
C6 as Hexane	220.2496	ND	110	153	ND	0	220	ND	0	110	0.11	11	51	5.12E-08	5.12E-08
n-Heptane	182.976	ND	91	160	ND	0	183	ND	0	91	0.09	9	42	4.25E-08	4.25E-08
C7 as Heptane	182.976	ND	91	160	ND	0	183	ND	0	91	0.09	9	42	4.25E-08	4.25E-08
n-Octane	2168.721304		2,169	156	ND	0	158	ND	0	2,169	2.17	218	1007	1.01E-06	1.01E-06
C8 as Octane	15833.32402		15,833	156	ND	0	158	ND	0	15,833	15.83	1594	7355	7.35E-06	7.35E-06
n-Nonane	9368.086873		9,368	157	ND	0	160	ND	0	9,368	9.37	943	4352	4.35E-06	4.35E-06
C9 as Nonane	55572.08503		55,572	157	ND	0	160	ND	0	55,572	55.57	5593	25814	2.58E-05	2.58E-05
n-Decane	23898.37878		23,898	158	ND	0	161	ND	0	23,898	23.90	2405	11101	1.11E-05	1.11E-05
C10 as Decane	104327.0087		104,327	158	ND	0	161	ND	0	104,327	104.33	10500	48462	4.85E-05	4.85E-05
n-Undecane	43964.17178		43,964	158	ND	0	161	ND	0	43,964	43.96	4425	20422	2.04E-05	2.04E-05
C11 as Undecane	171408.8601		171,409	158	ND	0	161	ND	0	171,409	171.41	17252	79623	7.96E-05	7.96E-05
n-Dodecane	68471.61322		68,472	157	ND	0	159	ND	0	68,472	68.47	6891	31806	3.18E-05	3.18E-05
C12 as Dodecane	203898.4263		203,898	157	ND	0	159	ND	0	203,898	203.90	20522	94715	9.47E-05	9.47E-05
n-Tridecane	51971.09333		51,971	157	ND	0	160	ND	0	51,971	51.97	5231	24142	2.41E-05	2.41E-05
C13 as Tridecane	120323.08		120,323	157	ND	0	160	ND	0	120,323	120.32	12110	55893	5.59E-05	5.59E-05
n-Tetradecane	18479.72524		18,480	157	ND	0	160	ND	0	18,480	18.48	1860	8584	8.58E-06	8.58E-06
C14 as tetradecane	21818.25769		21,818	157	ND	0	160	ND	0	21,818	21.82	2196	10135	1.01E-05	1.01E-05
n-Pentadecane	482.8969038	J	483	158	ND	0	160	ND	0	483	0.48	49	224	2.24E-07	2.24E-07
C15 as Pentadecane	160.48	ND	80	158	ND	0	160	ND	0	80	0.08	8	37	3.73E-08	3.73E-08
n-Hexadecane	159.616	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
C16 as Hexadecane	159.616	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
n-Heptadecane	157.76	ND	79	155	ND	0	158	ND	0	79	0.08	8	37	3.66E-08	3.66E-08
C17 as Heptadecane	157.76	ND	79	155	ND	0	158	ND	0	79	0.08	8	37	3.66E-08	3.66E-08
n-Octadecane	159.52	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
C18 as Octodecane	159.52	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
n-Nonadecane	159.84	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
C19 as Nonadecane	159.84	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.71E-08	3.71E-08
n-Eicosane	159.456	ND	80	157	ND	0	159	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
C20 as Eicosane	159.456	ND	80	157	ND	0	159	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
n-Heneicosane	160.96	ND	80	158	ND	0	161	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
C21 as Heneicosane	160.96	ND	80	158	ND	0	161	ND	0	80	0.08	8	37	3.74E-08	3.74E-08
n-Docosane	159.136	ND	80	157	ND	0	159	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
C22 as Docosane	159.136	ND	80	157	ND	0	159	ND	0	80	0.08	8	37	3.70E-08	3.70E-08
n-Tricosane	160	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
C23 as Tricosane	160	ND	80	157	ND	0	160	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
n-Tetracosane	160.224	ND	80	158	ND	0	160	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
C24 as Tetracosane	160.224	ND	80	158	ND	0	160	ND	0	80	0.08	8	37	3.72E-08	3.72E-08
Total Hydrocarbon			914,059			0			0		914.06	91996	424,599	4.25E-04	4.25E-04

Bagging Data Form — Vacuum Method

Sample Id: E040

Equipment type:	PRD		**Component ID:**	E-591	
Equipment Subtype:	SP		**Unit:**	Refinery E	
Line Size:	3/4 *inches*		**Date:**	24-Aug-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.94 *inHg*	760.5 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	74.8 *°F*	23.8 *°C*	**TVA ID**	37887	
Component Temp:	67 *°F*	19.4 *°C*	**Stream Pressure/Temp:**	*psig*	300 *°F*
Stream Description:	*Asphalt*				

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:22	Background	-6	*ppmv*	8-sec Dwell	0	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	0 *ppm*
11:01	Initial Bag Vacuum	0.04	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	76.5	*°F*	Leak @	PRV

Bag Concentrations (ppmv) (bag vented)

Time	11:04	11:06	11:08	11:10	11:12	11:17								
ppmv	15	16.8	17	17.2	17.2	17.6								

Sorbent Tube Sample Collection Parameters

E040A

Time								
11:14	Volume Start	411.2 *Liters*		Design Sample Flow Rate = 1 liter/min				
11:27	Volume Stop	424.1 *Liters*	Total Vol	12.9 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.972 *L/min*	

E040B

Time								
11:14	Volume Start	404.0 *Liters*		Design Sample Flow Rate = 1 liter/min				
11:27	Volume Stop	416.9 *Liters*	Total Vol	12.9 *Liters*				
	Sample Run Time	13 *Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.972 *L/min*	
	Total ST Vol$_{STP}$	25.27 *Liters*	DGM Vol$_{STP}$	84.88 *Liters*		Total Run Vol$_{STP}$	110.15 *Liters*	

Bagging Parameters

Time									
11:18	Vacuum check	0.055	*inches H2O*			DGM$_P$	1.9 *inches H2O vacuum*	756.9	*mmHg*
11:17	DGM$_{10L}$ Time	01:29.9	*min:sec.frac*	DGM Time	1.500	DGM Flow	6.67	DGM Flow$_{STP}$ 6.53	*liters/minute*
11:19	Bag Temp.	84.7	*°F*	29.3	*°C*	Sample$_T$	79 *°F*	26.1	*°C*

Post-Sample Data

11:34	Post Test M21	Background	-9 *ppmv*	8-sec Dwell	0 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	0 *ppm*
								Leak @	PRV
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A *ml*						
Density of organic condensate			N/A *g/ml*						

Average THC emissions =	2.40E-06 kg/hr
Percent difference THC ER =	4%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.82E-08
C5 as Pentane	2.82E-08
n-Hexane	3.67E-08
C6 as Hexane	3.67E-08
n-Heptane	3.25E-08
C7 as Heptane	3.25E-08
n-Octane	2.93E-08
C8 as Octane	2.93E-08
n-Nonane	2.95E-08
C9 as Nonane	2.95E-08
n-Decane	2.97E-08
C10 as Decane	2.97E-08
n-Undecane	2.97E-08
C11 as Undecane	3.96E-08
n-Dodecane	1.21E-07
C12 as Dodecane	1.71E-07
n-Tridecane	3.28E-07
C13 as Tridecane	3.03E-07
n-Tetradecane	3.72E-07
C14 as tetradecane	7.41E-08
n-Pentadecane	2.96E-08
C15 as Pentadecane	2.96E-08
n-Hexadecane	2.95E-08
C16 as Hexadecane	2.95E-08
n-Heptadecane	2.91E-08
C17 as Heptadecane	2.91E-08
n-Octadecane	2.95E-08
C18 as Octodecane	2.95E-08
n-Nonadecane	2.95E-08
C19 as Nonadecane	2.95E-08
n-Eicosane	2.95E-08
C20 as Eicosane	2.95E-08
n-Heneicosane	2.97E-08
C21 as Heneicosane	2.97E-08
n-Docosane	2.94E-08
C22 as Docosane	2.94E-08
n-Tricosane	2.96E-08
C23 as Tricosane	2.96E-08
n-Tetracosane	2.96E-08
C24 as Tetracosane	2.96E-08
Total Hydrocarbon	2.40E-06

THC:	1.27E-04	lbs/day	2.32E-05	tons/yr

E040A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS			COMBINED EMISSION RATE
E040A	E040A		ND Adj	E041A		ND Adj	#E009A		ND Adj						Capture	#E0XX		
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	72.5736	ND	36	141.85	ND	0	154	ND	0	36	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C5 as Pentane	72.5736	ND	36	141.85	ND	0	154	ND	0	36	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Hexane	75.3954	ND	38	147.36	ND	0	220	ND	0	38	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C6 as Hexane	75.3954	ND	38	147.36	ND	0	220	ND	0	38	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
n-Heptane	78.7907	ND	39	154	ND	0	183	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C7 as Heptane	78.7907	ND	39	154	ND	0	183	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Octane	76.7132	ND	38	149.94	ND	0	158	ND	0	38	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C8 as Octane	76.7132	ND	38	149.94	ND	0	158	ND	0	38	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Nonane	77.2868	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C9 as Nonane	77.2868	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Decane	77.9845	ND	39	152.42	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C10 as Decane	77.9845	ND	39	152.42	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Undecane	77.7829	ND	39	152.03	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C11 as Undecane	77.8539	J	78	152.03	ND	0	161	ND	0	78	0.08	9	40	3.96E-08	0	0	0.00E+00	3.96E-08
n-Dodecane	268.6458	J	269	151	ND	0	159	ND	0	269	0.27	30	137	1.37E-07	0	0	0.00E+00	1.37E-07
C12 as Dodecane	427.7920	J	428	151	ND	0	159	ND	0	428	0.43	47	217	2.17E-07	0	0	0.00E+00	2.17E-07
n-Tridecane	746.2455	J	746	151.36	ND	0	160	ND	0	746	0.75	82	379	3.79E-07	0	0	0.00E+00	3.79E-07
C13 as Tridecane	786.3687		786	151.36	ND	0	160	ND	0	786	0.79	87	400	4.00E-07	0	0	0.00E+00	4.00E-07
n-Tetradecane	843.8857		844	151.21	ND	0	160	ND	0	844	0.84	93	429	4.29E-07	0	0	0.00E+00	4.29E-07
C14 as tetradecane	214.2090	J	214	151.21	ND	0	160	ND	0	214	0.21	24	109	1.09E-07	0	0	0.00E+00	1.09E-07
n-Pentadecane	77.7519	ND	39	151.97	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C15 as Pentadecane	77.7519	ND	39	151.97	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Hexadecane	77.3333	ND	39	151.15	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C16 as Hexadecane	77.3333	ND	39	151.15	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptadecane	76.4341	ND	38	149.39	ND	0	158	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C17 as Heptadecane	76.4341	ND	38	149.39	ND	0	158	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Octadecane	77.2868	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C18 as Octodecane	77.2868	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Nonadecane	77.4419	ND	39	151.36	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C19 as Nonadecane	77.4419	ND	39	151.36	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Eicosane	77.2558	ND	39	151	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C20 as Eicosane	77.2558	ND	39	151	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heneicosane	77.9845	ND	39	152.42	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C21 as Heneicosane	77.9845	ND	39	152.42	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Docosane	77.1008	ND	39	150.7	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	77.1008	ND	39	150.7	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	77.5194	ND	39	151.52	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C23 as Tricosane	77.5194	ND	39	151.52	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetracosane	77.6279	ND	39	151.73	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C24 as Tetracosane	77.6279	ND	39	151.73	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
Total Hydrocarbon			4,636			0			0		4.64	511	2,357	2.36E-06	0	0	0.00E+00	2.36E-06

E040B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
E040B	E040B		ND Adj	E041A		ND Adj	#E009A		ND Adj						
Component	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	Flag	µg/m^3	µg/m^3	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.93644	ND	74	142	ND	0	154	ND	0	74	0.07	8	38	3.79E-08	3.79E-08
C5 as Pentane	148.93644	ND	74	142	ND	0	154	ND	0	74	0.07	8	38	3.79E-08	3.79E-08
n-Hexane	213.42016	ND	107	147	ND	0	220	ND	0	107	0.11	12	54	5.43E-08	5.43E-08
C6 as Hexane	213.42016	ND	107	147	ND	0	220	ND	0	107	0.11	12	54	5.43E-08	5.43E-08
n-Heptane	177.30233	ND	89	154	ND	0	183	ND	0	89	0.09	10	45	4.51E-08	4.51E-08
C7 as Heptane	177.30233	ND	89	154	ND	0	183	ND	0	89	0.09	10	45	4.51E-08	4.51E-08
n-Octane	153.42636	ND	77	150	ND	0	158	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
C8 as Octane	153.42636	ND	77	150	ND	0	158	ND	0	77	0.08	8	39	3.90E-08	3.90E-08
n-Nonane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C9 as Nonane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Decane	155.969	ND	78	152	ND	0	161	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C10 as Decane	155.969	ND	78	152	ND	0	161	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Undecane	155.5659	ND	78	152	ND	0	161	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
C11 as Undecane	155.5659	ND	78	152	ND	0	161	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
n-Dodecane	209.24867	J	209	151	ND	0	159	ND	0	209	0.21	23	106	1.06E-07	1.06E-07
C12 as Dodecane	244.57494	J	245	151	ND	0	159	ND	0	245	0.24	27	124	1.24E-07	1.24E-07
n-Tridecane	542.74587	J	543	151	ND	0	160	ND	0	543	0.54	60	276	2.76E-07	2.76E-07
C13 as Tridecane	404.2309	J	404	151	ND	0	160	ND	0	404	0.40	45	206	2.06E-07	2.06E-07
n-Tetradecane	618.97869	J	619	151	ND	0	160	ND	0	619	0.62	68	315	3.15E-07	3.15E-07
C14 as tetradecane	154.72869	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Pentadecane	155.50388	ND	78	152	ND	0	160	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
C15 as Pentadecane	155.50388	ND	78	152	ND	0	160	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
n-Hexadecane	154.66667	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C16 as Hexadecane	154.66667	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Heptadecane	152.86822	ND	76	149	ND	0	158	ND	0	76	0.08	8	39	3.89E-08	3.89E-08
C17 as Heptadecane	152.86822	ND	76	149	ND	0	158	ND	0	76	0.08	8	39	3.89E-08	3.89E-08
n-Octadecane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C18 as Octodecane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Nonadecane	154.88373	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
C19 as Nonadecane	154.88373	ND	77	151	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
n-Eicosane	154.51163	ND	77	151	ND	0	159	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C20 as Eicosane	154.51163	ND	77	151	ND	0	159	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Heneicosane	155.969	ND	78	152	ND	0	161	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C21 as Heneicosane	155.969	ND	78	152	ND	0	161	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Docosane	154.20155	ND	77	151	ND	0	159	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
C22 as Docosane	154.20155	ND	77	151	ND	0	159	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
n-Tricosane	155.03876	ND	78	152	ND	0	160	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
C23 as Tricosane	155.03876	ND	78	152	ND	0	160	ND	0	78	0.08	9	39	3.94E-08	3.94E-08
n-Tetracosane	155.25582	ND	78	152	ND	0	160	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C24 as Tetracosane	155.25582	ND	78	152	ND	0	160	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
Total Hydrocarbon			4,804			0			0		4.80	529	2,442	2.44E-06	2.44E-06

Bagging Data Form — Vacuum Method

Sample Id: E042

Equipment type:	PRD			**Component ID:**	E-551		
Equipment Subtype:	SP			**Unit:**	Refinery E		
Line Size:	3/4	*inches*		**Date:**	4-Sep-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.85	*inHg*	758.2 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	68.3	*°F*	20.2	**TVA ID**	34251		
Component Temp:	67	*°F*	19.4 *°C*	**Stream Pressure/Temp:**		*psig*	*°F*
Stream Description:	*Asphalt*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:25	Background	3	*ppmv*	8-sec Dwell	0	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	0 *ppm*
9:57	Initial Bag Vacuum	0.01	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	75.7	*°F*	Leak @	top PRV interface

Bag Concentrations (ppmv)

Time	9:59	10:01	10:03	10:05	10:07	10:12	10:18
ppmv	15	15.2	15.3	15.4	15.3	15.1	15

Sorbent Tube Sample Collection Parameters

E042A

Time									
10:07	Volume Start	427.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:20	Volume Stop	439.8	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.982	*L/min*

E042B

10:07	Volume Start	419.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:20	Volume Stop	432.7	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.000 *L/min*	Sorbent Flow$_{STP}$	0.997	*L/min*
	Total ST Vol$_{STP}$	25.72	*Liters*	DGM Vol$_{STP}$	87.39 *Liters*		Total Run Vol$_{STP}$	113.11	*Liters*

Bagging Parameters

Time										
10:11	Vacuum check	0.01	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	754.8	*mmHg*
10:11	DGM$_{10L}$ Time	01:28.8	*min:sec.frac*	DGM Time	1.483	DGM Flow	6.74	DGM Flow$_{STP}$	6.72	*liters/minute*
10:12	Bag Temp.	77.4	*°F*	25.2	*°C*	Sample$_T$	68	*°F*	20.0	*°C*

Post-Sample Data

10:32	Post Test M21	Background	3	*ppmv*	8-sec Dwell	0	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21 1 *ppm*
											Leak @ top PRV interface
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*	0:00	*hours:min*		
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	2.81E-06	kg/hr
Percent difference THC ER =	53%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.91E-08
C5 as Pentane	2.91E-08
n-Hexane	4.17E-08
C6 as Hexane	4.17E-08
n-Heptane	3.46E-08
C7 as Heptane	3.46E-08
n-Octane	3.00E-08
C8 as Octane	3.00E-08
n-Nonane	3.02E-08
C9 as Nonane	3.02E-08
n-Decane	3.05E-08
C10 as Decane	3.05E-08
n-Undecane	3.04E-08
C11 as Undecane	3.04E-08
n-Dodecane	5.63E-08
C12 as Dodecane	1.08E-07
n-Tridecane	2.40E-07
C13 as Tridecane	6.64E-07
n-Tetradecane	3.74E-07
C14 as tetradecane	2.80E-07
n-Pentadecane	3.04E-08
C15 as Pentadecane	3.04E-08
n-Hexadecane	3.02E-08
C16 as Hexadecane	3.02E-08
n-Heptadecane	2.99E-08
C17 as Heptadecane	2.99E-08
n-Octadecane	3.02E-08
C18 as Octodecane	3.02E-08
n-Nonadecane	3.02E-08
C19 as Nonadecane	4.14E-08
n-Eicosane	3.02E-08
C20 as Eicosane	3.02E-08
n-Heneicosane	3.05E-08
C21 as Heneicosane	5.04E-08
n-Docosane	3.01E-08
C22 as Docosane	3.01E-08
n-Tricosane	3.03E-08
C23 as Tricosane	3.03E-08
n-Tetracosane	3.03E-08
C24 as Tetracosane	3.03E-08
Total Hydrocarbon	2.81E-06

THC:	1.49E-04	lbs/day	2.71E-05	tons/yr

E042A

ANALYTICAL RESULTS	E042A		ND Adj	BACKGROUND E043A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.0500	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C5 as Pentane	75.0500	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Hexane	107.5437	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	28	2.81E-08	0	0	0.00E+00	2.81E-08
C6 as Hexane	107.5437	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	28	2.81E-08	0	0	0.00E+00	2.81E-08
n-Heptane	89.3437	ND	45	175.94	ND	0	183	ND	0	45	0.04	5	23	2.33E-08	0	0	0.00E+00	2.33E-08
C7 as Heptane	89.3437	ND	45	175.94	ND	0	183	ND	0	45	0.04	5	23	2.33E-08	0	0	0.00E+00	2.33E-08
n-Octane	77.3125	ND	39	152.25	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C8 as Octane	77.3125	ND	39	152.25	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Nonane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C9 as Nonane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Decane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C10 as Decane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Undecane	78.3906	ND	39	154.37	ND	0	161	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C11 as Undecane	78.3906	ND	39	154.37	ND	0	161	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Dodecane	139.0632	J	139	153.32	ND	0	159	ND	0	139	0.14	16	73	7.26E-08	0	0	0.00E+00	7.26E-08
C12 as Dodecane	335.7648	J	336	153.32	ND	0	159	ND	0	336	0.34	38	175	1.75E-07	0	0	0.00E+00	1.75E-07
n-Tridecane	603.9353	J	604	153.69	ND	0	160	ND	0	604	0.60	68	315	3.15E-07	0	0	0.00E+00	3.15E-07
C13 as Tridecane	2228.0849		2,228	153.69	ND	0	160	ND	0	2,228	2.23	252	1163	1.16E-06	0	0	0.00E+00	1.16E-06
n-Tetradecane	1014.8623		1,015	153.54	ND	0	160	ND	0	1,015	1.01	115	530	5.30E-07	0	0	0.00E+00	5.30E-07
C14 as tetradecane	995.7058		996	153.54	ND	0	160	ND	0	996	1.00	113	520	5.20E-07	0	0	0.00E+00	5.20E-07
n-Pentadecane	78.3594	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C15 as Pentadecane	78.3594	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C16 as Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Heptadecane	77.0312	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C17 as Heptadecane	77.0312	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Octadecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C18 as Octodecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Nonadecane	78.0469	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C19 as Nonadecane	81.7860	J	82	153.69	ND	0	160	ND	0	82	0.08	9	43	4.27E-08	0	0	0.00E+00	4.27E-08
n-Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C20 as Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Heneicosane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C21 as Heneicosane	115.8402	J	116	154.77	ND	0	161	ND	0	116	0.12	13	60	6.05E-08	0	0	0.00E+00	6.05E-08
n-Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C22 as Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C23 as Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C24 as Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
Total Hydrocarbon			6,801			0			0		6.80	769	3,550	3.55E-06	0	0	0.00E+00	3.55E-06

E042B

ANALYTICAL RESULTS	E042B		ND Adj	BACKGROUND E043A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.79077	ND	74	148	ND	0	154	ND	0	74	0.07	8	39	3.86E-08	3.86E-08
C5 as Pentane	147.79077	ND	74	148	ND	0	154	ND	0	74	0.07	8	39	3.86E-08	3.86E-08
n-Hexane	211.77846	ND	106	212	ND	0	220	ND	0	106	0.11	12	55	5.53E-08	5.53E-08
C6 as Hexane	211.77846	ND	106	212	ND	0	220	ND	0	106	0.11	12	55	5.53E-08	5.53E-08
n-Heptane	175.93846	ND	88	176	ND	0	183	ND	0	88	0.09	10	46	4.59E-08	4.59E-08
C7 as Heptane	175.93846	ND	88	176	ND	0	183	ND	0	88	0.09	10	46	4.59E-08	4.59E-08
n-Octane	152.24615	ND	76	152	ND	0	158	ND	0	76	0.08	9	40	3.97E-08	3.97E-08
C8 as Octane	152.24615	ND	76	152	ND	0	158	ND	0	76	0.08	9	40	3.97E-08	3.97E-08
n-Nonane	153.38462	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C9 as Nonane	153.38462	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Decane	154.76923	ND	77	155	ND	0	161	ND	0	77	0.08	9	40	4.04E-08	4.04E-08
C10 as Decane	154.76923	ND	77	155	ND	0	161	ND	0	77	0.08	9	40	4.04E-08	4.04E-08
n-Undecane	154.36923	ND	77	154	ND	0	161	ND	0	77	0.08	9	40	4.03E-08	4.03E-08
C11 as Undecane	154.36923	ND	77	154	ND	0	161	ND	0	77	0.08	9	40	4.03E-08	4.03E-08
n-Dodecane	153.32308	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C12 as Dodecane	153.32308	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Tridecane	314.60958	J	315	154	ND	0	160	ND	0	315	0.31	36	164	1.64E-07	1.64E-07
C13 as Tridecane	315.92156	J	316	154	ND	0	160	ND	0	316	0.32	36	165	1.65E-07	1.65E-07
n-Tetradecane	416.18392	J	416	154	ND	0	160	ND	0	416	0.42	47	217	2.17E-07	2.17E-07
C14 as tetradecane	153.53846	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Pentadecane	154.30769	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.03E-08	4.03E-08
C15 as Pentadecane	154.30769	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.03E-08	4.03E-08
n-Hexadecane	153.47692	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
C16 as Hexadecane	153.47692	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Heptadecane	151.69231	ND	76	152	ND	0	158	ND	0	76	0.08	9	40	3.96E-08	3.96E-08
C17 as Heptadecane	151.69231	ND	76	152	ND	0	158	ND	0	76	0.08	9	40	3.96E-08	3.96E-08
n-Octadecane	153.38462	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C18 as Octodecane	153.38462	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Nonadecane	153.69231	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
C19 as Nonadecane	153.69231	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Eicosane	153.32308	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C20 as Eicosane	153.32308	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Heneicosane	154.76923	ND	77	155	ND	0	161	ND	0	77	0.08	9	40	4.04E-08	4.04E-08
C21 as Heneicosane	154.76923	ND	77	155	ND	0	161	ND	0	77	0.08	9	40	4.04E-08	4.04E-08
n-Docosane	153.01538	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
C22 as Docosane	153.01538	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
n-Tricosane	153.84615	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
C23 as Tricosane	153.84615	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
n-Tetracosane	154.06154	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
C24 as Tetracosane	154.06154	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
Total Hydrocarbon			3,963			0			0		3.96	448	2,069	2.07E-06	2.07E-06

Bagging Data Form — Vacuum Method

Sample Id: E044

Equipment type:	Connector			**Component ID:**	E-451		
Equipment Subtype:	P4410 B			**Unit:**	Refinery E		
Line Size:	16	*inches*		**Date:**	4-Sep-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.74	*inHg*	755.4 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	75	*°F*	23.9 *°C*	**TVA ID**	36502		
Component Temp:		*°F*	-17.8 *°C*	**Stream Pressure/Temp:**	175	*psig*	*°F*
Stream Description:	*HCN (Pump On)*						

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:14	Background	-4	*ppmv*	8-sec Dwell	26	*ppmv*	Total Dwell	4:00	*min:sec*	Final M21	2308 *ppm*
14:02	Initial Bag Vacuum	0.01	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	297.3	*°F*	Leak @	Flange at Bottom of Pump Body

Bag Concentrations (ppmv)

Time	14:04	14:06	14:08	14:10	14:16	14:20							
ppmv	116	171	202	229	281	394							

Sorbent Tube Sample Collection Parameters

E044A

Time									
14:10	Volume Start	439.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:23	Volume Stop	452.7	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow 0.992	*L/min*	$\text{Sorbent Flow}_{STP}$	0.975	*L/min*

E044B

14:10	Volume Start	432.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:23	Volume Stop	445.7	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow 1.000	*L/min*	$\text{Sorbent Flow}_{STP}$	0.982	*L/min*
	$\text{Total ST Vol}_{STP}$	25.44	*Liters*	DGM Vol_{STP}	80.65	*Liters*	$\text{Total Run Vol}_{STP}$	106.09	*Liters*

Bagging Parameters

Time									
14:14	Vacuum check	0.01	*inches H2O*			DGM_P	1.8 *inches H2O vacuum*	752.0	*mmHg*
14:14	DGM_{10L} Time	01:34.8	*min:sec.frac*	DGM Time	1.583	DGM Flow	6.32	DGM Flow_{STP} 6.20	*liters/minute*
14:15	Bag Temp.	307	*°F*	152.8	*°C*	Sample_T	74 *°F*	23.3	*°C*

Post-Sample Data

14:32	Post Test M21	Background	17 *ppmv*	8-sec Dwell	186 *ppmv*	Total Dwell	3:30 *min:sec*	Final M21	2184 *ppm*
								Leak @	Flange at Bottom of Pump Body

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	6.68E-04	kg/hr
Percent difference THC ER =	7%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.72E-08
C5 as Pentane	2.72E-08
n-Hexane	3.90E-08
C6 as Hexane	3.90E-08
n-Heptane	3.24E-08
C7 as Heptane	3.24E-08
n-Octane	6.56E-08
C8 as Octane	1.28E-07
n-Nonane	6.61E-08
C9 as Nonane	1.23E-04
n-Decane	1.05E-05
C10 as Decane	2.02E-04
n-Undecane	2.04E-05
C11 as Undecane	1.73E-04
n-Dodecane	5.95E-06
C12 as Dodecane	9.26E-05
n-Tridecane	8.40E-06
C13 as Tridecane	2.56E-05
n-Tetradecane	1.69E-06
C14 as tetradecane	1.65E-06
n-Pentadecane	1.06E-07
C15 as Pentadecane	6.65E-08
n-Hexadecane	6.61E-08
C16 as Hexadecane	6.61E-08
n-Heptadecane	6.53E-08
C17 as Heptadecane	6.53E-08
n-Octadecane	6.61E-08
C18 as Octodecane	1.35E-07
n-Nonadecane	6.62E-08
C19 as Nonadecane	6.62E-08
n-Eicosane	6.61E-08
C20 as Eicosane	1.42E-07
n-Heneicosane	6.67E-08
C21 as Heneicosane	3.91E-08
n-Docosane	6.59E-08
C22 as Docosane	6.59E-08
n-Tricosane	6.63E-08
C23 as Tricosane	6.63E-08
n-Tetracosane	6.64E-08
C24 as Tetracosane	6.64E-08
Total Hydrocarbon	6.68E-04

THC:	3.53E-02	lbs/day	6.45E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E044A	E044A		ND Adj	E045A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
C6 as Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
n-Heptane	88.6512	ND	44	177.3	ND	0	183	ND	0	44	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
C7 as Heptane	88.6512	ND	44	177.3	ND	0	183	ND	0	44	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
n-Octane	383.5659	ND	192	153.43	ND	0	158	ND	0	192	0.19	20	94	9.39E-08	0	0	0.00E+00	9.39E-08
C8 as Octane	448.6282	J	449	153.43	ND	0	158	ND	0	449	0.45	48	220	2.20E-07	0	0	0.00E+00	2.20E-07
n-Nonane	386.4341	ND	193	154.57	ND	0	160	ND	0	193	0.19	20	95	9.46E-08	0	0	0.00E+00	9.46E-08
C9 as Nonane	243243.0336		243,243	154.57	ND	0	160	ND	0	243,243	243.24	25805	119098	1.19E-04	0	0	0.00E+00	1.19E-04
n-Decane	23112.1463		23,112	155.97	ND	0	161	ND	0	23,112	23.11	2452	11316	1.13E-05	0	0	0.00E+00	1.13E-05
C10 as Decane	406458.4008		406,458	155.97	ND	0	161	ND	0	406,458	406.46	43119	199013	1.99E-04	0	0	0.00E+00	1.99E-04
n-Undecane	40876.9034		40,877	155.57	ND	0	161	ND	0	40,877	40.88	4336	20014	2.00E-05	0	0	0.00E+00	2.00E-05
C11 as Undecane	344198.4623		344,198	155.57	ND	0	161	ND	0	344,198	344.20	36515	168529	1.69E-04	0	0	0.00E+00	1.69E-04
n-Dodecane	11985.3719		11,985	154.51	ND	0	159	ND	0	11,985	11.99	1271	5868	5.87E-06	0	0	0.00E+00	5.87E-06
C12 as Dodecane	176530.0906		176,530	154.51	ND	0	159	ND	0	176,530	176.53	18727	86434	8.64E-05	0	0	0.00E+00	8.64E-05
n-Tridecane	15652.9249		15,653	154.88	ND	0	160	ND	0	15,653	15.65	1661	7664	7.66E-06	0	0	0.00E+00	7.66E-06
C13 as Tridecane	44173.1261		44,173	154.88	ND	0	160	ND	0	44,173	44.17	4686	21628	2.16E-05	0	0	0.00E+00	2.16E-05
n-Tetradecane	2810.4204	J	2,810	154.73	ND	0	160	ND	0	2,810	2.81	298	1376	1.38E-06	0	0	0.00E+00	1.38E-06
C14 as tetradecane	1340.7325	J	1,341	154.73	ND	0	160	ND	0	1,341	1.34	142	656	6.56E-07	0	0	0.00E+00	6.56E-07
n-Pentadecane	388.7597	ND	194	155.5	ND	0	160	ND	0	194	0.19	21	95	9.52E-08	0	0	0.00E+00	9.52E-08
C15 as Pentadecane	388.7597	ND	194	155.5	ND	0	160	ND	0	194	0.19	21	95	9.52E-08	0	0	0.00E+00	9.52E-08
n-Hexadecane	386.6667	ND	193	154.67	ND	0	160	ND	0	193	0.19	21	95	9.47E-08	0	0	0.00E+00	9.47E-08
C16 as Hexadecane	386.6667	ND	193	154.67	ND	0	160	ND	0	193	0.19	21	95	9.47E-08	0	0	0.00E+00	9.47E-08
n-Heptadecane	382.1706	ND	191	152.87	ND	0	158	ND	0	191	0.19	20	94	9.36E-08	0	0	0.00E+00	9.36E-08
C17 as Heptadecane	382.1706	ND	191	152.87	ND	0	158	ND	0	191	0.19	20	94	9.36E-08	0	0	0.00E+00	9.36E-08
n-Octadecane	386.4341	ND	193	154.57	ND	0	160	ND	0	193	0.19	20	95	9.46E-08	0	0	0.00E+00	9.46E-08
C18 as Octodecane	88.2556	J	88	154.57	ND	0	160	ND	0	88	0.09	9	43	4.32E-08	0	0	0.00E+00	4.32E-08
n-Nonadecane	387.2093	ND	194	154.88	ND	0	160	ND	0	194	0.19	21	95	9.48E-08	0	0	0.00E+00	9.48E-08
C19 as Nonadecane	387.2093	ND	194	154.88	ND	0	160	ND	0	194	0.19	21	95	9.48E-08	0	0	0.00E+00	9.48E-08
n-Eicosane	386.2791	ND	193	154.51	ND	0	159	ND	0	193	0.19	20	95	9.46E-08	0	0	0.00E+00	9.46E-08
C20 as Eicosane	386.2791	ND	193	154.51	ND	0	159	ND	0	193	0.19	20	95	9.46E-08	0	0	0.00E+00	9.46E-08
n-Heneicosane	389.9225	ND	195	155.97	ND	0	161	ND	0	195	0.19	21	95	9.55E-08	0	0	0.00E+00	9.55E-08
C21 as Heneicosane	82.2972	J	82	155.97	ND	0	161	ND	0	82	0.08	9	40	4.03E-08	0	0	0.00E+00	4.03E-08
n-Docosane	385.5039	ND	193	154.2	ND	0	159	ND	0	193	0.19	20	94	9.44E-08	0	0	0.00E+00	9.44E-08
C22 as Docosane	385.5039	ND	193	154.2	ND	0	159	ND	0	193	0.19	20	94	9.44E-08	0	0	0.00E+00	9.44E-08
n-Tricosane	387.5969	ND	194	155.04	ND	0	160	ND	0	194	0.19	21	95	9.49E-08	0	0	0.00E+00	9.49E-08
C23 as Tricosane	387.5969	ND	194	155.04	ND	0	160	ND	0	194	0.19	21	95	9.49E-08	0	0	0.00E+00	9.49E-08
n-Tetracosane	388.1395	ND	194	155.26	ND	0	160	ND	0	194	0.19	21	95	9.50E-08	0	0	0.00E+00	9.50E-08
C24 as Tetracosane	388.1395	ND	194	155.26	ND	0	160	ND	0	194	0.19	21	95	9.50E-08	0	0	0.00E+00	9.50E-08
Total Hydrocarbon			1,315,136			0			0		1315.14	139517	643,925	6.44E-04	0	0	0.00E+00	6.44E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E044B	E044B		ND Adj	E045A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	147.7907692	ND	74	149	ND	0	154	ND	0	74	0.07	8	36	3.62E-08	3.62E-08
C5 as Pentane	147.7907692	ND	74	149	ND	0	154	ND	0	74	0.07	8	36	3.62E-08	3.62E-08
n-Hexane	211.7784615	ND	106	213	ND	0	220	ND	0	106	0.11	11	52	5.18E-08	5.18E-08
C6 as Hexane	211.7784615	ND	106	213	ND	0	220	ND	0	106	0.11	11	52	5.18E-08	5.18E-08
n-Heptane	175.9384615	ND	88	177	ND	0	183	ND	0	88	0.09	9	43	4.31E-08	4.31E-08
C7 as Heptane	175.9384615	ND	88	177	ND	0	183	ND	0	88	0.09	9	43	4.31E-08	4.31E-08
n-Octane	152.2461538	ND	76	153	ND	0	158	ND	0	76	0.08	8	37	3.73E-08	3.73E-08
C8 as Octane	152.2461538	ND	76	153	ND	0	158	ND	0	76	0.08	8	37	3.73E-08	3.73E-08
n-Nonane	153.3846154	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C9 as Nonane	260228.8876		260,229	155	ND	0	160	ND	0	260,229	260.23	27607	127415	1.27E-04	1.27E-04
n-Decane	19596.46664		19,596	156	ND	0	161	ND	0	19,596	19.60	2079	9595	9.59E-06	9.59E-06
C10 as Decane	420520.542		420,521	156	ND	0	161	ND	0	420,521	420.52	44611	205898	2.06E-04	2.06E-04
n-Undecane	42427.46661		42,427	156	ND	0	161	ND	0	42,427	42.43	4501	20774	2.08E-05	2.08E-05
C11 as Undecane	364159.0044		364,159	156	ND	0	161	ND	0	364,159	364.16	38632	178302	1.78E-04	1.78E-04
n-Dodecane	12322.67116		12,323	155	ND	0	159	ND	0	12,323	12.32	1307	6034	6.03E-06	6.03E-06
C12 as Dodecane	201681.8056		201,682	155	ND	0	159	ND	0	201,682	201.68	21396	98749	9.87E-05	9.87E-05
n-Tridecane	18639.96033		18,640	155	ND	0	160	ND	0	18,640	18.64	1977	9127	9.13E-06	9.13E-06
C13 as Tridecane	60431.16784		60,431	155	ND	0	160	ND	0	60,431	60.43	6411	29589	2.96E-05	2.96E-05
n-Tetradecane	4086.5501		4,087	155	ND	0	160	ND	0	4,087	4.09	434	2001	2.00E-06	2.00E-06
C14 as tetradecane	5394.102889		5,394	155	ND	0	160	ND	0	5,394	5.39	572	2641	2.64E-06	2.64E-06
n-Pentadecane	236.9845375	J	237	156	ND	0	160	ND	0	237	0.24	25	116	1.16E-07	1.16E-07
C15 as Pentadecane	154.3076923	ND	77	156	ND	0	160	ND	0	77	0.08	8	38	3.78E-08	3.78E-08
n-Hexadecane	153.4769231	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C16 as Hexadecane	153.4769231	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Heptadecane	151.6923077	ND	76	153	ND	0	158	ND	0	76	0.08	8	37	3.71E-08	3.71E-08
C17 as Heptadecane	151.6923077	ND	76	153	ND	0	158	ND	0	76	0.08	8	37	3.71E-08	3.71E-08
n-Octadecane	153.3846154	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C18 as Octodecane	464.8742334	J	465	155	ND	0	160	ND	0	465	0.46	49	228	2.28E-07	2.28E-07
n-Nonadecane	153.6923077	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C19 as Nonadecane	153.6923077	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Eicosane	153.3230769	ND	77	155	ND	0	159	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
C20 as Eicosane	385.8738493	J	386	155	ND	0	159	ND	0	386	0.39	41	189	1.89E-07	1.89E-07
n-Heneicosane	154.7692308	ND	77	156	ND	0	161	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C21 as Heneicosane	154.7692308	ND	77	156	ND	0	161	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Docosane	153.0153846	ND	77	154	ND	0	159	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C22 as Docosane	153.0153846	ND	77	154	ND	0	159	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
n-Tricosane	153.8461538	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C23 as Tricosane	153.8461538	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Tetracosane	154.0615385	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C24 as Tetracosane	154.0615385	ND	77	155	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
Total Hydrocarbon			1,412,646			0			0		1412.65	149861	691,668	6.92E-04	6.92E-04

Bagging Data Form — Vacuum Method

Sample Id: E046

WSPA — Western States Petroleum Association

Equipment type:	PRD			**Component ID:**	E-1845		
Equipment Subtype:	Threaded Connetor			**Unit:**	Refinery E		
Line Size:	1	*inches*		**Date:**	5-Sep-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.93	*inHg*	760.2 *mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	61.2	°F	16.2 °C	**TVA ID**	34251		
Component Temp:	62	°F	16.7 °C	**Stream Pressure/Temp:**		*psig*	°F
Stream Description:	*Diesel*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:20	Background	5	*ppmv*	8-sec Dwell	0	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	20 *ppm*
10:03	Initial Bag Vacuum	0.025	*inches H2O*	DGM Vac.	2.1	*inches H2O*	Bag Temp	66.9	°F	Leak @	threaded connection

Bag Concentrations (ppmv)

Time	10:05	10:07	10:09	10:11	10:13	10:15	10:23	10:26						
ppmv	10.4	11.9	12.2	12.5	12.6	12.7	13.1	13.1						

Sorbent Tube Sample Collection Parameters

E046A

Time									
10:15	Volume Start	455.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:28	Volume Stop	467.6	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.976	*L/min*

E046B

10:15	Volume Start	447.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:28	Volume Stop	460.0	*Liters*	Total Vol	12.5	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.962 *L/min*	Sorbent Flow$_{STP}$	0.976	*L/min*
	Total ST Vol$_{STP}$	25.37	*Liters*	DGM Vol$_{STP}$	89.94	*Liters*	Total Run Vol$_{STP}$	115.30	*Liters*

Bagging Parameters

Time										
10:20	Vacuum check	0.02	*inches H2O*			DGM$_P$	2	*inches H2O vacuum*	756.5	*mmHg*
10:20	DGM$_{10L}$ Time	01:27.8	*min:sec.frac*	DGM Time	1.467	DGM Flow	6.82	DGM Flow$_{STP}$	6.92	*liters/minute*
10:21	Bag Temp.	68.4	°F	20.2	°C	Sample$_T$	60	°F	15.6	°C

Post-Sample Data

10:37	Post Test M21	Background	9	*ppmv*	8-sec Dwell	18 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	45 *ppm*
									Leak @	threaded connection

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	2.08E-06	kg/hr
Percent difference THC ER =	21%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	3.07E-08
C5 as Pentane	3.07E-08
n-Hexane	4.40E-08
C6 as Hexane	4.40E-08
n-Heptane	3.65E-08
C7 as Heptane	3.65E-08
n-Octane	3.16E-08
C8 as Octane	7.15E-08
n-Nonane	4.49E-08
C9 as Nonane	1.69E-07
n-Decane	4.91E-08
C10 as Decane	2.35E-07
n-Undecane	4.81E-08
C11 as Undecane	2.42E-07
n-Dodecane	3.18E-08
C12 as Dodecane	1.29E-07
n-Tridecane	4.95E-08
C13 as Tridecane	4.31E-08
n-Tetradecane	4.30E-08
C14 as tetradecane	3.19E-08
n-Pentadecane	3.20E-08
C15 as Pentadecane	3.20E-08
n-Hexadecane	3.19E-08
C16 as Hexadecane	3.19E-08
n-Heptadecane	3.15E-08
C17 as Heptadecane	3.15E-08
n-Octadecane	3.18E-08
C18 as Octodecane	3.18E-08
n-Nonadecane	3.19E-08
C19 as Nonadecane	3.19E-08
n-Eicosane	3.18E-08
C20 as Eicosane	3.18E-08
n-Heneicosane	3.21E-08
C21 as Heneicosane	3.21E-08
n-Docosane	3.18E-08
C22 as Docosane	3.18E-08
n-Tricosane	3.19E-08
C23 as Tricosane	3.19E-08
n-Tetracosane	3.20E-08
C24 as Tetracosane	3.20E-08
Total Hydrocarbon	2.08E-06

THC:	1.10E-04	lbs/day	2.01E-05	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E046A	E046A		ND Adj	E047A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.8512	ND	38	150.1	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C5 as Pentane	76.8512	ND	38	150.1	ND	0	154	ND	0	38	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Hexane	110.1248	ND	55	215.09	ND	0	220	ND	0	55	0.06	6	29	2.93E-08	0	0	0.00E+00	2.93E-08
C6 as Hexane	110.1248	ND	55	215.09	ND	0	220	ND	0	55	0.06	6	29	2.93E-08	0	0	0.00E+00	2.93E-08
n-Heptane	91.4880	ND	46	178.69	ND	0	183	ND	0	46	0.05	5	24	2.43E-08	0	0	0.00E+00	2.43E-08
C7 as Heptane	91.4880	ND	46	178.69	ND	0	183	ND	0	46	0.05	5	24	2.43E-08	0	0	0.00E+00	2.43E-08
n-Octane	79.1680	ND	40	154.62	ND	0	158	ND	0	40	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C8 as Octane	189.3844	J	189	154.62	ND	0	158	ND	0	189	0.19	22	101	1.01E-07	0	0	0.00E+00	1.01E-07
n-Nonane	88.9995	J	89	155.78	ND	0	160	ND	0	89	0.09	10	47	4.74E-08	0	0	0.00E+00	4.74E-08
C9 as Nonane	359.5771	J	360	155.78	ND	0	160	ND	0	360	0.36	41	191	1.91E-07	0	0	0.00E+00	1.91E-07
n-Decane	104.1665	J	104	157.19	ND	0	161	ND	0	104	0.10	12	55	5.54E-08	0	0	0.00E+00	5.54E-08
C10 as Decane	444.1113	J	444	157.19	ND	0	161	ND	0	444	0.44	51	236	2.36E-07	0	0	0.00E+00	2.36E-07
n-Undecane	100.3315	J	100	156.78	ND	0	161	ND	0	100	0.10	12	53	5.34E-08	0	0	0.00E+00	5.34E-08
C11 as Undecane	472.8926	J	473	156.78	ND	0	161	ND	0	473	0.47	55	252	2.52E-07	0	0	0.00E+00	2.52E-07
n-Dodecane	79.7280	ND	40	155.72	ND	0	159	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C12 as Dodecane	274.7299	J	275	155.72	ND	0	159	ND	0	275	0.27	32	146	1.46E-07	0	0	0.00E+00	1.46E-07
n-Tridecane	106.0064	J	106	156.09	ND	0	160	ND	0	106	0.11	12	56	5.64E-08	0	0	0.00E+00	5.64E-08
C13 as Tridecane	82.2375	J	82	156.09	ND	0	160	ND	0	82	0.08	9	44	4.38E-08	0	0	0.00E+00	4.38E-08
n-Tetradecane	81.6771	J	82	155.94	ND	0	160	ND	0	82	0.08	9	43	4.35E-08	0	0	0.00E+00	4.35E-08
C14 as tetradecane	79.8400	ND	40	155.94	ND	0	160	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Pentadecane	80.2400	ND	40	156.72	ND	0	160	ND	0	40	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
C15 as Pentadecane	80.2400	ND	40	156.72	ND	0	160	ND	0	40	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
n-Hexadecane	79.8080	ND	40	155.87	ND	0	160	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C16 as Hexadecane	79.8080	ND	40	155.87	ND	0	160	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Heptadecane	78.8800	ND	39	154.06	ND	0	158	ND	0	39	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
C17 as Heptadecane	78.8800	ND	39	154.06	ND	0	158	ND	0	39	0.04	5	21	2.10E-08	0	0	0.00E+00	2.10E-08
n-Octadecane	79.7600	ND	40	155.78	ND	0	160	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C18 as Octodecane	79.7600	ND	40	155.78	ND	0	160	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Nonadecane	79.9200	ND	40	156.09	ND	0	160	ND	0	40	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C19 as Nonadecane	79.9200	ND	40	156.09	ND	0	160	ND	0	40	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
n-Eicosane	79.7280	ND	40	155.72	ND	0	159	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C20 as Eicosane	79.7280	ND	40	155.72	ND	0	159	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Heneicosane	80.4800	ND	40	157.19	ND	0	161	ND	0	40	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
C21 as Heneicosane	80.4800	ND	40	157.19	ND	0	161	ND	0	40	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
n-Docosane	79.5680	ND	40	155.41	ND	0	159	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
C22 as Docosane	79.5680	ND	40	155.41	ND	0	159	ND	0	40	0.04	5	21	2.12E-08	0	0	0.00E+00	2.12E-08
n-Tricosane	80.0000	ND	40	156.25	ND	0	160	ND	0	40	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C23 as Tricosane	80.0000	ND	40	156.25	ND	0	160	ND	0	40	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
n-Tetracosane	80.1120	ND	40	156.47	ND	0	160	ND	0	40	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C24 as Tetracosane	80.1120	ND	40	156.47	ND	0	160	ND	0	40	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
Total Hydrocarbon			3,500			0			0		3.50	404	1,863	1.86E-06	0	0	0.00E+00	1.86E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E046B	E046B		ND Adj	E047A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	153.7024	ND	77	150	ND	0	154	ND	0	77	0.08	9	41	4.09E-08	4.09E-08
C5 as Pentane	153.7024	ND	77	150	ND	0	154	ND	0	77	0.08	9	41	4.09E-08	4.09E-08
n-Hexane	220.2496	ND	110	215	ND	0	220	ND	0	110	0.11	13	59	5.86E-08	5.86E-08
C6 as Hexane	220.2496	ND	110	215	ND	0	220	ND	0	110	0.11	13	59	5.86E-08	5.86E-08
n-Heptane	182.976	ND	91	179	ND	0	183	ND	0	91	0.09	11	49	4.87E-08	4.87E-08
C7 as Heptane	182.976	ND	91	179	ND	0	183	ND	0	91	0.09	11	49	4.87E-08	4.87E-08
n-Octane	158.336	ND	79	155	ND	0	158	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
C8 as Octane	158.336	ND	79	155	ND	0	158	ND	0	79	0.08	9	42	4.21E-08	4.21E-08
n-Nonane	159.52	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
C9 as Nonane	273.85368	J	274	156	ND	0	160	ND	0	274	0.27	32	146	1.46E-07	1.46E-07
n-Decane	160.96	ND	80	157	ND	0	161	ND	0	80	0.08	9	43	4.28E-08	4.28E-08
C10 as Decane	439.6182	J	440	157	ND	0	161	ND	0	440	0.44	51	234	2.34E-07	2.34E-07
n-Undecane	160.544	ND	80	157	ND	0	161	ND	0	80	0.08	9	43	4.27E-08	4.27E-08
C11 as Undecane	435.33382	J	435	157	ND	0	161	ND	0	435	0.44	50	232	2.32E-07	2.32E-07
n-Dodecane	159.456	ND	80	156	ND	0	159	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
C12 as Dodecane	211.88674	J	212	156	ND	0	159	ND	0	212	0.21	24	113	1.13E-07	1.13E-07
n-Tridecane	159.84	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.25E-08	4.25E-08
C13 as Tridecane	159.84	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.25E-08	4.25E-08
n-Tetradecane	159.68	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.25E-08	4.25E-08
C14 as tetradecane	159.68	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.25E-08	4.25E-08
n-Pentadecane	160.48	ND	80	157	ND	0	160	ND	0	80	0.08	9	43	4.27E-08	4.27E-08
C15 as Pentadecane	160.48	ND	80	157	ND	0	160	ND	0	80	0.08	9	43	4.27E-08	4.27E-08
n-Hexadecane	159.616	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.25E-08	4.25E-08
C16 as Hexadecane	159.616	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.25E-08	4.25E-08
n-Heptadecane	157.76	ND	79	154	ND	0	158	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
C17 as Heptadecane	157.76	ND	79	154	ND	0	158	ND	0	79	0.08	9	42	4.20E-08	4.20E-08
n-Octadecane	159.52	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
C18 as Octodecane	159.52	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
n-Nonadecane	159.84	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.25E-08	4.25E-08
C19 as Nonadecane	159.84	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.25E-08	4.25E-08
n-Eicosane	159.456	ND	80	156	ND	0	159	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
C20 as Eicosane	159.456	ND	80	156	ND	0	159	ND	0	80	0.08	9	42	4.24E-08	4.24E-08
n-Heneicosane	160.96	ND	80	157	ND	0	161	ND	0	80	0.08	9	43	4.28E-08	4.28E-08
C21 as Heneicosane	160.96	ND	80	157	ND	0	161	ND	0	80	0.08	9	43	4.28E-08	4.28E-08
n-Docosane	159.136	ND	80	155	ND	0	159	ND	0	80	0.08	9	42	4.23E-08	4.23E-08
C22 as Docosane	159.136	ND	80	155	ND	0	159	ND	0	80	0.08	9	42	4.23E-08	4.23E-08
n-Tricosane	160	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.26E-08	4.26E-08
C23 as Tricosane	160	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.26E-08	4.26E-08
n-Tetracosane	160.224	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.26E-08	4.26E-08
C24 as Tetracosane	160.224	ND	80	156	ND	0	160	ND	0	80	0.08	9	43	4.26E-08	4.26E-08
Total Hydrocarbon			4,313			0			0		4.31	497	2,295	2.30E-06	2.30E-06

Bagging Data Form **Vacuum Method** **Sample Id** **E048**

Equipment type:	Valve			**Component ID:**	E-1873	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	4	*inches*		**Date:**	5-Sep-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.91	*inHg*	759.7 *mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	72	*°F*	22.2 *°C*	**TVA ID**	37887	
Component Temp:	70	*°F*	21.1 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Jet A*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:11	Background	-20	*ppmv*	8-sec Dwell	31	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	228 *ppm*
13:56	Initial Bag Vacuum	0.05	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	81.5	*°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	13:59	14:03	14:05	14:07	14:09	14:13	14:15	14:20	14:23					
ppmv	13.9	26.2	27.1	29.4	29.7	31.2	32.1	31.9	32.4					

Sorbent Tube Sample Collection Parameters

E048A

Time									
14:15	Volume Start	467.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:28	Volume Stop	480.3	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.929	*L/min*

E048B

14:15	Volume Start	460.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:28	Volume Stop	472.9	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.943	*L/min*
	Total ST Vol$_{STP}$	24.33	*Liters*	DGM Vol$_{STP}$	79.71	*Liters*	Total Run Vol$_{STP}$	104.05	*Liters*

Bagging Parameters

Time										
14:20	Vacuum check	0.04	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	756.4	*mmHg*
14:18	DGM$_{10L}$ Time	01:32.7	*min:sec.frac*	DGM Time	1.550	DGM Flow	6.45	DGM Flow$_{STP}$	6.13	*liters/minute*
14:20	Bag Temp.	83.6	*°F*	28.7	*°C*	Sample$_T$	95	*°F*	35.0	*°C*

Post-Sample Data

14:39 Post Test M21	Background	-6	*ppmv*	8-sec Dwell	122	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	259 *ppm*
									Leak @	Stem
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*							
Density of organic condensate		N/A	*g/ml*							

Average THC emissions =	3.24E-05 kg/hr
Percent difference THC ER =	8%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.70E-08
C5 as Pentane	2.70E-08
n-Hexane	3.86E-08
C6 as Hexane	3.86E-08
n-Heptane	3.21E-08
C7 as Heptane	3.21E-08
n-Octane	3.15E-07
C8 as Octane	2.20E-06
n-Nonane	1.06E-06
C9 as Nonane	5.48E-06
n-Decane	1.55E-06
C10 as Decane	6.52E-06
n-Undecane	1.54E-06
C11 as Undecane	5.71E-06
n-Dodecane	9.85E-07
C12 as Dodecane	3.65E-06
n-Tridecane	7.15E-07
C13 as Tridecane	1.48E-06
n-Tetradecane	2.85E-07
C14 as tetradecane	1.82E-07
n-Pentadecane	2.82E-08
C15 as Pentadecane	2.82E-08
n-Hexadecane	2.80E-08
C16 as Hexadecane	2.80E-08
n-Heptadecane	2.77E-08
C17 as Heptadecane	2.77E-08
n-Octadecane	2.80E-08
C18 as Octodecane	2.80E-08
n-Nonadecane	2.80E-08
C19 as Nonadecane	2.80E-08
n-Eicosane	2.80E-08
C20 as Eicosane	2.80E-08
n-Heneicosane	2.82E-08
C21 as Heneicosane	2.82E-08
n-Docosane	2.79E-08
C22 as Docosane	2.79E-08
n-Tricosane	2.81E-08
C23 as Tricosane	2.81E-08
n-Tetracosane	2.81E-08
C24 as Tetracosane	2.81E-08
Total Hydrocarbon	3.24E-05

THC:	**1.72E-03**	**lbs/day**	**3.13E-04**	**tons/yr**

ANALYTICAL RESULTS E048A				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS			COMBINED EMISSION RATE
E048A	E048A		ND Adj	E049A		ND Adj	#E009A		ND Adj						Capture	#E0XX		
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	75.6409	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	108.3906	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	26	2.60E-08	0	0	0.00E+00	2.60E-08
C6 as Hexane	108.3906	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	26	2.60E-08	0	0	0.00E+00	2.60E-08
n-Heptane	90.0472	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	22	2.16E-08	0	0	0.00E+00	2.16E-08
C7 as Heptane	90.0472	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	22	2.16E-08	0	0	0.00E+00	2.16E-08
n-Octane	655.1781	J	655	153.43	ND	0	158	ND	0	655	0.66	68	315	3.15E-07	0	0	0.00E+00	3.15E-07
C8 as Octane	4589.5327		4,590	153.43	ND	0	158	ND	0	4,590	4.59	478	2204	2.20E-06	0	0	0.00E+00	2.20E-06
n-Nonane	2152.8755		2,153	154.57	ND	0	160	ND	0	2,153	2.15	224	1034	1.03E-06	0	0	0.00E+00	1.03E-06
C9 as Nonane	11093.5024		11,094	154.57	ND	0	160	ND	0	11,094	11.09	1154	5327	5.33E-06	0	0	0.00E+00	5.33E-06
n-Decane	2947.4083		2,947	155.97	ND	0	161	ND	0	2,947	2.95	307	1415	1.42E-06	0	0	0.00E+00	1.42E-06
C10 as Decane	13102.6771		13,103	155.97	ND	0	161	ND	0	13,103	13.10	1363	6292	6.29E-06	0	0	0.00E+00	6.29E-06
n-Undecane	3057.6647		3,058	155.57	ND	0	161	ND	0	3,058	3.06	318	1468	1.47E-06	0	0	0.00E+00	1.47E-06
C11 as Undecane	11455.5022		11,456	155.57	ND	0	161	ND	0	11,456	11.46	1192	5501	5.50E-06	0	0	0.00E+00	5.50E-06
n-Dodecane	1933.3431		1,933	154.51	ND	0	159	ND	0	1,933	1.93	201	928	9.28E-07	0	0	0.00E+00	9.28E-07
C12 as Dodecane	7249.5686		7,250	154.51	ND	0	159	ND	0	7,250	7.25	754	3481	3.48E-06	0	0	0.00E+00	3.48E-06
n-Tridecane	1384.1399		1,384	154.88	ND	0	160	ND	0	1,384	1.38	144	665	6.65E-07	0	0	0.00E+00	6.65E-07
C13 as Tridecane	3136.1165		3,136	154.88	ND	0	160	ND	0	3,136	3.14	326	1506	1.51E-06	0	0	0.00E+00	1.51E-06
n-Tetradecane	519.7768	J	520	154.73	ND	0	160	ND	0	520	0.52	54	250	2.50E-07	0	0	0.00E+00	2.50E-07
C14 as tetradecane	402.6367	J	403	154.73	ND	0	160	ND	0	403	0.40	42	193	1.93E-07	0	0	0.00E+00	1.93E-07
n-Pentadecane	78.9764	ND	39	155.5	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C15 as Pentadecane	78.9764	ND	39	155.5	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C16 as Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C17 as Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Octadecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C18 as Octodecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C19 as Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C20 as Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C21 as Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C22 as Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C23 as Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C24 as Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
Total Hydrocarbon			64,740			0			0		64.74	6736	31,089	3.11E-05	0	0	0.00E+00	3.11E-05

ANALYTICAL RESULTS E048B				BACKGROUND			TRIP BLANK			ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
E048B	E048B		ND Adj	E049A		ND Adj	#E009A		ND Adj						
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.9364385	ND	74	149	ND	0	154	ND	0	74	0.07	8	36	3.58E-08	3.58E-08
C5 as Pentane	148.9364385	ND	74	149	ND	0	154	ND	0	74	0.07	8	36	3.58E-08	3.58E-08
n-Hexane	213.4201613	ND	107	213	ND	0	220	ND	0	107	0.11	11	51	5.12E-08	5.12E-08
C6 as Hexane	213.4201613	ND	107	213	ND	0	220	ND	0	107	0.11	11	51	5.12E-08	5.12E-08
n-Heptane	177.3023308	ND	89	177	ND	0	183	ND	0	89	0.09	9	43	4.26E-08	4.26E-08
C7 as Heptane	177.3023308	ND	89	177	ND	0	183	ND	0	89	0.09	9	43	4.26E-08	4.26E-08
n-Octane	658.5861823	J	659	153	ND	0	158	ND	0	659	0.66	69	316	3.16E-07	3.16E-07
C8 as Octane	4557.734543		4,558	153	ND	0	158	ND	0	4,558	4.56	474	2189	2.19E-06	2.19E-06
n-Nonane	2250.781525		2,251	155	ND	0	160	ND	0	2,251	2.25	234	1081	1.08E-06	1.08E-06
C9 as Nonane	11729.29734		11,729	155	ND	0	160	ND	0	11,729	11.73	1220	5633	5.63E-06	5.63E-06
n-Decane	3523.093018		3,523	156	ND	0	161	ND	0	3,523	3.52	367	1692	1.69E-06	1.69E-06
C10 as Decane	14056.74787		14,057	156	ND	0	161	ND	0	14,057	14.06	1463	6750	6.75E-06	6.75E-06
n-Undecane	3363.515957		3,364	156	ND	0	161	ND	0	3,364	3.36	350	1615	1.62E-06	1.62E-06
C11 as Undecane	12345.01858		12,345	156	ND	0	161	ND	0	12,345	12.35	1284	5928	5.93E-06	5.93E-06
n-Dodecane	2170.776743		2,171	155	ND	0	159	ND	0	2,171	2.17	226	1042	1.04E-06	1.04E-06
C12 as Dodecane	7939.720805		7,940	155	ND	0	159	ND	0	7,940	7.94	826	3813	3.81E-06	3.81E-06
n-Tridecane	1592.273528		1,592	155	ND	0	160	ND	0	1,592	1.59	166	765	7.65E-07	7.65E-07
C13 as Tridecane	3044.519594		3,045	155	ND	0	160	ND	0	3,045	3.04	317	1462	1.46E-06	1.46E-06
n-Tetradecane	667.0044008	J	667	155	ND	0	160	ND	0	667	0.67	69	320	3.20E-07	3.20E-07
C14 as tetradecane	354.5924361	J	355	155	ND	0	160	ND	0	355	0.35	37	170	1.70E-07	1.70E-07
n-Pentadecane	155.5038806	ND	78	156	ND	0	160	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
C15 as Pentadecane	155.5038806	ND	78	156	ND	0	160	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
n-Hexadecane	154.6666712	ND	77	155	ND	0	160	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
C16 as Hexadecane	154.6666712	ND	77	155	ND	0	160	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
n-Heptadecane	152.8682216	ND	76	153	ND	0	158	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
C17 as Heptadecane	152.8682216	ND	76	153	ND	0	158	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
n-Octadecane	154.573648	ND	77	155	ND	0	160	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
C18 as Octodecane	154.573648	ND	77	155	ND	0	160	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
n-Nonadecane	154.8837255	ND	77	155	ND	0	160	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C19 as Nonadecane	154.8837255	ND	77	155	ND	0	160	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Eicosane	154.5116325	ND	77	155	ND	0	159	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
C20 as Eicosane	154.5116325	ND	77	155	ND	0	159	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
n-Heneicosane	155.9689969	ND	78	156	ND	0	161	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
C21 as Heneicosane	155.9689969	ND	78	156	ND	0	161	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
n-Docosane	154.2015549	ND	77	154	ND	0	159	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
C22 as Docosane	154.2015549	ND	77	154	ND	0	159	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
n-Tricosane	155.0387643	ND	78	155	ND	0	160	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
C23 as Tricosane	155.0387643	ND	78	155	ND	0	160	ND	0	78	0.08	8	37	3.72E-08	3.72E-08
n-Tetracosane	155.2558185	ND	78	155	ND	0	160	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
C24 as Tetracosane	155.2558185	ND	78	155	ND	0	160	ND	0	78	0.08	8	37	3.73E-08	3.73E-08
Total Hydrocarbon			70,341			0			0		70.34	7319	33,779	3.38E-05	3.38E-05

Bagging Data Form **Vacuum Method** **Sample Id** **E050**

WSPA Western States Petroleum Association

Equipment type:	PRD-SV-1749			**Component ID:**	E-1901	
Equipment Subtype:	Threaded Connection			**Unit:**	Refinery E	
Line Size:	3/4 inches			**Date:**	6-Sep-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30.04 inHg	763.0 mmHg		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	67.4 °F	19.7 °C		**TVA ID**	34251	
Component Temp:	°F	-17.8 °C		**Stream Pressure/Temp:**	psig	°F
Stream Description:	Jet A					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
9:23	Background	7.4 ppmv	8-sec Dwell	13 ppmv	Total Dwell	1:30 min:sec	Final M21	46 ppm
10:02	Initial Bag Vacuum	0.075 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	69.3 °F	Leak @	threaded connection

Bag Concentrations (ppmv) (had to vent bag)

Time	10:03	10:05	10:07	10:09	10:11	10:13	10:23
ppmv	9.3	11.1	11.7	11.9	12.1	12.1	12.6

Sorbent Tube Sample Collection Parameters

E050A

Time						
10:13	Volume Start	483.2 Liters		Design Sample Flow Rate = 1 liter/min		
10:26	Volume Stop	495.9 Liters	Total Vol	12.7 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.977 L/min	Sorbent Flow$_{STP}$	0.989 L/min

E050B

10:13	Volume Start	475.4 Liters		Design Sample Flow Rate = 1 liter/min		
10:26	Volume Stop	488.1 Liters	Total Vol	12.7 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.977 L/min	Sorbent Flow$_{STP}$	0.989 L/min
	Total ST Vol$_{STP}$	25.72 Liters	DGM Vol$_{STP}$	78.98 Liters	Total Run Vol$_{STP}$	104.70 Liters

Bagging Parameters

Time								
10:17	Vacuum check	0.07 inches H2O			DGM$_P$	2 inches H2O vacuum		759.3 mmHg
10:17	DGM$_{10L}$ Time	01:39.7 min:sec.frac	DGM Time	1.667	DGM Flow	6.00	DGM Flow$_{STP}$	6.08 liters/minute
10:18	Bag Temp.	70.2 °F	21.2 °C		Sample$_T$	63 °F		17.2 °C

Post-Sample Data

10:35	Post Test M21	Background 6 ppmv	8-sec Dwell	29 ppmv	Total Dwell	2:00 min:sec	Final M21	60 ppm
							Leak @	threaded connection

Condensate accumulation: starting time N/A hour:min Final time N/A hour:min 0:00 hours:min
Organic condensate collected N/A ml
Density of organic condensate N/A g/ml

Average THC emissions =	3.18E-06	kg/hr
Percent difference THC ER =	12%	
Acceptable?	Yes	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.74E-08
C5 as Pentane	2.74E-08
n-Hexane	3.93E-08
C6 as Hexane	3.93E-08
n-Heptane	3.26E-08
C7 as Heptane	3.26E-08
n-Octane	2.82E-08
C8 as Octane	8.63E-08
n-Nonane	5.14E-08
C9 as Nonane	2.45E-07
n-Decane	9.60E-08
C10 as Decane	3.35E-07
n-Undecane	1.19E-07
C11 as Undecane	4.68E-07
n-Dodecane	1.35E-07
C12 as Dodecane	4.08E-07
n-Tridecane	1.74E-07
C13 as Tridecane	1.41E-07
n-Tetradecane	9.48E-08
C14 as tetradecane	2.85E-08
n-Pentadecane	2.86E-08
C15 as Pentadecane	2.86E-08
n-Hexadecane	2.85E-08
C16 as Hexadecane	2.85E-08
n-Heptadecane	2.81E-08
C17 as Heptadecane	2.81E-08
n-Octadecane	2.85E-08
C18 as Octodecane	2.85E-08
n-Nonadecane	2.85E-08
C19 as Nonadecane	2.85E-08
n-Eicosane	2.84E-08
C20 as Eicosane	2.84E-08
n-Heneicosane	2.87E-08
C21 as Heneicosane	2.87E-08
n-Docosane	2.84E-08
C22 as Docosane	2.84E-08
n-Tricosane	2.85E-08
C23 as Tricosane	2.85E-08
n-Tetracosane	2.86E-08
C24 as Tetracosane	2.86E-08
Total Hydrocarbon	3.18E-06

THC:	1.68E-04	lbs/day	3.07E-05	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E050A	E050A		ND Adj	E051A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	150.1	ND	0	154	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C5 as Pentane	75.6409	ND	38	150.1	ND	0	154	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Hexane	108.3906	ND	54	215.09	ND	0	220	ND	0	54	0.05	6	26	2.62E-08	0	0	0.00E+00	2.62E-08
C6 as Hexane	108.3906	ND	54	215.09	ND	0	220	ND	0	54	0.05	6	26	2.62E-08	0	0	0.00E+00	2.62E-08
n-Heptane	90.0472	ND	45	178.69	ND	0	183	ND	0	45	0.05	5	22	2.18E-08	0	0	0.00E+00	2.18E-08
C7 as Heptane	90.0472	ND	45	178.69	ND	0	183	ND	0	45	0.05	5	22	2.18E-08	0	0	0.00E+00	2.18E-08
n-Octane	77.9213	ND	39	154.62	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C8 as Octane	279.1347	J	279	154.62	ND	0	158	ND	0	279	0.28	29	135	1.35E-07	0	0	0.00E+00	1.35E-07
n-Nonane	134.2234	J	134	155.78	ND	0	160	ND	0	134	0.13	14	65	6.49E-08	0	0	0.00E+00	6.49E-08
C9 as Nonane	668.9136	J	669	155.78	ND	0	160	ND	0	669	0.67	70	323	3.23E-07	0	0	0.00E+00	3.23E-07
n-Decane	233.8383	J	234	157.19	ND	0	161	ND	0	234	0.23	24	113	1.13E-07	0	0	0.00E+00	1.13E-07
C10 as Decane	945.5127		946	157.19	ND	0	161	ND	0	946	0.95	99	457	4.57E-07	0	0	0.00E+00	4.57E-07
n-Undecane	281.0995	J	281	156.78	ND	0	161	ND	0	281	0.28	29	136	1.36E-07	0	0	0.00E+00	1.36E-07
C11 as Undecane	1185.9123		1,186	156.78	ND	0	161	ND	0	1,186	1.19	124	573	5.73E-07	0	0	0.00E+00	5.73E-07
n-Dodecane	301.7351	J	302	155.72	ND	0	159	ND	0	302	0.30	32	146	1.46E-07	0	0	0.00E+00	1.46E-07
C12 as Dodecane	1001.2180		1,001	155.72	ND	0	159	ND	0	1,001	1.00	105	484	4.84E-07	0	0	0.00E+00	4.84E-07
n-Tridecane	383.0450	J	383	156.09	ND	0	160	ND	0	383	0.38	40	185	1.85E-07	0	0	0.00E+00	1.85E-07
C13 as Tridecane	275.7479	J	276	156.09	ND	0	160	ND	0	276	0.28	29	133	1.33E-07	0	0	0.00E+00	1.33E-07
n-Tetradecane	148.5677	J	149	155.94	ND	0	160	ND	0	149	0.15	16	72	7.18E-08	0	0	0.00E+00	7.18E-08
C14 as tetradecane	78.5827	ND	39	155.94	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Pentadecane	78.9764	ND	39	156.72	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C15 as Pentadecane	78.9764	ND	39	156.72	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Hexadecane	78.5512	ND	39	155.87	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C16 as Hexadecane	78.5512	ND	39	155.87	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptadecane	77.6378	ND	39	154.06	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C17 as Heptadecane	77.6378	ND	39	154.06	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Octadecane	78.5039	ND	39	155.78	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C18 as Octodecane	78.5039	ND	39	155.78	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Nonadecane	78.6614	ND	39	156.09	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C19 as Nonadecane	78.6614	ND	39	156.09	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Eicosane	78.4724	ND	39	155.72	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C20 as Eicosane	78.4724	ND	39	155.72	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heneicosane	79.2126	ND	40	157.19	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane	79.2126	ND	40	157.19	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane	78.3150	ND	39	155.41	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	78.3150	ND	39	155.41	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	78.7402	ND	39	156.25	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	78.7402	ND	39	156.25	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Tetracosane	78.8504	ND	39	156.47	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C24 as Tetracosane	78.8504	ND	39	156.47	ND	0	160	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
Total Hydrocarbon			6,977			0			0		6.98	731	3,372	3.37E-06	0	0	0.00E+00	3.37E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E050B	E050B		ND Adj	E051A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.28189	ND	76	150	ND	0	154	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
C5 as Pentane	151.28189	ND	76	150	ND	0	154	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
n-Hexane	216.78111	ND	108	215	ND	0	220	ND	0	108	0.11	11	52	5.24E-08	5.24E-08
C6 as Hexane	216.78111	ND	108	215	ND	0	220	ND	0	108	0.11	11	52	5.24E-08	5.24E-08
n-Heptane	180.09449	ND	90	179	ND	0	183	ND	0	90	0.09	9	44	4.35E-08	4.35E-08
C7 as Heptane	180.09449	ND	90	179	ND	0	183	ND	0	90	0.09	9	44	4.35E-08	4.35E-08
n-Octane	155.84252	ND	78	155	ND	0	158	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C8 as Octane	155.84252	ND	78	155	ND	0	158	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Nonane	157.00788	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C9 as Nonane	344.65571	J	345	156	ND	0	160	ND	0	345	0.34	36	167	1.67E-07	1.67E-07
n-Decane	163.69193	J	164	157	ND	0	161	ND	0	164	0.16	17	79	7.91E-08	7.91E-08
C10 as Decane	440.52916	J	441	157	ND	0	161	ND	0	441	0.44	46	213	2.13E-07	2.13E-07
n-Undecane	213.20729	J	213	157	ND	0	161	ND	0	213	0.21	22	103	1.03E-07	1.03E-07
C11 as Undecane	751.49417	J	751	157	ND	0	161	ND	0	751	0.75	79	363	3.63E-07	3.63E-07
n-Dodecane	255.80103	J	256	156	ND	0	159	ND	0	256	0.26	27	124	1.24E-07	1.24E-07
C12 as Dodecane	688.78557	J	689	156	ND	0	159	ND	0	689	0.69	72	333	3.33E-07	3.33E-07
n-Tridecane	335.69907	J	336	156	ND	0	160	ND	0	336	0.34	35	162	1.62E-07	1.62E-07
C13 as Tridecane	308.564	J	309	156	ND	0	160	ND	0	309	0.31	32	149	1.49E-07	1.49E-07
n-Tetradecane	243.7391	J	244	156	ND	0	160	ND	0	244	0.24	26	118	1.18E-07	1.18E-07
C14 as tetradecane	157.16536	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
n-Pentadecane	157.95276	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
C15 as Pentadecane	157.95276	ND	79	157	ND	0	160	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
n-Hexadecane	157.10236	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
C16 as Hexadecane	157.10236	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
n-Heptadecane	155.27559	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.75E-08	3.75E-08
C17 as Heptadecane	155.27559	ND	78	154	ND	0	158	ND	0	78	0.08	8	38	3.75E-08	3.75E-08
n-Octadecane	157.00788	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C18 as Octodecane	157.00788	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Nonadecane	157.32284	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
C19 as Nonadecane	157.32284	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
n-Eicosane	156.94488	ND	78	156	ND	0	159	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C20 as Eicosane	156.94488	ND	78	156	ND	0	159	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Heneicosane	158.4252	ND	79	157	ND	0	161	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
C21 as Heneicosane	158.4252	ND	79	157	ND	0	161	ND	0	79	0.08	8	38	3.83E-08	3.83E-08
n-Docosane	156.62992	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C22 as Docosane	156.62992	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Tricosane	157.48032	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
C23 as Tricosane	157.48032	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.80E-08	3.80E-08
n-Tetracosane	157.70079	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C24 as Tetracosane	157.70079	ND	79	156	ND	0	160	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
Total Hydrocarbon			6,179			0			0		6.18	647	2,986	2.99E-06	2.99E-06

Bagging Data Form — Vacuum Method

Sample Id: E052

Equipment type:	Valve			**Component ID:**	E-1781	
Equipment Subtype:	MOV			**Unit:**	Refinery E	
Line Size:	20 *inches*			**Date:**	6-Sep-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30 *inHg*	762.0 *mmHg*		**Sample Pump A**	LP52975	
				Sample Pump B	LP52979	
Ambient Temp:	73.4 *°F*	23.0 *°C*		**TVA ID**	36502	
Component Temp:	*°F*	-17.8 *°C*		**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Jet A*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:24	Background	-2	*ppmv*	8-sec Dwell	71	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	164 *ppm*
13:12	Initial Bag Vacuum	0.03	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	87.4	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	13:14	13:16	13:18	13:20	13:22	13:26	13:28	13:37						
ppmv	18.4	22.1	22.4	22.7	23.1	23.4	23.7	25.9						

Sorbent Tube Sample Collection Parameters

E052A

Time									
13:28	Volume Start	495.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:41	Volume Stop	508.6	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.936	*L/min*

E052B

13:28	Volume Start	488.1	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:41	Volume Stop	500.9	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.944	*L/min*
	Total ST Vol$_{STP}$	24.44	*Liters*	DGM Vol$_{STP}$	82.16	*Liters*	Total Run Vol$_{STP}$	106.60	*Liters*

Bagging Parameters

Time										
13:33	Vacuum check	0.04	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	758.6	*mmHg*
13:32	DGM$_{10L}$ Time	01:31.2	*min:sec.frac*	DGM Time	1.517	DGM Flow	6.59	DGM Flow$_{STP}$	6.32	*liters/minute*
13:34	Bag Temp.	91	*°F*	32.8	*°C*	Sample$_T$	92	*°F*	33.3	*°C*

Post-Sample Data

13:53 Post Test M21	Background	5	*ppmv*	8-sec Dwell	104 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	319 *ppm*
								Leak @	Packing
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*						
Density of organic condensate		N/A	*g/ml*						

Average THC emissions =	1.95E-05 kg/hr
Percent difference THC ER =	48%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.78E-08
C5 as Pentane	2.78E-08
n-Hexane	3.98E-08
C6 as Hexane	3.98E-08
n-Heptane	3.31E-08
C7 as Heptane	3.31E-08
n-Octane	4.37E-07
C8 as Octane	2.68E-06
n-Nonane	9.99E-07
C9 as Nonane	3.68E-06
n-Decane	9.47E-07
C10 as Decane	1.50E-06
n-Undecane	8.96E-07
C11 as Undecane	1.53E-06
n-Dodecane	1.20E-06
C12 as Dodecane	1.75E-06
n-Tridecane	1.01E-06
C13 as Tridecane	1.68E-06
n-Tetradecane	3.26E-07
C14 as tetradecane	7.78E-08
n-Pentadecane	2.90E-08
C15 as Pentadecane	2.90E-08
n-Hexadecane	2.88E-08
C16 as Hexadecane	2.88E-08
n-Heptadecane	2.85E-08
C17 as Heptadecane	2.85E-08
n-Octadecane	2.88E-08
C18 as Octodecane	2.88E-08
n-Nonadecane	2.89E-08
C19 as Nonadecane	2.89E-08
n-Eicosane	2.88E-08
C20 as Eicosane	2.88E-08
n-Heneicosane	2.91E-08
C21 as Heneicosane	2.91E-08
n-Docosane	2.87E-08
C22 as Docosane	2.87E-08
n-Tricosane	2.89E-08
C23 as Tricosane	2.89E-08
n-Tetracosane	2.89E-08
C24 as Tetracosane	2.89E-08
Total Hydrocarbon	1.95E-05

THC: 1.03E-03 lbs/day 1.88E-04 tons/yr

E052A

E052A	ANALYTICAL RESULTS E052A		ND Adj	BACKGROUND E053A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	146.66	ND	0	154	ND	0	38	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C5 as Pentane	75.6409	ND	38	146.66	ND	0	154	ND	0	38	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Hexane	108.3906	ND	54	210.16	ND	0	220	ND	0	54	0.05	6	27	2.67E-08	0	0	0.00E+00	2.67E-08
C6 as Hexane	108.3906	ND	54	210.16	ND	0	220	ND	0	54	0.05	6	27	2.67E-08	0	0	0.00E+00	2.67E-08
n-Heptane	90.0472	ND	45	174.6	ND	0	183	ND	0	45	0.05	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
C7 as Heptane	90.0472	ND	45	174.6	ND	0	183	ND	0	45	0.05	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Octane	907.9202		908	151.08	ND	0	158	ND	0	908	0.91	97	447	4.47E-07	0	0	0.00E+00	4.47E-07
C8 as Octane	5493.3339		5,493	151.08	ND	0	158	ND	0	5,493	5.49	586	2703	2.70E-06	0	0	0.00E+00	2.70E-06
n-Nonane	2053.2398		2,053	152.21	ND	0	160	ND	0	2,053	2.05	219	1010	1.01E-06	0	0	0.00E+00	1.01E-06
C9 as Nonane	7621.0971		7,621	152.21	ND	0	160	ND	0	7,621	7.62	812	3750	3.75E-06	0	0	0.00E+00	3.75E-06
n-Decane	1941.6305		1,942	153.59	ND	0	161	ND	0	1,942	1.94	207	955	9.55E-07	0	0	0.00E+00	9.55E-07
C10 as Decane	79.2126	ND	40	153.59	ND	0	161	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Undecane	1829.2615		1,829	153.19	ND	0	161	ND	0	1,829	1.83	195	900	9.00E-07	0	0	0.00E+00	9.00E-07
C11 as Undecane	79.0079	ND	40	153.19	ND	0	161	ND	0	40	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Dodecane	2438.5168		2,439	152.15	ND	0	159	ND	0	2,439	2.44	260	1200	1.20E-06	0	0	0.00E+00	1.20E-06
C12 as Dodecane	78.4724	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tridecane	2009.8105		2,010	152.52	ND	0	160	ND	0	2,010	2.01	214	989	9.89E-07	0	0	0.00E+00	9.89E-07
C13 as Tridecane	3684.2857		3,684	152.52	ND	0	160	ND	0	3,684	3.68	393	1813	1.81E-06	0	0	0.00E+00	1.81E-06
n-Tetradecane	654.4292	J	654	152.37	ND	0	160	ND	0	654	0.65	70	322	3.22E-07	0	0	0.00E+00	3.22E-07
C14 as tetradecane	238.3417	J	238	152.37	ND	0	160	ND	0	238	0.24	25	117	1.17E-07	0	0	0.00E+00	1.17E-07
n-Pentadecane	78.9764	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C15 as Pentadecane	78.9764	ND	39	153.13	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexadecane	78.5512	ND	39	152.31	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C16 as Hexadecane	78.5512	ND	39	152.31	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heptadecane	77.6378	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C17 as Heptadecane	77.6378	ND	39	150.53	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Octadecane	78.5039	ND	39	152.21	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C18 as Octodecane	78.5039	ND	39	152.21	ND	0	160	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Nonadecane	78.6614	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	78.6614	ND	39	152.52	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	78.4724	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C20 as Eicosane	78.4724	ND	39	152.15	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heneicosane	79.2126	ND	40	153.59	ND	0	161	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C21 as Heneicosane	79.2126	ND	40	153.59	ND	0	161	ND	0	40	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Docosane	78.3150	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C22 as Docosane	78.3150	ND	39	151.85	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tricosane	78.7402	ND	39	152.67	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C23 as Tricosane	78.7402	ND	39	152.67	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tetracosane	78.8504	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C24 as Tetracosane	78.8504	ND	39	152.89	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
Total Hydrocarbon			30,050			0			0		30.05	3203	14,785	1.48E-05	0	0	0.00E+00	1.48E-05

E052B

E052B	ANALYTICAL RESULTS E052B		ND Adj	BACKGROUND E053A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	147	ND	0	154	ND	0	75	0.08	8	37	3.69E-08	3.69E-08
C5 as Pentane	150.1	ND	75	147	ND	0	154	ND	0	75	0.08	8	37	3.69E-08	3.69E-08
n-Hexane	215.0875	ND	108	210	ND	0	220	ND	0	108	0.11	11	53	5.29E-08	5.29E-08
C6 as Hexane	215.0875	ND	108	210	ND	0	220	ND	0	108	0.11	11	53	5.29E-08	5.29E-08
n-Heptane	178.6875	ND	89	175	ND	0	183	ND	0	89	0.09	10	44	4.40E-08	4.40E-08
C7 as Heptane	178.6875	ND	89	175	ND	0	183	ND	0	89	0.09	10	44	4.40E-08	4.40E-08
n-Octane	868.26516	J	868	151	ND	0	158	ND	0	868	0.87	93	427	4.27E-07	4.27E-07
C8 as Octane	5381.8881		5,382	151	ND	0	158	ND	0	5,382	5.38	574	2648	2.65E-06	2.65E-06
n-Nonane	2006.1753		2,006	152	ND	0	160	ND	0	2,006	2.01	214	987	9.87E-07	9.87E-07
C9 as Nonane	7332.77		7,333	152	ND	0	160	ND	0	7,333	7.33	782	3608	3.61E-06	3.61E-06
n-Decane	1907.15		1,907	154	ND	0	161	ND	0	1,907	1.91	203	938	9.38E-07	9.38E-07
C10 as Decane	6075.8672		6,076	154	ND	0	161	ND	0	6,076	6.08	648	2989	2.99E-06	2.99E-06
n-Undecane	1811.5439		1,812	153	ND	0	161	ND	0	1,812	1.81	193	891	8.91E-07	8.91E-07
C11 as Undecane	6160.1317		6,160	153	ND	0	161	ND	0	6,160	6.16	657	3031	3.03E-06	3.03E-06
n-Dodecane	2457.7547		2,458	152	ND	0	159	ND	0	2,458	2.46	262	1209	1.21E-06	1.21E-06
C12 as Dodecane	7077.0662		7,077	152	ND	0	159	ND	0	7,077	7.08	754	3482	3.48E-06	3.48E-06
n-Tridecane	2115.6421		2,116	153	ND	0	160	ND	0	2,116	2.12	226	1041	1.04E-06	1.04E-06
C13 as Tridecane	3145.3101		3,145	153	ND	0	160	ND	0	3,145	3.15	335	1547	1.55E-06	1.55E-06
n-Tetradecane	672.39534	J	672	152	ND	0	160	ND	0	672	0.67	72	331	3.31E-07	3.31E-07
C14 as tetradecane	155.9375	ND	78	152	ND	0	160	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Pentadecane	156.71875	ND	78	153	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C15 as Pentadecane	156.71875	ND	78	153	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
n-Hexadecane	155.875	ND	78	152	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C16 as Hexadecane	155.875	ND	78	152	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Heptadecane	154.0625	ND	77	151	ND	0	158	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
C17 as Heptadecane	154.0625	ND	77	151	ND	0	158	ND	0	77	0.08	8	38	3.79E-08	3.79E-08
n-Octadecane	155.78125	ND	78	152	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C18 as Octodecane	155.78125	ND	78	152	ND	0	160	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Nonadecane	156.09375	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C19 as Nonadecane	156.09375	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Eicosane	155.71875	ND	78	152	ND	0	159	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
C20 as Eicosane	155.71875	ND	78	152	ND	0	159	ND	0	78	0.08	8	38	3.83E-08	3.83E-08
n-Heneicosane	157.1875	ND	79	154	ND	0	161	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
C21 as Heneicosane	157.1875	ND	79	154	ND	0	161	ND	0	79	0.08	8	39	3.87E-08	3.87E-08
n-Docosane	155.40625	ND	78	152	ND	0	159	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
C22 as Docosane	155.40625	ND	78	152	ND	0	159	ND	0	78	0.08	8	38	3.82E-08	3.82E-08
n-Tricosane	156.25	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
C23 as Tricosane	156.25	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.84E-08	3.84E-08
n-Tetracosane	156.46875	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
C24 as Tetracosane	156.46875	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.85E-08	3.85E-08
Total Hydrocarbon			49,193			0			0		49.19	5244	24,203	2.42E-05	2.42E-05

Bagging Data Form **Vacuum Method** **Sample Id** **E054**

Equipment type: Valve **Component ID:** E-1783

Equipment Subtype: Gate **Unit:** Refinery E

Line Size: 20 *inches* **Date:** 7-Sep-18

Phase (G, LL, HL): HL **Analysis team:** EG/DR

Barometric pressure 29.98 *inHg* 761.5 *mmHg* **Sample Pump A** LP52979

Sample Pump B LP52975

Ambient Temp: 67.1 *°F* 19.5 *°C* **TVA ID** 37887

Component Temp: 77 *°F* 25.0 *°C* **Stream Pressure/Temp:** *psig* *°F*

Stream Description: *Jet A*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
8:47	Background	3	*ppmv*	8-sec Dwell	7	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	57	*ppm*
9:45	Initial Bag Vacuum	0.025	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	74.1	*°F*	Leak @	Packing	

Bag Concentrations (ppmv)

Time	9:49	9:51	9:53	9:55	9:57	9:59	10:01	10:03	10:05	10:08	10:20	10:24		
ppmv	13.5	15.2	16.3	16.8	17.4	17.7	18.1	18.5	18.9	19.2	20.5	20.5		

Sorbent Tube Sample Collection Parameters

E054A

Time									
10:11	Volume Start	511.3	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:24	Volume Stop	524.0	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.957	*L/min*

E054B

10:11	Volume Start	502.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:24	Volume Stop	515.5	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent Flow$_{STP}$	0.957	*L/min*
	Total ST Vol$_{STP}$	24.87	*Liters*	DGM Vol$_{STP}$	87.79	*Liters*	Total Run Vol$_{STP}$	112.66	*Liters*

Bagging Parameters

Time										
10:16	Vacuum check	0.005	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	758.1	*mmHg*
10:15	DGM$_{10L}$ Time	01:27.2	*min:sec.frac*	DGM Time	1.450	DGM Flow	6.90	DGM Flow$_{STP}$	6.75	*liters/minute*
10:17	Bag Temp.	80.1	*°F*	26.7	*°C*	Sample$_T$	80	*°F*	26.7	*°C*

Post-Sample Data

10:32	Post Test M21	Background	3	*ppmv*	8-sec Dwell	44	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21 Leak @	119 *ppm* Packing

Condensate accumulation: starting time N/A *hour:min* Final time N/A *hour:min* 0:00 *hours:min*
Organic condensate collected N/A *ml*
Density of organic condensate N/A *g/ml*

Average THC emissions = 1.20E-05 kg/hr
Percent difference THC ER = 67%

Acceptable? No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.95E-08
C5 as Pentane	2.95E-08
n-Hexane	4.23E-08
C6 as Hexane	4.23E-08
n-Heptane	3.51E-08
C7 as Heptane	3.51E-08
n-Octane	1.25E-07
C8 as Octane	1.00E-06
n-Nonane	5.32E-07
C9 as Nonane	2.52E-06
n-Decane	8.28E-07
C10 as Decane	1.53E-06
n-Undecane	7.97E-07
C11 as Undecane	1.30E-06
n-Dodecane	6.96E-07
C12 as Dodecane	9.33E-07
n-Tridecane	3.69E-07
C13 as Tridecane	3.87E-07
n-Tetradecane	1.24E-07
C14 as tetradecane	3.06E-08
n-Pentadecane	3.08E-08
C15 as Pentadecane	3.08E-08
n-Hexadecane	3.06E-08
C16 as Hexadecane	3.06E-08
n-Heptadecane	3.03E-08
C17 as Heptadecane	3.03E-08
n-Octadecane	3.06E-08
C18 as Octodecane	3.06E-08
n-Nonadecane	3.07E-08
C19 as Nonadecane	3.07E-08
n-Eicosane	3.06E-08
C20 as Eicosane	3.06E-08
n-Heneicosane	3.09E-08
C21 as Heneicosane	3.09E-08
n-Docosane	3.05E-08
C22 as Docosane	3.05E-08
n-Tricosane	3.07E-08
C23 as Tricosane	3.07E-08
n-Tetracosane	3.07E-08
C24 as Tetracosane	3.07E-08
Total Hydrocarbon	1.20E-05

THC:	6.35E-04	lbs/day	1.16E-04	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E054A	E054A		ND Adj	E055A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C5 as Pentane	75.6409	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Hexane	108.3906	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	28	2.82E-08	0	0	0.00E+00	2.82E-08
C6 as Hexane	108.3906	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	28	2.82E-08	0	0	0.00E+00	2.82E-08
n-Heptane	90.0472	ND	45	175.94	ND	0	183	ND	0	45	0.05	5	23	2.34E-08	0	0	0.00E+00	2.34E-08
C7 as Heptane	90.0472	ND	45	175.94	ND	0	183	ND	0	45	0.05	5	23	2.34E-08	0	0	0.00E+00	2.34E-08
n-Octane	247.8914	J	248	152.25	ND	0	158	ND	0	248	0.25	28	129	1.29E-07	0	0	0.00E+00	1.29E-07
C8 as Octane	1913.9611		1,914	152.25	ND	0	158	ND	0	1,914	1.91	216	995	9.95E-07	0	0	0.00E+00	9.95E-07
n-Nonane	1014.7734		1,015	153.38	ND	0	160	ND	0	1,015	1.01	114	528	5.28E-07	0	0	0.00E+00	5.28E-07
C9 as Nonane	4811.6081		4,812	153.38	ND	0	160	ND	0	4,812	4.81	542	2502	2.50E-06	0	0	0.00E+00	2.50E-06
n-Decane	1577.4784		1,577	154.77	ND	0	161	ND	0	1,577	1.58	178	820	8.20E-07	0	0	0.00E+00	8.20E-07
C10 as Decane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Undecane	1509.0058		1,509	154.37	ND	0	161	ND	0	1,509	1.51	170	785	7.85E-07	0	0	0.00E+00	7.85E-07
C11 as Undecane	79.0079	ND	40	154.37	ND	0	161	ND	0	40	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Dodecane	1325.1765		1,325	153.32	ND	0	159	ND	0	1,325	1.33	149	689	6.89E-07	0	0	0.00E+00	6.89E-07
C12 as Dodecane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tridecane	653.9555	J	654	153.69	ND	0	160	ND	0	654	0.65	74	340	3.40E-07	0	0	0.00E+00	3.40E-07
C13 as Tridecane	793.4815		793	153.69	ND	0	160	ND	0	793	0.79	89	413	4.13E-07	0	0	0.00E+00	4.13E-07
n-Tetradecane	250.6897	J	251	153.54	ND	0	160	ND	0	251	0.25	28	130	1.30E-07	0	0	0.00E+00	1.30E-07
C14 as tetradecane	78.5827	ND	39	153.54	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Pentadecane	78.9764	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C15 as Pentadecane	78.9764	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C16 as Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C17 as Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Octadecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C18 as Octodecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C19 as Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C20 as Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C21 as Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C22 as Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C23 as Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
n-Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C24 as Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
Total Hydrocarbon			15,316			0			0		15.32	1725	7,964	7.96E-06	0	0	0.00E+00	7.96E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E054B	E054B		ND Adj	E055A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	151.28189	ND	76	148	ND	0	154	ND	0	76	0.08	9	39	3.93E-08	3.93E-08
C5 as Pentane	151.28189	ND	76	148	ND	0	154	ND	0	76	0.08	9	39	3.93E-08	3.93E-08
n-Hexane	216.78111	ND	108	212	ND	0	220	ND	0	108	0.11	12	56	5.64E-08	5.64E-08
C6 as Hexane	216.78111	ND	108	212	ND	0	220	ND	0	108	0.11	12	56	5.64E-08	5.64E-08
n-Heptane	180.09449	ND	90	176	ND	0	183	ND	0	90	0.09	10	47	4.68E-08	4.68E-08
C7 as Heptane	180.09449	ND	90	176	ND	0	183	ND	0	90	0.09	10	47	4.68E-08	4.68E-08
n-Octane	232.7208	J	233	152	ND	0	158	ND	0	233	0.23	26	121	1.21E-07	1.21E-07
C8 as Octane	1948.2345		1,948	152	ND	0	158	ND	0	1,948	1.95	219	1013	1.01E-06	1.01E-06
n-Nonane	1031.3135	J	1,031	153	ND	0	160	ND	0	1,031	1.03	116	536	5.36E-07	5.36E-07
C9 as Nonane	4862.1943		4,862	153	ND	0	160	ND	0	4,862	4.86	548	2528	2.53E-06	2.53E-06
n-Decane	1608.3832		1,608	155	ND	0	161	ND	0	1,608	1.61	181	836	8.36E-07	8.36E-07
C10 as Decane	5854.228		5,854	155	ND	0	161	ND	0	5,854	5.85	660	3044	3.04E-06	3.04E-06
n-Undecane	1555.8477	J	1,556	154	ND	0	161	ND	0	1,556	1.56	175	809	8.09E-07	8.09E-07
C11 as Undecane	4957.8476		4,958	154	ND	0	161	ND	0	4,958	4.96	559	2578	2.58E-06	2.58E-06
n-Dodecane	1352.389	J	1,352	153	ND	0	159	ND	0	1,352	1.35	152	703	7.03E-07	7.03E-07
C12 as Dodecane	3550.3366		3,550	153	ND	0	159	ND	0	3,550	3.55	400	1846	1.85E-06	1.85E-06
n-Tridecane	767.0175	J	767	154	ND	0	160	ND	0	767	0.77	86	399	3.99E-07	3.99E-07
C13 as Tridecane	695.66523	J	696	154	ND	0	160	ND	0	696	0.70	78	362	3.62E-07	3.62E-07
n-Tetradecane	227.84507	J	228	154	ND	0	160	ND	0	228	0.23	26	118	1.18E-07	1.18E-07
C14 as tetradecane	157.16536	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
n-Pentadecane	157.95276	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
C15 as Pentadecane	157.95276	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.11E-08	4.11E-08
n-Hexadecane	157.10236	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
C16 as Hexadecane	157.10236	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
n-Heptadecane	155.27559	ND	78	152	ND	0	158	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
C17 as Heptadecane	155.27559	ND	78	152	ND	0	158	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
n-Octadecane	157.00788	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
C18 as Octodecane	157.00788	ND	79	153	ND	0	160	ND	0	79	0.08	9	41	4.08E-08	4.08E-08
n-Nonadecane	157.32284	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
C19 as Nonadecane	157.32284	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
n-Eicosane	156.94488	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.08E-08	4.08E-08
C20 as Eicosane	156.94488	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.08E-08	4.08E-08
n-Heneicosane	158.4252	ND	79	155	ND	0	161	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
C21 as Heneicosane	158.4252	ND	79	155	ND	0	161	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
n-Docosane	156.62992	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
C22 as Docosane	156.62992	ND	78	153	ND	0	159	ND	0	78	0.08	9	41	4.07E-08	4.07E-08
n-Tricosane	157.48032	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
C23 as Tricosane	157.48032	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.09E-08	4.09E-08
n-Tetracosane	157.70079	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C24 as Tetracosane	157.70079	ND	79	154	ND	0	160	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
Total Hydrocarbon			30,843			0			0		30.84	3475	16,037	1.60E-05	1.60E-05

Bagging Data Form — Vacuum Method

Sample Id: E056

WSPA — Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	E-1795	
Equipment Subtype:	Gate		**Unit:**	Refinery E	
Line Size:	3/4	*inches*	**Date:**	3-Oct-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.86 *inHg*	758.4 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	69.5 *°F*	20.8 *°C*	**TVA ID**	36502	
Component Temp:	70 *°F*	21.1 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*JP5 Jet Production*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
9:18	Background	4	*ppmv*	8-sec Dwell	14	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	122 *ppm*
9:53	Initial Bag Vacuum	0.02	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	62 *°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	9:56	9:58	10:00	10:02	10:06	10:14							
ppmv	13	13.8	14.3	15	15.2	16.7							

Sorbent Tube Sample Collection Parameters

E056A

Time									
10:06	Volume Start	529.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:19	Volume Stop	541.8	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.991	*L/min*

E056B

Time									
10:06	Volume Start	519.6	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:19	Volume Stop	532.5	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.999	*L/min*
	Total ST Vol$_{STP}$	25.88	*Liters*	DGM Vol$_{STP}$	86.31	*Liters*	Total Run Vol$_{STP}$	112.19	*Liters*

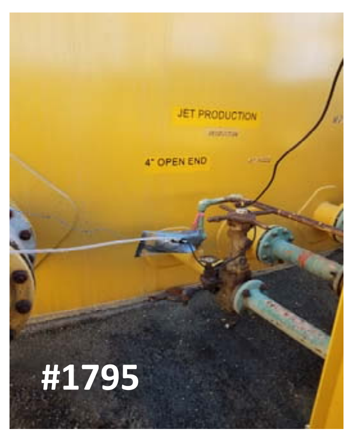
Bagging Parameters

Time									
10:08	Vacuum check	2	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	755.1 *mmHg*
10:11	DGM$_{10L}$ Time	01:31.3	*min:sec.frac*	DGM Time	1.517	DGM Flow	6.59	DGM Flow$_{STP}$	6.64 *liters/minute*
10:08	Bag Temp.	74.1	*°F*	23.4	*°C*	Sample$_T$	63	*°F*	17.2 *°C*

Post-Sample Data

10:27	Post Test M21	Background	5 *ppmv*	8-sec Dwell	97 *ppmv*	Total Dwell	1:30 *min:sec*	Final M21	185 *ppm*
								Leak @	Packing
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A *ml*						
Density of organic condensate			N/A *g/ml*						

Average THC emissions =	1.08E-05 kg/hr
Percent difference THC ER =	14%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.90E-08
C5 as Pentane	2.90E-08
n-Hexane	4.15E-08
C6 as Hexane	4.15E-08
n-Heptane	3.45E-08
C7 as Heptane	3.45E-08
n-Octane	2.21E-07
C8 as Octane	1.31E-06
n-Nonane	4.81E-07
C9 as Nonane	2.00E-06
n-Decane	5.94E-07
C10 as Decane	2.01E-06
n-Undecane	4.79E-07
C11 as Undecane	1.43E-06
n-Dodecane	3.56E-07
C12 as Dodecane	5.46E-07
n-Tridecane	1.37E-07
C13 as Tridecane	2.34E-07
n-Tetradecane	1.21E-07
C14 as tetradecane	3.01E-08
n-Pentadecane	3.03E-08
C15 as Pentadecane	9.70E-08
n-Hexadecane	3.01E-08
C16 as Hexadecane	3.01E-08
n-Heptadecane	2.98E-08
C17 as Heptadecane	2.98E-08
n-Octadecane	3.01E-08
C18 as Octodecane	3.01E-08
n-Nonadecane	3.02E-08
C19 as Nonadecane	3.02E-08
n-Eicosane	3.01E-08
C20 as Eicosane	3.01E-08
n-Heneicosane	3.04E-08
C21 as Heneicosane	3.04E-08
n-Docosane	3.00E-08
C22 as Docosane	3.00E-08
n-Tricosane	3.02E-08
C23 as Tricosane	0.00E+00
n-Tetracosane	3.02E-08
C24 as Tetracosane	3.02E-08
Total Hydrocarbon	1.08E-05

THC:	5.71E-04	lbs/day	1.04E-04 tons/yr

E056A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E056A	E056A		ND Adj	E057A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.0500	ND	38	151.28	ND	0	154	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C5 as Pentane	75.0500	ND	38	151.28	ND	0	154	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexane	107.5437	ND	54	216.78	ND	0	220	ND	0	54	0.05	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
C6 as Hexane	107.5437	ND	54	216.78	ND	0	220	ND	0	54	0.05	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
n-Heptane	89.3437	ND	45	180.09	ND	0	183	ND	0	45	0.04	5	23	2.31E-08	0	0	0.00E+00	2.31E-08
C7 as Heptane	89.3437	ND	45	180.09	ND	0	183	ND	0	45	0.04	5	23	2.31E-08	0	0	0.00E+00	2.31E-08
n-Octane	439.8671	J	440	155.84	ND	0	158	ND	0	440	0.44	49	228	2.28E-07	0	0	0.00E+00	2.28E-07
C8 as Octane	2623.7149		2,624	155.84	ND	0	158	ND	0	2,624	2.62	294	1359	1.36E-06	0	0	0.00E+00	1.36E-06
n-Nonane	1019.9969		1,020	157.01	ND	0	160	ND	0	1,020	1.02	114	528	5.28E-07	0	0	0.00E+00	5.28E-07
C9 as Nonane	3989.9542		3,990	157.01	ND	0	160	ND	0	3,990	3.99	448	2066	2.07E-06	0	0	0.00E+00	2.07E-06
n-Decane	1232.1478		1,232	158.43	ND	0	161	ND	0	1,232	1.23	138	638	6.38E-07	0	0	0.00E+00	6.38E-07
C10 as Decane	4203.7099		4,204	158.43	ND	0	161	ND	0	4,204	4.20	472	2177	2.18E-06	0	0	0.00E+00	2.18E-06
n-Undecane	991.1726		991	158.02	ND	0	161	ND	0	991	0.99	111	513	5.13E-07	0	0	0.00E+00	5.13E-07
C11 as Undecane	3118.3317		3,118	158.02	ND	0	161	ND	0	3,118	3.12	350	1615	1.61E-06	0	0	0.00E+00	1.61E-06
n-Dodecane	743.1997	J	743	156.94	ND	0	159	ND	0	743	0.74	83	385	3.85E-07	0	0	0.00E+00	3.85E-07
C12 as Dodecane	1241.2989		1,241	156.94	ND	0	159	ND	0	1,241	1.24	139	643	6.43E-07	0	0	0.00E+00	6.43E-07
n-Tridecane	301.6564	J	302	157.32	ND	0	160	ND	0	302	0.30	34	156	1.56E-07	0	0	0.00E+00	1.56E-07
C13 as Tridecane	827.8594	J	828	157.32	ND	0	160	ND	0	828	0.83	93	429	4.29E-07	0	0	0.00E+00	4.29E-07
n-Tetradecane	307.5254	J	308	157.17	ND	0	160	ND	0	308	0.31	35	159	1.59E-07	0	0	0.00E+00	1.59E-07
C14 as tetradecane	77.9687	ND	39	157.17	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Pentadecane	78.3594	ND	39	157.95	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C15 as Pentadecane	296.8862	J	297	157.95	ND	0	160	ND	0	297	0.30	33	154	1.54E-07	0	0	0.00E+00	1.54E-07
n-Hexadecane	77.9375	ND	39	157.1	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C16 as Hexadecane	77.9375	ND	39	157.1	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heptadecane	77.0312	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C17 as Heptadecane	77.0312	ND	39	155.28	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Octadecane	77.8906	ND	39	157.01	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C18 as Octodecane	77.8906	ND	39	157.01	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Nonadecane	78.0469	ND	39	157.32	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C19 as Nonadecane	78.0469	ND	39	157.32	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Eicosane	77.8594	ND	39	156.94	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C20 as Eicosane	77.8594	ND	39	156.94	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Heneicosane	78.5937	ND	39	158.43	ND	0	161	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C21 as Heneicosane	78.5937	ND	39	158.43	ND	0	161	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Docosane	77.7031	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C22 as Docosane	77.7031	ND	39	156.63	ND	0	159	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Tricosane	78.1250	ND	39	157.48	ND	0	160	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C23 as Tricosane	78.1250	ND	39	1684.4		1,684	160	ND	0	-1,645	0.00	0	0	0.00E+00	0	0	0.00E+00	0.00E+00
n-Tetracosane	78.2344	ND	39	157.7	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C24 as Tetracosane	78.2344	ND	39	157.7	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
Total Hydrocarbon			22,389			1,684			0		22.35	2507	11,573	1.16E-05	0	0	0.00E+00	1.16E-05

E056B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E056B	E056B		ND Adj	E057A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.93644	ND	74	151	ND	0	154	ND	0	74	0.07	8	39	3.86E-08	3.86E-08
C5 as Pentane	148.93644	ND	74	151	ND	0	154	ND	0	74	0.07	8	39	3.86E-08	3.86E-08
n-Hexane	213.42016	ND	107	217	ND	0	220	ND	0	107	0.11	12	55	5.53E-08	5.53E-08
C6 as Hexane	213.42016	ND	107	217	ND	0	220	ND	0	107	0.11	12	55	5.53E-08	5.53E-08
n-Heptane	177.30233	ND	89	180	ND	0	183	ND	0	89	0.09	10	46	4.59E-08	4.59E-08
C7 as Heptane	177.30233	ND	89	180	ND	0	183	ND	0	89	0.09	10	46	4.59E-08	4.59E-08
n-Octane	413.53598	J	414	156	ND	0	158	ND	0	414	0.41	46	214	2.14E-07	2.14E-07
C8 as Octane	2418.5639		2,419	156	ND	0	158	ND	0	2,419	2.42	271	1252	1.25E-06	1.25E-06
n-Nonane	836.3534	J	836	157	ND	0	160	ND	0	836	0.84	94	433	4.33E-07	4.33E-07
C9 as Nonane	3739.4275		3,739	157	ND	0	160	ND	0	3,739	3.74	420	1936	1.94E-06	1.94E-06
n-Decane	1060.5664	J	1,061	158	ND	0	161	ND	0	1,061	1.06	119	549	5.49E-07	5.49E-07
C10 as Decane	3553.4135		3,553	158	ND	0	161	ND	0	3,553	3.55	399	1840	1.84E-06	1.84E-06
n-Undecane	859.4734	J	859	158	ND	0	161	ND	0	859	0.86	96	445	4.45E-07	4.45E-07
C11 as Undecane	2398.8049		2,399	158	ND	0	161	ND	0	2,399	2.40	269	1242	1.24E-06	1.24E-06
n-Dodecane	632.77279	J	633	157	ND	0	159	ND	0	633	0.63	71	328	3.28E-07	3.28E-07
C12 as Dodecane	867.24511	J	867	157	ND	0	159	ND	0	867	0.87	97	449	4.49E-07	4.49E-07
n-Tridecane	226.95565	J	227	157	ND	0	160	ND	0	227	0.23	25	118	1.18E-07	1.18E-07
C13 as Tridecane	154.88373	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Tetradecane	161.49241	J	161	157	ND	0	160	ND	0	161	0.16	18	84	8.36E-08	8.36E-08
C14 as tetradecane	154.72869	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Pentadecane	155.50388	ND	78	158	ND	0	160	ND	0	78	0.08	9	40	4.03E-08	4.03E-08
C15 as Pentadecane	155.50388	ND	78	158	ND	0	160	ND	0	78	0.08	9	40	4.03E-08	4.03E-08
n-Hexadecane	154.66667	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C16 as Hexadecane	154.66667	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Heptadecane	152.86822	ND	76	155	ND	0	158	ND	0	76	0.08	9	40	3.96E-08	3.96E-08
C17 as Heptadecane	152.86822	ND	76	155	ND	0	158	ND	0	76	0.08	9	40	3.96E-08	3.96E-08
n-Octadecane	154.57365	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C18 as Octodecane	154.57365	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Nonadecane	154.88373	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
C19 as Nonadecane	154.88373	ND	77	157	ND	0	160	ND	0	77	0.08	9	40	4.01E-08	4.01E-08
n-Eicosane	154.51163	ND	77	157	ND	0	159	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C20 as Eicosane	154.51163	ND	77	157	ND	0	159	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Heneicosane	155.969	ND	78	158	ND	0	161	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
C21 as Heneicosane	155.969	ND	78	158	ND	0	161	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
n-Docosane	154.20155	ND	77	157	ND	0	159	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
C22 as Docosane	154.20155	ND	77	157	ND	0	159	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
n-Tricosane	155.03876	ND	78	157	ND	0	160	ND	0	78	0.08	9	40	4.01E-08	4.01E-08
C23 as Tricosane	155.03876	ND	78	1684	0	1,684	160	ND	0	-1,607	0.00	0	0	0.00E+00	0.00E+00
n-Tetracosane	155.25582	ND	78	158	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
C24 as Tetracosane	155.25582	ND	78	158	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
Total Hydrocarbon	0.0129		19,411			1,684			0		19.33	2169	10,011	1.00E-05	1.00E-05

Bagging Data Form — Vacuum Method

Sample Id: E058

Equipment type:	Valve			**Component ID:**	E-1813	
Equipment Subtype:	Gate			**Unit:**	Refinery E	
Line Size:	3/4	*inches*		**Date:**	3-Oct-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.79 *inHg*	756.7	*mmHg*	**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	84 *°F*	28.9	*°C*	**TVA ID**	37887	
Component Temp:	78 *°F*	25.6	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*Diesel @ Tank 17*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
13:32	Background	13	*ppmv*	8-sec Dwell	4	*ppmv*	Total Dwell	4:00	*min:sec*	Final M21	33	*ppm*
14:10	Initial Bag Vacuum	0.1	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	80.2	*°F*	Leak @	Packing	

Bag Concentrations (ppmv) (had to vent bag)

Time	14:17	14:19	14:28	14:30	14:37	14:43
ppmv	7.4	7.5	9.1	8	10	11

Sorbent Tube Sample Collection Parameters

E058A

Time									
14:31	Volume Start	541.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:44	Volume Stop	554.5	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.977 *L/min*	Sorbent $Flow_{STP}$	0.925	*L/min*

E058B

Time									
14:31	Volume Start	532.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:44	Volume Stop	545.3	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent $Flow_{STP}$	0.932	*L/min*
	Total ST Vol_{STP}	24.14	*Liters*	DGM Vol_{STP}	76.12 *Liters*		Total Run Vol_{STP}	100.26	*Liters*

Bagging Parameters

Time									
14:32	Vacuum check	0.13	*inches H2O*			DGM_P	1.8 *inches H2O vacuum*	753.3	*mmHg*
14:36	DGM_{10L} Time	01:37.3	*min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM $Flow_{STP}$ 5.86	*liters/minute*
14:33	Bag Temp.	89.2	*°F*	31.8	*°C*	$Sample_T$	95 *°F*	35.0	*°C*

Post-Sample Data

14:53	Post Test M21	Background	-11 *ppmv*	8-sec Dwell	12	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	26	*ppm*
										Leak @	Packing	

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*			
Density of organic condensate	N/A	*g/ml*			

Average THC emissions =	1.60E-06 kg/hr
Percent difference THC ER =	15%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.61E-08
C5 as Pentane	2.61E-08
n-Hexane	3.74E-08
C6 as Hexane	3.74E-08
n-Heptane	3.11E-08
C7 as Heptane	3.11E-08
n-Octane	2.69E-08
C8 as Octane	1.15E-07
n-Nonane	2.71E-08
C9 as Nonane	3.86E-08
n-Decane	2.73E-08
C10 as Decane	1.01E-07
n-Undecane	2.73E-08
C11 as Undecane	8.27E-08
n-Dodecane	6.99E-08
C12 as Dodecane	2.71E-08
n-Tridecane	4.51E-08
C13 as Tridecane	1.22E-07
n-Tetradecane	7.12E-08
C14 as tetradecane	2.71E-08
n-Pentadecane	2.73E-08
C15 as Pentadecane	8.79E-08
n-Hexadecane	2.71E-08
C16 as Hexadecane	2.71E-08
n-Heptadecane	2.68E-08
C17 as Heptadecane	2.68E-08
n-Octadecane	2.71E-08
C18 as Octodecane	2.71E-08
n-Nonadecane	2.72E-08
C19 as Nonadecane	2.72E-08
n-Eicosane	2.71E-08
C20 as Eicosane	2.71E-08
n-Heneicosane	2.73E-08
C21 as Heneicosane	2.73E-08
n-Docosane	2.70E-08
C22 as Docosane	2.70E-08
n-Tricosane	2.72E-08
C23 as Tricosane	2.72E-08
n-Tetracosane	2.72E-08
C24 as Tetracosane	2.72E-08
Total Hydrocarbon	1.60E-06

THC:	**8.47E-05**	**lbs/day**	**1.55E-05**	**tons/yr**

E058A	ANALYTICAL RESULTS E058A		ND Adj	BACKGROUND E059A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	145.55	ND	0	154	ND	0	38	0.04	4	18	1.75E-08	0	0	0.00E+00	1.75E-08
C5 as Pentane	75.6409	ND	38	145.55	ND	0	154	ND	0	38	0.04	4	18	1.75E-08	0	0	0.00E+00	1.75E-08
n-Hexane	108.3906	ND	54	208.57	ND	0	220	ND	0	54	0.05	5	25	2.51E-08	0	0	0.00E+00	2.51E-08
C6 as Hexane	108.3906	ND	54	208.57	ND	0	220	ND	0	54	0.05	5	25	2.51E-08	0	0	0.00E+00	2.51E-08
n-Heptane	90.0472	ND	45	173.27	ND	0	183	ND	0	45	0.05	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C7 as Heptane	90.0472	ND	45	173.27	ND	0	183	ND	0	45	0.05	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Octane	77.9213	ND	39	149.94	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C8 as Octane	420.6273	J	421	149.94	ND	0	158	ND	0	421	0.42	42	195	1.95E-07	0	0	0.00E+00	1.95E-07
n-Nonane	78.5039	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C9 as Nonane	89.0688	J	89	151.06	ND	0	160	ND	0	89	0.09	9	41	4.12E-08	0	0	0.00E+00	4.12E-08
n-Decane	79.2126	ND	40	152.42	ND	0	161	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C10 as Decane	358.5732	J	359	152.42	ND	0	161	ND	0	359	0.36	36	166	1.66E-07	0	0	0.00E+00	1.66E-07
n-Undecane	79.0079	ND	40	152.03	ND	0	161	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C11 as Undecane	279.1378	J	279	152.03	ND	0	161	ND	0	279	0.28	28	129	1.29E-07	0	0	0.00E+00	1.29E-07
n-Dodecane	224.1527	J	224	151	ND	0	159	ND	0	224	0.22	22	104	1.04E-07	0	0	0.00E+00	1.04E-07
C12 as Dodecane	78.4724	ND	39	151	ND	0	159	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Tridecane	116.6694	J	117	151.36	ND	0	160	ND	0	117	0.12	12	54	5.40E-08	0	0	0.00E+00	5.40E-08
C13 as Tridecane	451.1621	J	451	151.36	ND	0	160	ND	0	451	0.45	45	209	2.09E-07	0	0	0.00E+00	2.09E-07
n-Tetradecane	229.5672	J	230	151.21	ND	0	160	ND	0	230	0.23	23	106	1.06E-07	0	0	0.00E+00	1.06E-07
C14 as tetradecane	78.5827	ND	39	151.21	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Pentadecane	78.9764	ND	39	151.97	ND	0	160	ND	0	39	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C15 as Pentadecane	301.5309	J	302	151.97	ND	0	160	ND	0	302	0.30	30	140	1.40E-07	0	0	0.00E+00	1.40E-07
n-Hexadecane	78.5512	ND	39	151.15	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C16 as Hexadecane	78.5512	ND	39	151.15	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Heptadecane	77.6378	ND	39	149.39	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C17 as Heptadecane	77.6378	ND	39	149.39	ND	0	158	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Octadecane	78.5039	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C18 as Octodecane	78.5039	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Nonadecane	78.6614	ND	39	151.36	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C19 as Nonadecane	78.6614	ND	39	151.36	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Eicosane	78.4724	ND	39	151	ND	0	159	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C20 as Eicosane	78.4724	ND	39	151	ND	0	159	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Heneicosane	79.2126	ND	40	152.42	ND	0	161	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C21 as Heneicosane	79.2126	ND	40	152.42	ND	0	161	ND	0	40	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Docosane	78.3150	ND	39	150.7	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C22 as Docosane	78.3150	ND	39	150.7	ND	0	159	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Tricosane	78.7402	ND	39	151.52	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C23 as Tricosane	78.7402	ND	39	151.52	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Tetracosane	78.8504	ND	39	151.73	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C24 as Tetracosane	78.8504	ND	39	151.73	ND	0	160	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
Total Hydrocarbon			3,727			0			0		3.73	374	1,725	1.72E-06	0	0	0.00E+00	1.72E-06

E058B	ANALYTICAL RESULTS E058B		ND Adj	BACKGROUND E059A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	146	ND	0	154	ND	0	75	0.08	8	35	3.47E-08	3.47E-08
C5 as Pentane	150.1	ND	75	146	ND	0	154	ND	0	75	0.08	8	35	3.47E-08	3.47E-08
n-Hexane	215.0875	ND	108	209	ND	0	220	ND	0	108	0.11	11	50	4.98E-08	4.98E-08
C6 as Hexane	215.0875	ND	108	209	ND	0	220	ND	0	108	0.11	11	50	4.98E-08	4.98E-08
n-Heptane	178.6875	ND	89	173	ND	0	183	ND	0	89	0.09	9	41	4.13E-08	4.13E-08
C7 as Heptane	178.6875	ND	89	173	ND	0	183	ND	0	89	0.09	9	41	4.13E-08	4.13E-08
n-Octane	154.625	ND	77	150	ND	0	158	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
C8 as Octane	154.625	ND	77	150	ND	0	158	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
n-Nonane	155.78125	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C9 as Nonane	155.78125	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Decane	157.1875	ND	79	152	ND	0	161	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
C10 as Decane	157.1875	ND	79	152	ND	0	161	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
n-Undecane	156.78125	ND	78	152	ND	0	161	ND	0	78	0.08	8	36	3.63E-08	3.63E-08
C11 as Undecane	156.78125	ND	78	152	ND	0	161	ND	0	78	0.08	8	36	3.63E-08	3.63E-08
n-Dodecane	155.71875	ND	78	151	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C12 as Dodecane	155.71875	ND	78	151	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Tridecane	156.09375	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C13 as Tridecane	156.09375	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
n-Tetradecane	155.9375	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C14 as tetradecane	155.9375	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
n-Pentadecane	156.71875	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.63E-08	3.63E-08
C15 as Pentadecane	156.71875	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.63E-08	3.63E-08
n-Hexadecane	155.875	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C16 as Hexadecane	155.875	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
n-Heptadecane	154.0625	ND	77	149	ND	0	158	ND	0	77	0.08	8	36	3.56E-08	3.56E-08
C17 as Heptadecane	154.0625	ND	77	149	ND	0	158	ND	0	77	0.08	8	36	3.56E-08	3.56E-08
n-Octadecane	155.78125	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C18 as Octodecane	155.78125	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Nonadecane	156.09375	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
C19 as Nonadecane	156.09375	ND	78	151	ND	0	160	ND	0	78	0.08	8	36	3.61E-08	3.61E-08
n-Eicosane	155.71875	ND	78	151	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C20 as Eicosane	155.71875	ND	78	151	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Heneicosane	157.1875	ND	79	152	ND	0	161	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
C21 as Heneicosane	157.1875	ND	79	152	ND	0	161	ND	0	79	0.08	8	36	3.64E-08	3.64E-08
n-Docosane	155.40625	ND	78	151	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C22 as Docosane	155.40625	ND	78	151	ND	0	159	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
n-Tricosane	156.25	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
C23 as Tricosane	156.25	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
n-Tetracosane	156.46875	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
C24 as Tetracosane	156.46875	ND	78	152	ND	0	160	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
Total Hydrocarbon			3,196			0			0		3.20	320	1,479	1.48E-06	1.48E-06

Bagging Data Form **Vacuum Method** **Sample Id** **E060**

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	E-1855		
Equipment Subtype:	Gate		**Unit:**	Refinery E		
Line Size:	6	*inches*	**Date:**	4-Oct-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	29.94 *inHg*	760.5 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	69 *°F*	20.6 *°C*	**TVA ID**	37887		
Component Temp:	71 *°F*	21.7 *°C*	**Stream Pressure/Temp:**		*psig*	*°F*
Stream Description:	*Tank 1774 - Diesel*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
9:57	Background	4 *ppmv*	8-sec Dwell	23 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	60 *ppm*
10:40	Initial Bag Vacuum	0.04 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	75.9 *°F*	Leak @	Packing

Bag Concentrations (ppmv) (had to vent bag)

Time	10:44	10:46	10:48	10:50	10:52	10:54	10:56	10:58	11:00	11:02	11:04	11:11		
ppmv	18	20.5	21	22.7	24.2	25	26.4	27.9	29.1	30.7	31.1	33.9		

Sorbent Tube Sample Collection Parameters

E060A

Time						
11:04	Volume Start	557.8 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:17	Volume Stop	570.7 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	Sorbent $Flow_{STP}$	0.973 *L/min*

E060B

11:04	Volume Start	547.9 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:17	Volume Stop	560.8 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	Sorbent $Flow_{STP}$	0.973 *L/min*
	Total ST Vol_{STP}	25.31 *Liters*	DGM Vol_{STP}	85.02 *Liters*	Total Run Vol_{STP}	110.33 *Liters*

Bagging Parameters

Time							
11:05	Vacuum check	0.03 *inches H2O*		DGM_P	2 *inches H2O vacuum*		756.7 *mmHg*
11:08	DGM_{10L} Time	01:29.6 *min:sec.frac*	DGM Time 1.500	DGM Flow	6.67	DGM $Flow_{STP}$	6.54 *liters/minute*
11:06	Bag Temp.	85.5 *°F*	29.7 *°C*	$Sample_T$	78 *°F*		25.6 *°C*

Post-Sample Data

11:25 Post Test M21	Background	9 *ppmv*	8-sec Dwell	61 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21 145 *ppm* Leak @ Packing
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*	
Organic condensate collected		N/A *ml*					
Density of organic condensate		N/A *g/ml*					

Average THC emissions =	2.80E-05 kg/hr
Percent difference THC ER =	3%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.84E-08
C5 as Pentane	2.84E-08
n-Hexane	4.08E-08
C6 as Hexane	4.08E-08
n-Heptane	3.39E-08
C7 as Heptane	3.00E-07
n-Octane	1.59E-06
C8 as Octane	6.57E-06
n-Nonane	1.81E-06
C9 as Nonane	5.45E-06
n-Decane	1.14E-06
C10 as Decane	3.55E-06
n-Undecane	5.73E-07
C11 as Undecane	1.85E-06
n-Dodecane	4.93E-07
C12 as Dodecane	1.28E-06
n-Tridecane	4.85E-07
C13 as Tridecane	1.20E-06
n-Tetradecane	4.01E-07
C14 as tetradecane	4.47E-07
n-Pentadecane	7.11E-08
C15 as Pentadecane	1.00E-07
n-Hexadecane	2.95E-08
C16 as Hexadecane	2.95E-08
n-Heptadecane	2.92E-08
C17 as Heptadecane	2.92E-08
n-Octadecane	2.95E-08
C18 as Octodecane	2.95E-08
n-Nonadecane	2.96E-08
C19 as Nonadecane	2.96E-08
n-Eicosane	2.95E-08
C20 as Eicosane	2.95E-08
n-Heneicosane	2.98E-08
C21 as Heneicosane	2.98E-08
n-Docosane	2.94E-08
C22 as Docosane	2.94E-08
n-Tricosane	2.96E-08
C23 as Tricosane	2.96E-08
n-Tetracosane	2.96E-08
C24 as Tetracosane	2.96E-08
Total Hydrocarbon	2.80E-05

THC:	**1.48E-03**	**lbs/day**	**2.71E-04**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E060A	E060A		ND Adj	E061A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C5 as Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	6	27	2.72E-08	0	0	0.00E+00	2.72E-08
C6 as Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	6	27	2.72E-08	0	0	0.00E+00	2.72E-08
n-Heptane	88.6512	ND	44	177.3	ND	0	183	ND	0	44	0.04	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
C7 as Heptane	871.0230		871	177.3	ND	0	183	ND	0	871	0.87	96	444	4.44E-07	0	0	0.00E+00	4.44E-07
n-Octane	3137.3592		3,137	153.43	ND	0	158	ND	0	3,137	3.14	346	1598	1.60E-06	0	0	0.00E+00	1.60E-06
C8 as Octane	#########		12,358	153.43	ND	0	158	ND	0	12,358	12.36	1363	6293	6.29E-06	0	0	0.00E+00	6.29E-06
n-Nonane	3855.0575		3,855	154.57	ND	0	160	ND	0	3,855	3.86	425	1963	1.96E-06	0	0	0.00E+00	1.96E-06
C9 as Nonane	#########		10,257	154.57	ND	0	160	ND	0	10,257	10.26	1132	5223	5.22E-06	0	0	0.00E+00	5.22E-06
n-Decane	2317.1529		2,317	155.97	ND	0	161	ND	0	2,317	2.32	256	1180	1.18E-06	0	0	0.00E+00	1.18E-06
C10 as Decane	6744.2799		6,744	155.97	ND	0	161	ND	0	6,744	6.74	744	3434	3.43E-06	0	0	0.00E+00	3.43E-06
n-Undecane	1093.8412		1,094	155.57	ND	0	161	ND	0	1,094	1.09	121	557	5.57E-07	0	0	0.00E+00	5.57E-07
C11 as Undecane	3679.4702		3,679	155.57	ND	0	161	ND	0	3,679	3.68	406	1874	1.87E-06	0	0	0.00E+00	1.87E-06
n-Dodecane	1016.5480		1,017	154.51	ND	0	159	ND	0	1,017	1.02	112	518	5.18E-07	0	0	0.00E+00	5.18E-07
C12 as Dodecane	2671.2454		2,671	154.51	ND	0	159	ND	0	2,671	2.67	295	1360	1.36E-06	0	0	0.00E+00	1.36E-06
n-Tridecane	1045.3093		1,045	154.88	ND	0	160	ND	0	1,045	1.05	115	532	5.32E-07	0	0	0.00E+00	5.32E-07
C13 as Tridecane	3028.9119		3,029	154.88	ND	0	160	ND	0	3,029	3.03	334	1542	1.54E-06	0	0	0.00E+00	1.54E-06
n-Tetradecane	966.6461		967	154.73	ND	0	160	ND	0	967	0.97	107	492	4.92E-07	0	0	0.00E+00	4.92E-07
C14 as tetradecane	1443.4199		1,443	154.73	ND	0	160	ND	0	1,443	1.44	159	735	7.35E-07	0	0	0.00E+00	7.35E-07
n-Pentadecane	201.6144	J	202	155.5	ND	0	160	ND	0	202	0.20	22	103	1.03E-07	0	0	0.00E+00	1.03E-07
C15 as Pentadecane	316.3182	J	316	155.5	ND	0	160	ND	0	316	0.32	35	161	1.61E-07	0	0	0.00E+00	1.61E-07
n-Hexadecane	77.3333	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C16 as Hexadecane	77.3333	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heptadecane	76.4341	ND	38	152.87	ND	0	158	ND	0	38	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
C17 as Heptadecane	76.4341	ND	38	152.87	ND	0	158	ND	0	38	0.04	4	19	1.95E-08	0	0	0.00E+00	1.95E-08
n-Octadecane	77.2868	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C18 as Octodecane	77.2868	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Nonadecane	77.4419	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C19 as Nonadecane	77.4419	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Eicosane	77.2558	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C20 as Eicosane	77.2558	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C21 as Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Docosane	77.1008	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C22 as Docosane	77.1008	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tricosane	77.5194	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C23 as Tricosane	77.5194	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Tetracosane	77.6279	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C24 as Tetracosane	77.6279	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
Total Hydrocarbon			55,925			0			0		55.93	6170	28,478	2.85E-05	0	0	0.00E+00	2.85E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E060B	E060B		ND Adj	E061A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.93644	ND	74	149	ND	0	154	ND	0	74	0.07	8	38	3.79E-08	3.79E-08
C5 as Pentane	148.93644	ND	74	149	ND	0	154	ND	0	74	0.07	8	38	3.79E-08	3.79E-08
n-Hexane	213.42016	ND	107	213	ND	0	220	ND	0	107	0.11	12	54	5.43E-08	5.43E-08
C6 as Hexane	213.42016	ND	107	213	ND	0	220	ND	0	107	0.11	12	54	5.43E-08	5.43E-08
n-Heptane	177.30233	ND	89	177	ND	0	183	ND	0	89	0.09	10	45	4.51E-08	4.51E-08
C7 as Heptane	306.33351	J	306	177	ND	0	183	ND	0	306	0.31	34	156	1.56E-07	1.56E-07
n-Octane	3111.8454		3,112	153	ND	0	158	ND	0	3,112	3.11	343	1585	1.58E-06	1.58E-06
C8 as Octane	13459.462		13,459	153	ND	0	158	ND	0	13,459	13.46	1485	6854	6.85E-06	6.85E-06
n-Nonane	3257.9929		3,258	155	ND	0	160	ND	0	3,258	3.26	359	1659	1.66E-06	1.66E-06
C9 as Nonane	11137.909		11,138	155	ND	0	160	ND	0	11,138	11.14	1229	5672	5.67E-06	5.67E-06
n-Decane	2173.1359		2,173	156	ND	0	161	ND	0	2,173	2.17	240	1107	1.11E-06	1.11E-06
C10 as Decane	7210.3784		7,210	156	ND	0	161	ND	0	7,210	7.21	796	3672	3.67E-06	3.67E-06
n-Undecane	1156.6221	J	1,157	156	ND	0	161	ND	0	1,157	1.16	128	589	5.89E-07	5.89E-07
C11 as Undecane	3571.4116		3,571	156	ND	0	161	ND	0	3,571	3.57	394	1819	1.82E-06	1.82E-06
n-Dodecane	920.04639	J	920	155	ND	0	159	ND	0	920	0.92	102	469	4.69E-07	4.69E-07
C12 as Dodecane	2346.4361		2,346	155	ND	0	159	ND	0	2,346	2.35	259	1195	1.19E-06	1.19E-06
n-Tridecane	859.18962	J	859	155	ND	0	160	ND	0	859	0.86	95	438	4.38E-07	4.38E-07
C13 as Tridecane	1672.5529		1,673	155	ND	0	160	ND	0	1,673	1.67	185	852	8.52E-07	8.52E-07
n-Tetradecane	607.23329	J	607	155	ND	0	160	ND	0	607	0.61	67	309	3.09E-07	3.09E-07
C14 as tetradecane	310.5958	J	311	155	ND	0	160	ND	0	311	0.31	34	158	1.58E-07	1.58E-07
n-Pentadecane	155.50388	ND	78	156	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C15 as Pentadecane	155.50388	ND	78	156	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Hexadecane	154.66667	ND	77	155	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
C16 as Hexadecane	154.66667	ND	77	155	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
n-Heptadecane	152.86822	ND	76	153	ND	0	158	ND	0	76	0.08	8	39	3.89E-08	3.89E-08
C17 as Heptadecane	152.86822	ND	76	153	ND	0	158	ND	0	76	0.08	8	39	3.89E-08	3.89E-08
n-Octadecane	154.57365	ND	77	155	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
C18 as Octodecane	154.57365	ND	77	155	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
n-Nonadecane	154.88373	ND	77	155	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
C19 as Nonadecane	154.88373	ND	77	155	ND	0	160	ND	0	77	0.08	9	39	3.94E-08	3.94E-08
n-Eicosane	154.51163	ND	77	155	ND	0	159	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C20 as Eicosane	154.51163	ND	77	155	ND	0	159	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Heneicosane	155.969	ND	78	156	ND	0	161	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
C21 as Heneicosane	155.969	ND	78	156	ND	0	161	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
n-Docosane	154.20155	ND	77	154	ND	0	159	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C22 as Docosane	154.20155	ND	77	154	ND	0	159	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
n-Tricosane	155.03876	ND	78	155	ND	0	160	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
C23 as Tricosane	155.03876	ND	78	155	ND	0	160	ND	0	78	0.08	9	39	3.95E-08	3.95E-08
n-Tetracosane	155.25582	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
C24 as Tetracosane	155.25582	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
Total Hydrocarbon			54,100			0			0		54.10	5969	27,549	2.75E-05	2.75E-05

Bagging Data Form — Vacuum Method

Sample Id: E062

Equipment type:	Bull Plug			**Component ID:**	E-2200
Equipment Subtype:				**Unit:**	Refinery E
Line Size:	3/4 *inches*			**Date:**	4-Oct-18
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR
Barometric pressure	29.91 *inHg*	759.7 *mmHg*		**Sample Pump A**	LP52979
				Sample Pump B	LP52975
Ambient Temp:	85 *°F*	29.4 *°C*		**TVA ID**	36502
Component Temp:	128 *°F*	53.3 *°C*		**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*Jet*				

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:30	Background	-2	*ppmv*	8-sec Dwell	240	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	778 *ppm*
13:58	Initial Bag Vacuum	0.07	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	95.9	*°F*	Leak @	Plug Threads

Bag Concentrations (ppmv) (had to vent bag

Time	14:00	14:02	14:04	14:11	14:14									
ppmv	29.1	29.5	21.4	23	23.6									

Sorbent Tube Sample Collection Parameters

E062A

Time									
14:05	Volume Start	570.7	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:18	Volume Stop	583.6	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.978	*L/min*

E062B

14:05	Volume Start	560.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:18	Volume Stop	573.9	*Liters*	Total Vol	13.1	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.008 *L/min*	Sorbent Flow$_{STP}$	0.994	*L/min*
	Total ST Vol$_{STP}$	25.64	*Liters*	DGM Vol$_{STP}$	78.48	*Liters*	Total Run Vol$_{STP}$	104.12	*Liters*

Bagging Parameters

Time										
14:07	Vacuum check	0.09	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	756.4	*mmHg*
14:10	DGM$_{10L}$ Time	01:37.9	*min:sec.frac*	DGM Time	1.633	DGM Flow	6.12	DGM Flow$_{STP}$	6.04	*liters/minute*
14:07	Bag Temp.	96.8	*°F*	36.0	*°C*	Sample$_T$	75	*°F*	23.9	*°C*

Post-Sample Data

14:26 Post Test M21	Background	4	*ppmv*	8-sec Dwell	565	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	799 *ppm*
									Leak @	Plug Threads
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*							
Density of organic condensate		N/A	*g/ml*							

Average THC emissions =	2.50E-05 kg/hr
Percent difference THC ER =	2%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.66E-08
C5 as Pentane	2.66E-08
n-Hexane	3.81E-08
C6 as Hexane	3.81E-08
n-Heptane	3.16E-08
C7 as Heptane	3.16E-08
n-Octane	9.93E-08
C8 as Octane	1.12E-06
n-Nonane	3.73E-07
C9 as Nonane	2.11E-06
n-Decane	5.99E-07
C10 as Decane	2.88E-06
n-Undecane	8.00E-07
C11 as Undecane	3.48E-06
n-Dodecane	1.18E-06
C12 as Dodecane	4.16E-06
n-Tridecane	1.11E-06
C13 as Tridecane	3.65E-06
n-Tetradecane	8.47E-07
C14 as tetradecane	1.52E-06
n-Pentadecane	2.60E-07
C15 as Pentadecane	1.78E-07
n-Hexadecane	2.76E-08
C16 as Hexadecane	2.76E-08
n-Heptadecane	2.73E-08
C17 as Heptadecane	2.73E-08
n-Octadecane	2.76E-08
C18 as Octodecane	2.76E-08
n-Nonadecane	2.76E-08
C19 as Nonadecane	2.76E-08
n-Eicosane	2.76E-08
C20 as Eicosane	2.76E-08
n-Heneicosane	2.78E-08
C21 as Heneicosane	2.78E-08
n-Docosane	2.75E-08
C22 as Docosane	2.75E-08
n-Tricosane	2.77E-08
C23 as Tricosane	2.77E-08
n-Tetracosane	2.77E-08
C24 as Tetracosane	2.77E-08
Total Hydrocarbon	2.50E-05

THC:	**1.32E-03**	**lbs/day**	**2.42E-04**	**tons/yr**

ANALYTICAL RESULTS				**BACKGROUND**			**TRIP BLANK**			**ADJUSTED G/V CONCENTRATION**		**TOTAL G/V MASS**	**G/V EMISSION RATE**		**LIQUID RESULTS**			**COMBINED EMISSION RATE**
E062A	**E062A**		**ND Adj**	**E063A**		**ND Adj**	**#E009A**		**ND Adj**						**Capture**	**#E0XX**		
Component	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**µg/L**	**µg**	**µg/hr**	**kg/hr**	**µg**	**µg/min**	**kg/hr**	**kg/hr**
n-Pentane	74.4682	ND	37	147.79	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C5 as Pentane	74.4682	ND	37	147.79	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Hexane	106.7101	ND	53	211.78	ND	0	220	ND	0	53	0.05	6	26	2.56E-08	0	0	0.00E+00	2.56E-08
C6 as Hexane	106.7101	ND	53	211.78	ND	0	220	ND	0	53	0.05	6	26	2.56E-08	0	0	0.00E+00	2.56E-08
n-Heptane	88.6512	ND	44	175.94	ND	0	183	ND	0	44	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
C7 as Heptane	88.6512	ND	44	175.94	ND	0	183	ND	0	44	0.04	5	21	2.13E-08	0	0	0.00E+00	2.13E-08
n-Octane	220.4998	J	220	152.25	ND	0	158	ND	0	220	0.22	23	106	1.06E-07	0	0	0.00E+00	1.06E-07
C8 as Octane	2425.4891		2,425	152.25	ND	0	158	ND	0	2,425	2.43	253	1166	1.17E-06	0	0	0.00E+00	1.17E-06
n-Nonane	858.5199		859	153.38	ND	0	160	ND	0	859	0.86	89	413	4.13E-07	0	0	0.00E+00	4.13E-07
C9 as Nonane	4357.9050		4,358	153.38	ND	0	160	ND	0	4,358	4.36	454	2094	2.09E-06	0	0	0.00E+00	2.09E-06
n-Decane	1307.0855		1,307	154.77	ND	0	161	ND	0	1,307	1.31	136	628	6.28E-07	0	0	0.00E+00	6.28E-07
C10 as Decane	5927.3667		5,927	154.77	ND	0	161	ND	0	5,927	5.93	617	2848	2.85E-06	0	0	0.00E+00	2.85E-06
n-Undecane	1603.3682		1,603	154.37	ND	0	161	ND	0	1,603	1.60	167	770	7.70E-07	0	0	0.00E+00	7.70E-07
C11 as Undecane	7215.3566		7,215	154.37	ND	0	161	ND	0	7,215	7.22	751	3467	3.47E-06	0	0	0.00E+00	3.47E-06
n-Dodecane	2391.2360		2,391	153.32	ND	0	159	ND	0	2,391	2.39	249	1149	1.15E-06	0	0	0.00E+00	1.15E-06
C12 as Dodecane	8462.1872		8,462	153.32	ND	0	159	ND	0	8,462	8.46	881	4066	4.07E-06	0	0	0.00E+00	4.07E-06
n-Tridecane	2304.9359		2,305	153.69	ND	0	160	ND	0	2,305	2.30	240	1108	1.11E-06	0	0	0.00E+00	1.11E-06
C13 as Tridecane	7354.7367		7,355	153.69	ND	0	160	ND	0	7,355	7.35	766	3534	3.53E-06	0	0	0.00E+00	3.53E-06
n-Tetradecane	1641.4550		1,641	153.54	ND	0	160	ND	0	1,641	1.64	171	789	7.89E-07	0	0	0.00E+00	7.89E-07
C14 as tetradecane	3356.8389		3,357	153.54	ND	0	160	ND	0	3,357	3.36	349	1613	1.61E-06	0	0	0.00E+00	1.61E-06
n-Pentadecane	510.7214	J	511	154.31	ND	0	160	ND	0	511	0.51	53	245	2.45E-07	0	0	0.00E+00	2.45E-07
C15 as Pentadecane	663.1897	J	663	154.31	ND	0	160	ND	0	663	0.66	69	319	3.19E-07	0	0	0.00E+00	3.19E-07
n-Hexadecane	77.3333	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C16 as Hexadecane	77.3333	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Heptadecane	76.4341	ND	38	151.69	ND	0	158	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C17 as Heptadecane	76.4341	ND	38	151.69	ND	0	158	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Octadecane	77.2868	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C18 as Octodecane	77.2868	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Nonadecane	77.4419	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C19 as Nonadecane	77.4419	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Eicosane	77.2558	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C20 as Eicosane	77.2558	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Heneicosane	77.9845	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C21 as Heneicosane	77.9845	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Docosane	77.1008	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
C22 as Docosane	77.1008	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
n-Tricosane	77.5194	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C23 as Tricosane	77.5194	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Tetracosane	77.6279	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C24 as Tetracosane	77.6279	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
Total Hydrocarbon			51,567			0			0		51.57	5369	24,779	2.48E-05	0	0	0.00E+00	2.48E-05

ANALYTICAL RESULTS				**BACKGROUND**			**TRIP BLANK**			**ADJUSTED G/V CONCENTRATION**		**TOTAL G/V MASS**	**G/V EMISSION RATE**		**COMBINED EMISSION RATE**
E062B	**E062B**		**ND Adj**	**E063A**		**ND Adj**	**#E009A**		**ND Adj**						
Component	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**Flag**	**µg/m³**	**µg/m³**	**µg/L**	**µg**	**µg/hr**	**kg/hr**	**kg/hr**
n-Pentane	146.66259	ND	73	148	ND	0	154	ND	0	73	0.07	8	35	3.52E-08	3.52E-08
C5 as Pentane	146.66259	ND	73	148	ND	0	154	ND	0	73	0.07	8	35	3.52E-08	3.52E-08
n-Hexane	210.16183	ND	105	212	ND	0	220	ND	0	105	0.11	11	50	5.05E-08	5.05E-08
C6 as Hexane	210.16183	ND	105	212	ND	0	220	ND	0	105	0.11	11	50	5.05E-08	5.05E-08
n-Heptane	174.59541	ND	87	176	ND	0	183	ND	0	87	0.09	9	42	4.19E-08	4.19E-08
C7 as Heptane	174.59541	ND	87	176	ND	0	183	ND	0	87	0.09	9	42	4.19E-08	4.19E-08
n-Octane	192.88118	J	193	152	ND	0	158	ND	0	193	0.19	20	93	9.27E-08	9.27E-08
C8 as Octane	2219.0026		2,219	152	ND	0	158	ND	0	2,219	2.22	231	1066	1.07E-06	1.07E-06
n-Nonane	695.79268	J	696	153	ND	0	160	ND	0	696	0.70	72	334	3.34E-07	3.34E-07
C9 as Nonane	4408.9715		4,409	153	ND	0	160	ND	0	4,409	4.41	459	2119	2.12E-06	2.12E-06
n-Decane	1185.4841	J	1,185	155	ND	0	161	ND	0	1,185	1.19	123	570	5.70E-07	5.70E-07
C10 as Decane	6043.4677		6,043	155	ND	0	161	ND	0	6,043	6.04	629	2904	2.90E-06	2.90E-06
n-Undecane	1724.7535		1,725	154	ND	0	161	ND	0	1,725	1.72	180	829	8.29E-07	8.29E-07
C11 as Undecane	7275.6785		7,276	154	ND	0	161	ND	0	7,276	7.28	758	3496	3.50E-06	3.50E-06
n-Dodecane	2506.0478		2,506	153	ND	0	159	ND	0	2,506	2.51	261	1204	1.20E-06	1.20E-06
C12 as Dodecane	8837.5266		8,838	153	ND	0	159	ND	0	8,838	8.84	920	4247	4.25E-06	4.25E-06
n-Tridecane	2307.7222		2,308	154	ND	0	160	ND	0	2,308	2.31	240	1109	1.11E-06	1.11E-06
C13 as Tridecane	7847.194		7,847	154	ND	0	160	ND	0	7,847	7.85	817	3771	3.77E-06	3.77E-06
n-Tetradecane	1884.2268		1,884	154	ND	0	160	ND	0	1,884	1.88	196	905	9.05E-07	9.05E-07
C14 as tetradecane	2968.8773		2,969	154	ND	0	160	ND	0	2,969	2.97	309	1427	1.43E-06	1.43E-06
n-Pentadecane	572.42283	J	572	154	ND	0	160	ND	0	572	0.57	60	275	2.75E-07	2.75E-07
C15 as Pentadecane	153.12977	ND	77	154	ND	0	160	ND	0	77	0.08	8	37	3.68E-08	3.68E-08
n-Hexadecane	152.30534	ND	76	153	ND	0	160	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
C16 as Hexadecane	152.30534	ND	76	153	ND	0	160	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
n-Heptadecane	150.53435	ND	75	152	ND	0	158	ND	0	75	0.08	8	36	3.62E-08	3.62E-08
C17 as Heptadecane	150.53435	ND	75	152	ND	0	158	ND	0	75	0.08	8	36	3.62E-08	3.62E-08
n-Octadecane	152.21374	ND	76	153	ND	0	160	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
C18 as Octodecane	152.21374	ND	76	153	ND	0	160	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
n-Nonadecane	152.51908	ND	76	154	ND	0	160	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
C19 as Nonadecane	152.51908	ND	76	154	ND	0	160	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
n-Eicosane	152.15267	ND	76	153	ND	0	159	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
C20 as Eicosane	152.15267	ND	76	153	ND	0	159	ND	0	76	0.08	8	37	3.66E-08	3.66E-08
n-Heneicosane	153.58778	ND	77	155	ND	0	161	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
C21 as Heneicosane	153.58778	ND	77	155	ND	0	161	ND	0	77	0.08	8	37	3.69E-08	3.69E-08
n-Docosane	151.84732	ND	76	153	ND	0	159	ND	0	76	0.08	8	36	3.65E-08	3.65E-08
C22 as Docosane	151.84732	ND	76	153	ND	0	159	ND	0	76	0.08	8	36	3.65E-08	3.65E-08
n-Tricosane	152.67175	ND	76	154	ND	0	160	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
C23 as Tricosane	152.67175	ND	76	154	ND	0	160	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
n-Tetracosane	152.88549	ND	76	154	ND	0	160	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
C24 as Tetracosane	152.88549	ND	76	154	ND	0	160	ND	0	76	0.08	8	37	3.67E-08	3.67E-08
Total Hydrocarbon			52,649			0			0		52.65	5482	25,299	2.53E-05	2.53E-05

Bagging Data Form — Vacuum Method

Sample Id E064

WSPA Western States Petroleum Association

Equipment type:	Connector			**Component ID:**	E-382	
Equipment Subtype:	Elbow			**Unit:**	Refinery E	
Line Size:	3/4	*inches*		**Date:**	5-Oct-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	30 *inHg*	762.0	*mmHg*	**Sample Pump A**	LP52975	
				Sample Pump B	LP52979	
Ambient Temp:	68 *°F*	20.0	*°C*	**TVA ID**	36502	
Component Temp:	69 *°F*	20.6	*°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*DSL P503B*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:52	Background	6	*ppmv*	8-sec Dwell	91	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	361 *ppm*
10:24	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	70.9	*°F*	Leak @	Threaded Connection

Bag Concentrations (ppmv)

Time	10:26	10:32	10:34	10:36	10:38	10:40	10:42	10:44	10:49					
ppmv	12	24.2	25	26.5	28.2	29.4	29.9	31	30					

Sorbent Tube Sample Collection Parameters

E064A

Time									
10:44	Volume Start	587.5	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:57	Volume Stop	600.2	*Liters*	Total Vol	12.7	*Liters*			
	Sample Run Time	13	*Minutes*	Sorbent Flow	0.977	*L/min*	Sorbent Flow$_{STP}$	0.986	*L/min*

E064B

10:44	Volume Start	575.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:57	Volume Stop	588.9	*Liters*	Total Vol	13.0	*Liters*			
	Sample Run Time	13	*Minutes*	Sorbent Flow	1.000	*L/min*	Sorbent Flow$_{STP}$	1.009	*L/min*
	Total ST Vol$_{STP}$	25.94	*Liters*	DGM Vol$_{STP}$	86.51	*Liters*	Total Run Vol$_{STP}$	112.45	*Liters*

Bagging Parameters

Time										
10:45	Vacuum check	0.005	*inches H2O*			DGM$_P$	2	*inches H2O vacuum*	758.3	*mmHg*
10:48	DGM$_{10L}$ Time	01:31.3	*min:sec.frac*	DGM Time	1.517	DGM Flow	6.59	DGM Flow$_{STP}$	6.65	*liters/minute*
10:46	Bag Temp.	72.5	*°F*	22.5	*°C*	Sample$_T$	64	*°F*	17.8	*°C*

Post-Sample Data

11:05 Post Test M21	Background	4	*ppmv*	8-sec Dwell	46	*ppmv*	Total Dwell	3:00 *min:sec*	Final M21	371 *ppm*
									Leak @	Threaded Connection
Condensate accumulation: starting time		N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A	*ml*							
Density of organic condensate		N/A	*g/ml*							

Average THC emissions =	3.96E-05 kg/hr
Percent difference THC ER =	8%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.90E-08
C5 as Pentane	2.90E-08
n-Hexane	4.15E-08
C6 as Hexane	4.15E-08
n-Heptane	3.45E-08
C7 as Heptane	3.45E-08
n-Octane	2.99E-08
C8 as Octane	2.05E-06
n-Nonane	1.67E-07
C9 as Nonane	9.85E-06
n-Decane	4.95E-07
C10 as Decane	1.06E-05
n-Undecane	7.66E-07
C11 as Undecane	8.72E-06
n-Dodecane	5.58E-07
C12 as Dodecane	3.79E-06
n-Tridecane	3.23E-07
C13 as Tridecane	1.01E-06
n-Tetradecane	1.98E-07
C14 as tetradecane	1.11E-07
n-Pentadecane	5.24E-08
C15 as Pentadecane	9.17E-08
n-Hexadecane	3.01E-08
C16 as Hexadecane	3.01E-08
n-Heptadecane	2.98E-08
C17 as Heptadecane	2.98E-08
n-Octadecane	3.01E-08
C18 as Octodecane	3.01E-08
n-Nonadecane	3.01E-08
C19 as Nonadecane	3.01E-08
n-Eicosane	3.01E-08
C20 as Eicosane	3.01E-08
n-Heneicosane	3.04E-08
C21 as Heneicosane	3.04E-08
n-Docosane	3.00E-08
C22 as Docosane	3.00E-08
n-Tricosane	3.02E-08
C23 as Tricosane	3.02E-08
n-Tetracosane	3.02E-08
C24 as Tetracosane	3.02E-08
Total Hydrocarbon	3.96E-05

THC: 2.10E-03 lbs/day 3.82E-04 tons/yr

E064A

Component	ANALYTICAL RESULTS E064A µg/m³	Flag	ND Adj µg/m³	BACKGROUND E065A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#E0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	75.6409	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C5 as Pentane	75.6409	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Hexane	108.3906	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	28	2.81E-08	0	0	0.00E+00	2.81E-08
C6 as Hexane	108.3906	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	28	2.81E-08	0	0	0.00E+00	2.81E-08
n-Heptane	90.0472	ND	45	175.94	ND	0	183	ND	0	45	0.05	5	23	2.34E-08	0	0	0.00E+00	2.34E-08
C7 as Heptane	90.0472	ND	45	175.94	ND	0	183	ND	0	45	0.05	5	23	2.34E-08	0	0	0.00E+00	2.34E-08
n-Octane	77.9213	ND	39	152.25	ND	0	158	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C8 as Octane	3884.1348		3,884	152.25	ND	0	158	ND	0	3,884	3.88	437	2016	2.02E-06	0	0	0.00E+00	2.02E-06
n-Nonane	446.5551	J	447	153.38	ND	0	160	ND	0	447	0.45	50	232	2.32E-07	0	0	0.00E+00	2.32E-07
C9 as Nonane	18162.9446		18,163	153.38	ND	0	160	ND	0	18,163	18.16	2042	9426	9.43E-06	0	0	0.00E+00	9.43E-06
n-Decane	953.0138		953	154.77	ND	0	161	ND	0	953	0.95	107	495	4.95E-07	0	0	0.00E+00	4.95E-07
C10 as Decane	19133.8703		19,134	154.77	ND	0	161	ND	0	19,134	19.13	2152	9930	9.93E-06	0	0	0.00E+00	9.93E-06
n-Undecane	1497.7103		1,498	154.37	ND	0	161	ND	0	1,498	1.50	168	777	7.77E-07	0	0	0.00E+00	7.77E-07
C11 as Undecane	16367.0077		16,367	154.37	ND	0	161	ND	0	16,367	16.37	1840	8494	8.49E-06	0	0	0.00E+00	8.49E-06
n-Dodecane	934.2746		934	153.32	ND	0	159	ND	0	934	0.93	105	485	4.85E-07	0	0	0.00E+00	4.85E-07
C12 as Dodecane	6877.1161		6,877	153.32	ND	0	159	ND	0	6,877	6.88	773	3569	3.57E-06	0	0	0.00E+00	3.57E-06
n-Tridecane	690.1621	J	690	153.69	ND	0	160	ND	0	690	0.69	78	358	3.58E-07	0	0	0.00E+00	3.58E-07
C13 as Tridecane	2182.9402		2,183	153.69	ND	0	160	ND	0	2,183	2.18	245	1133	1.13E-06	0	0	0.00E+00	1.13E-06
n-Tetradecane	416.6736	J	417	153.54	ND	0	160	ND	0	417	0.42	47	216	2.16E-07	0	0	0.00E+00	2.16E-07
C14 as tetradecane	351.3133	J	351	153.54	ND	0	160	ND	0	351	0.35	40	182	1.82E-07	0	0	0.00E+00	1.82E-07
n-Pentadecane	124.6111	J	125	154.31	ND	0	160	ND	0	125	0.12	14	65	6.47E-08	0	0	0.00E+00	6.47E-08
C15 as Pentadecane	276.3008	J	276	154.31	ND	0	160	ND	0	276	0.28	31	143	1.43E-07	0	0	0.00E+00	1.43E-07
n-Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C16 as Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C17 as Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Octadecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C18 as Octodecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C19 as Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C20 as Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C21 as Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C22 as Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C23 as Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C24 as Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
Total Hydrocarbon			73,319			0			0		73.32	8245	38,052	3.81E-05	0	0	0.00E+00	3.81E-05

E064B

Component	ANALYTICAL RESULTS E064B µg/m³	Flag	ND Adj µg/m³	BACKGROUND E065A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	147.7907692	ND	74	148	ND	0	154	ND	0	74	0.07	8	38	3.84E-08	3.84E-08
C5 as Pentane	147.7907692	ND	74	148	ND	0	154	ND	0	74	0.07	8	38	3.84E-08	3.84E-08
n-Hexane	211.7784615	ND	106	212	ND	0	220	ND	0	106	0.11	12	55	5.50E-08	5.50E-08
C6 as Hexane	211.7784615	ND	106	212	ND	0	220	ND	0	106	0.11	12	55	5.50E-08	5.50E-08
n-Heptane	175.9384615	ND	88	176	ND	0	183	ND	0	88	0.09	10	46	4.57E-08	4.57E-08
C7 as Heptane	175.9384615	ND	88	176	ND	0	183	ND	0	88	0.09	10	46	4.57E-08	4.57E-08
n-Octane	152.2461538	ND	76	152	ND	0	158	ND	0	76	0.08	9	40	3.95E-08	3.95E-08
C8 as Octane	4003.938243		4,004	152	ND	0	158	ND	0	4,004	4.00	450	2078	2.08E-06	2.08E-06
n-Nonane	195.7026194	J	196	153	ND	0	160	ND	0	196	0.20	22	102	1.02E-07	1.02E-07
C9 as Nonane	19783.37575		19,783	153	ND	0	160	ND	0	19,783	19.78	2225	10267	1.03E-05	1.03E-05
n-Decane	956.3153487	J	956	155	ND	0	161	ND	0	956	0.96	108	496	4.96E-07	4.96E-07
C10 as Decane	21896.47439		21,896	155	ND	0	161	ND	0	21,896	21.90	2462	11364	1.14E-05	1.14E-05
n-Undecane	1454.248808	J	1,454	154	ND	0	161	ND	0	1,454	1.45	164	755	7.55E-07	7.55E-07
C11 as Undecane	17249.51452		17,250	154	ND	0	161	ND	0	17,250	17.25	1940	8952	8.95E-06	8.95E-06
n-Dodecane	1215.026474	J	1,215	153	ND	0	159	ND	0	1,215	1.22	137	631	6.31E-07	6.31E-07
C12 as Dodecane	7712.825304		7,713	153	ND	0	159	ND	0	7,713	7.71	867	4003	4.00E-06	4.00E-06
n-Tridecane	552.8237481	J	553	154	ND	0	160	ND	0	553	0.55	62	287	2.87E-07	2.87E-07
C13 as Tridecane	1697.303559		1,697	154	ND	0	160	ND	0	1,697	1.70	191	881	8.81E-07	8.81E-07
n-Tetradecane	346.1368339	J	346	154	ND	0	160	ND	0	346	0.35	39	180	1.80E-07	1.80E-07
C14 as tetradecane	153.5384615	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
n-Pentadecane	154.3076923	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C15 as Pentadecane	154.3076923	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
n-Hexadecane	153.4769231	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
C16 as Hexadecane	153.4769231	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
n-Heptadecane	151.6923077	ND	76	152	ND	0	158	ND	0	76	0.08	9	39	3.94E-08	3.94E-08
C17 as Heptadecane	151.6923077	ND	76	152	ND	0	158	ND	0	76	0.08	9	39	3.94E-08	3.94E-08
n-Octadecane	153.3846154	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
C18 as Octodecane	153.3846154	ND	77	153	ND	0	160	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
n-Nonadecane	153.6923077	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
C19 as Nonadecane	153.6923077	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
n-Eicosane	153.3230769	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
C20 as Eicosane	153.3230769	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
n-Heneicosane	154.7692308	ND	77	155	ND	0	161	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
C21 as Heneicosane	154.7692308	ND	77	155	ND	0	161	ND	0	77	0.08	9	40	4.02E-08	4.02E-08
n-Docosane	153.0153846	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	3.97E-08	3.97E-08
C22 as Docosane	153.0153846	ND	77	153	ND	0	159	ND	0	77	0.08	9	40	3.97E-08	3.97E-08
n-Tricosane	153.8461538	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
C23 as Tricosane	153.8461538	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
n-Tetracosane	154.0615385	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
C24 as Tetracosane	154.0615385	ND	77	154	ND	0	160	ND	0	77	0.08	9	40	4.00E-08	4.00E-08
Total Hydrocarbon			79,288			0			0		79.29	8916	41,150	4.11E-05	4.11E-05

Bagging Data Form — Vacuum Method

Sample Id: E066

WSPA Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	E-5	
Equipment Subtype:	Plug		**Unit:**	Refinery E	
Line Size:	3/4	*inches*	**Date:**	5-Oct-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.97 *inHg*	761.2 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	80 °F	26.7 °C	**TVA ID**	37887	
Component Temp:	188 °F	86.7 °C	**Stream Pressure/Temp:**	*psig*	°F
Stream Description:	*Frac Bottoms @ P504*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:18	Background	-11	*ppmv*	8-sec Dwell	34	*ppmv*	Total Dwell	1:00	*min:sec*	Final M21	1825 *ppm*
12:47	Initial Bag Vacuum	0.07	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	94.3	°F	Leak @	Threaded Connection

Bag Concentrations (ppmv) (had to vent bag)

Time	12:50	12:52	12:54	12:56	12:58	13:00	13:02	13:04	13:06	13:18				
ppmv	26.5	33.7	35.1	36.2	36.8	37.3	37.8	38.6	38.7	35.9				

Sorbent Tube Sample Collection Parameters

E066A

Time									
13:06	Volume Start	600.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:19	Volume Stop	612.8	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.954	*L/min*

E066B

13:06	Volume Start	588.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:19	Volume Stop	601.7	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent $Flow_{STP}$	0.969	*L/min*
	Total ST Vol_{STP}	24.99	*Liters*	DGM Vol_{STP}	85.27	*Liters*	Total Run Vol_{STP}	110.26	*Liters*

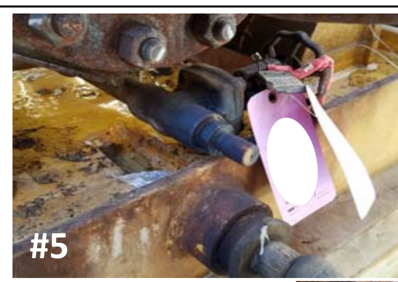
Bagging Parameters

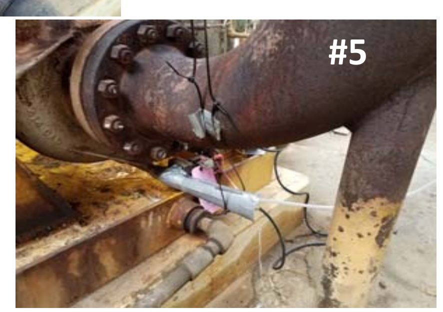
Time										
13:07	Vacuum check	0.08	*inches H2O*			DGM_P	2	*inches H2O vacuum*	757.5	*mmHg*
13:10	DGM_{10L} Time	01:29.6	*min:sec.frac*	DGM Time	1.500	DGM Flow	6.67	DGM $Flow_{STP}$	6.56	*liters/minute*
13:08	Bag Temp.	101.8	°F	38.8	°C	$Sample_T$	77	°F	25.0	°C

Post-Sample Data

13:27	Post Test M21	Background	-13	*ppmv*	8-sec Dwell	320	*ppmv*	Total Dwell	1:30 *min:sec*	Final M21	2173 *ppm*
										Leak @	Threaded Connection
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	4.29E-05	kg/hr
Percent difference THC ER =	13%	
Acceptable?	Yes	





AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.88E-08
C5 as Pentane	2.88E-08
n-Hexane	4.13E-08
C6 as Hexane	4.13E-08
n-Heptane	3.43E-08
C7 as Heptane	3.43E-08
n-Octane	2.97E-08
C8 as Octane	1.26E-06
n-Nonane	9.77E-08
C9 as Nonane	6.43E-06
n-Decane	4.16E-07
C10 as Decane	9.79E-06
n-Undecane	9.02E-07
C11 as Undecane	1.10E-05
n-Dodecane	8.95E-07
C12 as Dodecane	6.92E-06
n-Tridecane	7.17E-07
C13 as Tridecane	2.63E-06
n-Tetradecane	3.81E-07
C14 as tetradecane	4.54E-07
n-Pentadecane	1.22E-07
C15 as Pentadecane	9.32E-08
n-Hexadecane	2.99E-08
C16 as Hexadecane	2.99E-08
n-Heptadecane	2.96E-08
C17 as Heptadecane	2.96E-08
n-Octadecane	2.99E-08
C18 as Octodecane	2.99E-08
n-Nonadecane	2.99E-08
C19 as Nonadecane	2.99E-08
n-Eicosane	2.99E-08
C20 as Eicosane	2.99E-08
n-Heneicosane	3.02E-08
C21 as Heneicosane	3.02E-08
n-Docosane	2.98E-08
C22 as Docosane	2.98E-08
n-Tricosane	3.00E-08
C23 as Tricosane	3.00E-08
n-Tetracosane	3.00E-08
C24 as Tetracosane	3.00E-08
Total Hydrocarbon	4.29E-05

THC:	**2.27E-03**	**lbs/day**	**4.14E-04**	**tons/yr**

E066A Component	ANALYTICAL RESULTS E066A µg/m³	Flag	ND Adj µg/m³	BACKGROUND E067A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#E0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	76.2413	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C5 as Pentane	76.2413	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Hexane	109.2508	ND	55	213.42	ND	0	220	ND	0	55	0.05	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
C6 as Hexane	109.2508	ND	55	213.42	ND	0	220	ND	0	55	0.05	6	28	2.78E-08	0	0	0.00E+00	2.78E-08
n-Heptane	90.7619	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	23	2.31E-08	0	0	0.00E+00	2.31E-08
C7 as Heptane	90.7619	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	23	2.31E-08	0	0	0.00E+00	2.31E-08
n-Octane	78.5397	ND	39	153.43	ND	0	158	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C8 as Octane	2668.1430		2,668	153.43	ND	0	158	ND	0	2,668	2.67	294	1358	1.36E-06	0	0	0.00E+00	1.36E-06
n-Nonane	306.0134	J	306	154.57	ND	0	160	ND	0	306	0.31	34	156	1.56E-07	0	0	0.00E+00	1.56E-07
C9 as Nonane	13638.7480		13,639	154.57	ND	0	160	ND	0	13,639	13.64	1504	6940	6.94E-06	0	0	0.00E+00	6.94E-06
n-Decane	989.2796		989	155.97	ND	0	161	ND	0	989	0.99	109	503	5.03E-07	0	0	0.00E+00	5.03E-07
C10 as Decane	19963.0191		19,963	155.97	ND	0	161	ND	0	19,963	19.96	2201	10159	1.02E-05	0	0	0.00E+00	1.02E-05
n-Undecane	2006.7463		2,007	155.57	ND	0	161	ND	0	2,007	2.01	221	1021	1.02E-06	0	0	0.00E+00	1.02E-06
C11 as Undecane	23271.1673		23,271	155.57	ND	0	161	ND	0	23,271	23.27	2566	11842	1.18E-05	0	0	0.00E+00	1.18E-05
n-Dodecane	1669.9741		1,670	154.51	ND	0	159	ND	0	1,670	1.67	184	850	8.50E-07	0	0	0.00E+00	8.50E-07
C12 as Dodecane	14288.5210		14,289	154.51	ND	0	159	ND	0	14,289	14.29	1575	7271	7.27E-06	0	0	0.00E+00	7.27E-06
n-Tridecane	1688.6082		1,689	154.88	ND	0	160	ND	0	1,689	1.69	186	859	8.59E-07	0	0	0.00E+00	8.59E-07
C13 as Tridecane	5602.9439		5,603	154.88	ND	0	160	ND	0	5,603	5.60	618	2851	2.85E-06	0	0	0.00E+00	2.85E-06
n-Tetradecane	746.0891	J	746	154.73	ND	0	160	ND	0	746	0.75	82	380	3.80E-07	0	0	0.00E+00	3.80E-07
C14 as tetradecane	1120.4182		1,120	154.73	ND	0	160	ND	0	1,120	1.12	124	570	5.70E-07	0	0	0.00E+00	5.70E-07
n-Pentadecane	250.9256	J	251	155.5	ND	0	160	ND	0	251	0.25	28	128	1.28E-07	0	0	0.00E+00	1.28E-07
C15 as Pentadecane	287.9377	J	288	155.5	ND	0	160	ND	0	288	0.29	32	147	1.47E-07	0	0	0.00E+00	1.47E-07
n-Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C16 as Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Heptadecane	78.2540	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C17 as Heptadecane	78.2540	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Octadecane	79.1270	ND	40	154.57	ND	0	160	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C18 as Octodecane	79.1270	ND	40	154.57	ND	0	160	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Nonadecane	79.2857	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C19 as Nonadecane	79.2857	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Eicosane	79.0952	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C20 as Eicosane	79.0952	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Heneicosane	79.8413	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C21 as Heneicosane	79.8413	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Docosane	78.9365	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C22 as Docosane	78.9365	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
n-Tricosane	79.3651	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C23 as Tricosane	79.3651	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tetracosane	79.4762	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C24 as Tetracosane	79.4762	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
Total Hydrocarbon			89,527			0			0		89.53	9871	45,557	4.56E-05	0	0	0.00E+00	4.56E-05

E066B Component	ANALYTICAL RESULTS E066B µg/m³	Flag	ND Adj µg/m³	BACKGROUND E067A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	150.0999978	ND	75	149	ND	0	154	ND	0	75	0.08	8	38	3.82E-08	3.82E-08
C5 as Pentane	150.0999978	ND	75	149	ND	0	154	ND	0	75	0.08	8	38	3.82E-08	3.82E-08
n-Hexane	215.0874968	ND	108	213	ND	0	220	ND	0	108	0.11	12	55	5.47E-08	5.47E-08
C6 as Hexane	215.0874968	ND	108	213	ND	0	220	ND	0	108	0.11	12	55	5.47E-08	5.47E-08
n-Heptane	178.6874973	ND	89	177	ND	0	183	ND	0	89	0.09	10	45	4.55E-08	4.55E-08
C7 as Heptane	178.6874973	ND	89	177	ND	0	183	ND	0	89	0.09	10	45	4.55E-08	4.55E-08
n-Octane	154.6249977	ND	77	153	ND	0	158	ND	0	77	0.08	9	39	3.93E-08	3.93E-08
C8 as Octane	2274.932189		2,275	153	ND	0	158	ND	0	2,275	2.27	251	1158	1.16E-06	1.16E-06
n-Nonane	155.7812477	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C9 as Nonane	11619.10175		11,619	155	ND	0	160	ND	0	11,619	11.62	1281	5913	5.91E-06	5.91E-06
n-Decane	647.332396	J	647	156	ND	0	161	ND	0	647	0.65	71	329	3.29E-07	3.29E-07
C10 as Decane	18527.1819		18,527	156	ND	0	161	ND	0	18,527	18.53	2043	9428	9.43E-06	9.43E-06
n-Undecane	1538.334422	J	1,538	156	ND	0	161	ND	0	1,538	1.54	170	783	7.83E-07	7.83E-07
C11 as Undecane	19936.07476		19,936	156	ND	0	161	ND	0	19,936	19.94	2198	10145	1.01E-05	1.01E-05
n-Dodecane	1846.607285		1,847	155	ND	0	159	ND	0	1,847	1.85	204	940	9.40E-07	9.40E-07
C12 as Dodecane	12891.95355		12,892	155	ND	0	159	ND	0	12,892	12.89	1421	6560	6.56E-06	6.56E-06
n-Tridecane	1129.266132	J	1,129	155	ND	0	160	ND	0	1,129	1.13	125	575	5.75E-07	5.75E-07
C13 as Tridecane	4745.724966		4,746	155	ND	0	160	ND	0	4,746	4.75	523	2415	2.41E-06	2.41E-06
n-Tetradecane	750.3062423	J	750	155	ND	0	160	ND	0	750	0.75	83	382	3.82E-07	3.82E-07
C14 as tetradecane	663.6238926	J	664	155	ND	0	160	ND	0	664	0.66	73	338	3.38E-07	3.38E-07
n-Pentadecane	227.4545338	J	227	156	ND	0	160	ND	0	227	0.23	25	116	1.16E-07	1.16E-07
C15 as Pentadecane	156.7187477	ND	78	156	ND	0	160	ND	0	78	0.08	9	40	3.99E-08	3.99E-08
n-Hexadecane	155.8749977	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
C16 as Hexadecane	155.8749977	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
n-Heptadecane	154.0624977	ND	77	153	ND	0	158	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
C17 as Heptadecane	154.0624977	ND	77	153	ND	0	158	ND	0	77	0.08	8	39	3.92E-08	3.92E-08
n-Octadecane	155.7812477	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C18 as Octodecane	155.7812477	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Nonadecane	156.0937477	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
C19 as Nonadecane	156.0937477	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.97E-08	3.97E-08
n-Eicosane	155.7187477	ND	78	155	ND	0	159	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
C20 as Eicosane	155.7187477	ND	78	155	ND	0	159	ND	0	78	0.08	9	40	3.96E-08	3.96E-08
n-Heneicosane	157.1874977	ND	79	156	ND	0	161	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
C21 as Heneicosane	157.1874977	ND	79	156	ND	0	161	ND	0	79	0.08	9	40	4.00E-08	4.00E-08
n-Docosane	155.4062477	ND	78	154	ND	0	159	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
C22 as Docosane	155.4062477	ND	78	154	ND	0	159	ND	0	78	0.08	9	40	3.95E-08	3.95E-08
n-Tricosane	156.2499977	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
C23 as Tricosane	156.2499977	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
n-Tetracosane	156.4687477	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
C24 as Tetracosane	156.4687477	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	3.98E-08	3.98E-08
Total Hydrocarbon			78,978			0			0		78.98	8708	40,190	4.02E-05	4.02E-05

Bagging Data Form — Vacuum Method

Sample Id: E068

Equipment type:	Valve	**Component ID:**	E-16
Equipment Subtype:	Globe	**Unit:**	Refinery E
Line Size:	2 *inches*	**Date:**	8-Oct-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.73 *inHg* / 755.1 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	85.6 *°F* / 29.8 *°C*	**TVA ID**	36502
Component Temp:	364 *°F* / 184.4 *°C*	**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*HCRF*		

WSPA Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
10:29	Background	0 *ppmv*	8-sec Dwell	120 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	233 *ppm*
11:06	Initial Bag Vacuum	0.045 *inches H2O*	DGM Vac.	2 *inches H2O*	Bag Temp	93.7 *°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	11:08	11:10	11:12	11:14	11:16	11:18	11:20	11:22	11:24	11:26	11:37			
ppmv	60	99.1	111	122	133	138	149	153	157	165	162			

Sorbent Tube Sample Collection Parameters

E068A

Time						
11:27	Volume Start	615.2 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:40	Volume Stop	628.0 *Liters*	Total Vol	12.8 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.985 *L/min*	$Sorbent\ Flow_{STP}$	0.943 *L/min*

E068B

11:27	Volume Start	603.9 *Liters*		Design Sample Flow Rate = 1 liter/min		
11:40	Volume Stop	616.8 *Liters*	Total Vol	12.9 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.992 *L/min*	$Sorbent\ Flow_{STP}$	0.951 *L/min*
	$Total\ ST\ Vol_{STP}$	24.62 *Liters*	$DGM\ Vol_{STP}$	83.03 *Liters*	$Total\ Run\ Vol_{STP}$	107.65 *Liters*

Bagging Parameters

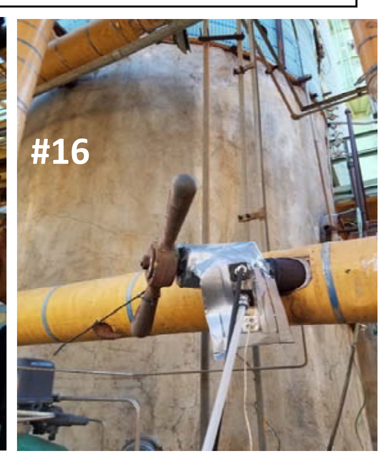
Time								
11:29	Vacuum check	0.04 *inches H2O*			DGM_P	2 *inches H2O vacuum*		751.4 *mmHg*
11:31	DGM_{10L} Time	01:29.8 *min:sec.frac*	DGM Time	1.500	DGM Flow	6.67	$DGM\ Flow_{STP}$	6.39 *liters/minute*
11:29	Bag Temp.	101.8 *°F*	38.8 *°C*		$Sample_T$	87 *°F*		30.6 *°C*

Post-Sample Data

11:47	Post Test M21	Background 17 *ppmv*	8-sec Dwell	98 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	302 *ppm*
							Leak @	Packing

Condensate accumulation: starting time	N/A *hour:min*	Final time	N/A *hour:min*	0:00 *hours:min*
Organic condensate collected	N/A *ml*			
Density of organic condensate	N/A *g/ml*			

Average THC emissions =	2.77E-04 kg/hr
Percent difference THC ER =	9%
Acceptable?	Yes



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.78E-08
C5 as Pentane	2.78E-08
n-Hexane	3.99E-08
C6 as Hexane	3.99E-08
n-Heptane	3.31E-08
C7 as Heptane	3.31E-08
n-Octane	2.87E-08
C8 as Octane	6.49E-06
n-Nonane	5.97E-07
C9 as Nonane	3.85E-05
n-Decane	2.56E-06
C10 as Decane	6.54E-05
n-Undecane	7.36E-06
C11 as Undecane	7.35E-05
n-Dodecane	5.58E-06
C12 as Dodecane	4.41E-05
n-Tridecane	3.90E-06
C13 as Tridecane	1.84E-05
n-Tetradecane	2.14E-06
C14 as tetradecane	5.32E-06
n-Pentadecane	8.06E-07
C15 as Pentadecane	1.07E-06
n-Hexadecane	9.64E-08
C16 as Hexadecane	2.89E-08
n-Heptadecane	2.86E-08
C17 as Heptadecane	4.44E-08
n-Octadecane	2.89E-08
C18 as Octodecane	2.89E-08
n-Nonadecane	2.89E-08
C19 as Nonadecane	2.89E-08
n-Eicosane	2.89E-08
C20 as Eicosane	2.89E-08
n-Heneicosane	2.91E-08
C21 as Heneicosane	2.91E-08
n-Docosane	2.88E-08
C22 as Docosane	2.88E-08
n-Tricosane	2.90E-08
C23 as Tricosane	2.90E-08
n-Tetracosane	2.90E-08
C24 as Tetracosane	2.90E-08
Total Hydrocarbon	2.77E-04

THC:	1.46E-02	lbs/day	2.67E-03	tons/yr

E068A	ANALYTICAL RESULTS E068A		ND Adj	BACKGROUND E069A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.0500	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C5 as Pentane	75.0500	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Hexane	107.5437	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	27	2.67E-08	0	0	0.00E+00	2.67E-08
C6 as Hexane	107.5437	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	27	2.67E-08	0	0	0.00E+00	2.67E-08
n-Heptane	89.3437	ND	45	175.94	ND	0	183	ND	0	45	0.04	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
C7 as Heptane	89.3437	ND	45	175.94	ND	0	183	ND	0	45	0.04	5	22	2.22E-08	0	0	0.00E+00	2.22E-08
n-Octane	77.3125	ND	39	152.25	ND	0	158	ND	0	39	0.04	4	19	1.92E-08	0	0	0.00E+00	1.92E-08
C8 as Octane	#########		11,934	152.25	ND	0	158	ND	0	11,934	11.93	1285	5930	5.93E-06	0	0	0.00E+00	5.93E-06
n-Nonane	1665.9616		1,666	153.38	ND	0	160	ND	0	1,666	1.67	179	828	8.28E-07	0	0	0.00E+00	8.28E-07
C9 as Nonane	#########		73,697	153.38	ND	0	160	ND	0	73,697	73.70	7934	36618	3.66E-05	0	0	0.00E+00	3.66E-05
n-Decane	5709.0227		5,709	154.77	ND	0	161	ND	0	5,709	5.71	615	2837	2.84E-06	0	0	0.00E+00	2.84E-06
C10 as Decane	#########		123,725	154.77	ND	0	161	ND	0	123,725	123.73	13319	61474	6.15E-05	0	0	0.00E+00	6.15E-05
n-Undecane	#########		14,848	154.37	ND	0	161	ND	0	14,848	14.85	1598	7377	7.38E-06	0	0	0.00E+00	7.38E-06
C11 as Undecane	#########		145,128	154.37	ND	0	161	ND	0	145,128	145.13	15624	72109	7.21E-05	0	0	0.00E+00	7.21E-05
n-Dodecane	9403.3939		9,403	153.32	ND	0	159	ND	0	9,403	9.40	1012	4672	4.67E-06	0	0	0.00E+00	4.67E-06
C12 as Dodecane	#########		85,037	153.32	ND	0	159	ND	0	85,037	85.04	9155	42252	4.23E-05	0	0	0.00E+00	4.23E-05
n-Tridecane	9037.9721		9,038	153.69	ND	0	160	ND	0	9,038	9.04	973	4491	4.49E-06	0	0	0.00E+00	4.49E-06
C13 as Tridecane	#########		33,578	153.69	ND	0	160	ND	0	33,578	33.58	3615	16684	1.67E-05	0	0	0.00E+00	1.67E-05
n-Tetradecane	3748.6249		3,749	153.54	ND	0	160	ND	0	3,749	3.75	404	1863	1.86E-06	0	0	0.00E+00	1.86E-06
C14 as tetradecane	#########		10,005	153.54	ND	0	160	ND	0	10,005	10.01	1077	4971	4.97E-06	0	0	0.00E+00	4.97E-06
n-Pentadecane	1206.5372		1,207	154.31	ND	0	160	ND	0	1,207	1.21	130	599	5.99E-07	0	0	0.00E+00	5.99E-07
C15 as Pentadecane	1758.4413		1,758	154.31	ND	0	160	ND	0	1,758	1.76	189	874	8.74E-07	0	0	0.00E+00	8.74E-07
n-Hexadecane	161.6131	J	162	153.48	ND	0	160	ND	0	162	0.16	17	80	8.03E-08	0	0	0.00E+00	8.03E-08
C16 as Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Heptadecane	77.0312	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C17 as Heptadecane	102.1776	J	102	151.69	ND	0	158	ND	0	102	0.10	11	51	5.08E-08	0	0	0.00E+00	5.08E-08
n-Octadecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C18 as Octodecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Nonadecane	78.0469	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C19 as Nonadecane	78.0469	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C20 as Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Heneicosane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C21 as Heneicosane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
C22 as Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.93E-08	0	0	0.00E+00	1.93E-08
n-Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C23 as Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C24 as Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
Total Hydrocarbon			531,682			0			0		531.68	57237	264,173	2.64E-04	0	0	0.00E+00	2.64E-04

E068B	ANALYTICAL RESULTS E068B		ND Adj	BACKGROUND E069A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.93644	ND	74	148	ND	0	154	ND	0	74	0.07	8	37	3.70E-08	3.70E-08
C5 as Pentane	148.93644	ND	74	148	ND	0	154	ND	0	74	0.07	8	37	3.70E-08	3.70E-08
n-Hexane	213.42016	ND	107	212	ND	0	220	ND	0	107	0.11	11	53	5.30E-08	5.30E-08
C6 as Hexane	213.42016	ND	107	212	ND	0	220	ND	0	107	0.11	11	53	5.30E-08	5.30E-08
n-Heptane	177.30233	ND	89	176	ND	0	183	ND	0	89	0.09	10	44	4.40E-08	4.40E-08
C7 as Heptane	177.30233	ND	89	176	ND	0	183	ND	0	89	0.09	10	44	4.40E-08	4.40E-08
n-Octane	153.42636	ND	77	152	ND	0	158	ND	0	77	0.08	8	38	3.81E-08	3.81E-08
C8 as Octane	14177.802		14,178	152	ND	0	158	ND	0	14,178	14.18	1526	7044	7.04E-06	7.04E-06
n-Nonane	738.62228	J	739	153	ND	0	160	ND	0	739	0.74	80	367	3.67E-07	3.67E-07
C9 as Nonane	81358.332		81,358	153	ND	0	160	ND	0	81,358	81.36	8759	40424	4.04E-05	4.04E-05
n-Decane	4597.9173		4,598	155	ND	0	161	ND	0	4,598	4.60	495	2285	2.28E-06	2.28E-06
C10 as Decane	139435.54		139,436	155	ND	0	161	ND	0	139,436	139.44	15011	69280	6.93E-05	6.93E-05
n-Undecane	14767.932		14,768	154	ND	0	161	ND	0	14,768	14.77	1590	7338	7.34E-06	7.34E-06
C11 as Undecane	150749.62		150,750	154	ND	0	161	ND	0	150,750	150.75	16229	74902	7.49E-05	7.49E-05
n-Dodecane	13051.41		13,051	153	ND	0	159	ND	0	13,051	13.05	1405	6485	6.48E-06	6.48E-06
C12 as Dodecane	92523.924		92,524	153	ND	0	159	ND	0	92,524	92.52	9961	45972	4.60E-05	4.60E-05
n-Tridecane	6660.8301		6,661	154	ND	0	160	ND	0	6,661	6.66	717	3310	3.31E-06	3.31E-06
C13 as Tridecane	40550.682		40,551	154	ND	0	160	ND	0	40,551	40.55	4365	20148	2.01E-05	2.01E-05
n-Tetradecane	4875.4332		4,875	154	ND	0	160	ND	0	4,875	4.88	525	2422	2.42E-06	2.42E-06
C14 as tetradecane	11425.495		11,425	154	ND	0	160	ND	0	11,425	11.43	1230	5677	5.68E-06	5.68E-06
n-Pentadecane	2038.1934		2,038	154	ND	0	160	ND	0	2,038	2.04	219	1013	1.01E-06	1.01E-06
C15 as Pentadecane	2558.8238		2,559	154	ND	0	160	ND	0	2,559	2.56	275	1271	1.27E-06	1.27E-06
n-Hexadecane	226.48844	J	226	153	ND	0	160	ND	0	226	0.23	24	113	1.13E-07	1.13E-07
C16 as Hexadecane	154.66667	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.84E-08	3.84E-08
n-Heptadecane	152.86822	ND	76	152	ND	0	158	ND	0	76	0.08	8	38	3.80E-08	3.80E-08
C17 as Heptadecane	152.86822	ND	76	152	ND	0	158	ND	0	76	0.08	8	38	3.80E-08	3.80E-08
n-Octadecane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.84E-08	3.84E-08
C18 as Octodecane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.84E-08	3.84E-08
n-Nonadecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.85E-08	3.85E-08
C19 as Nonadecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.85E-08	3.85E-08
n-Eicosane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.84E-08	3.84E-08
C20 as Eicosane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.84E-08	3.84E-08
n-Heneicosane	155.969	ND	78	155	ND	0	161	ND	0	78	0.08	8	39	3.87E-08	3.87E-08
C21 as Heneicosane	155.969	ND	78	155	ND	0	161	ND	0	78	0.08	8	39	3.87E-08	3.87E-08
n-Docosane	154.20155	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.83E-08	3.83E-08
C22 as Docosane	154.20155	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.83E-08	3.83E-08
n-Tricosane	155.03876	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
C23 as Tricosane	155.03876	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.85E-08	3.85E-08
n-Tetracosane	155.25582	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
C24 as Tetracosane	155.25582	ND	78	154	ND	0	160	ND	0	78	0.08	8	39	3.86E-08	3.86E-08
Total Hydrocarbon			581,668			0			0		581.67	62619	289,009	2.89E-04	2.89E-04

Bagging Data Form	Vacuum Method	Sample Id	E070
Equipment type:	Connector	Component ID:	E-68
Equipment Subtype:	Bull Plug	Unit:	Refinery E
Line Size:	1 inches	Date:	9-Oct-18
Phase (G, LL, HL):	HL	Analysis team:	EG/DR
Barometric pressure	29.74 inHg / 755.4 mmHg	Sample Pump A	LP52979
		Sample Pump B	LP52975
Ambient Temp:	87.7 °F / 30.9 °C	TVA ID	36502
Component Temp:	148 °F / 64.4 °C	Stream Pressure/Temp:	psig / °F
Stream Description:	LGO to R-402 B		

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
10:17	Background	12	ppmv	8-sec Dwell	21	ppmv	Total Dwell	1:30	min:sec	Final M21	211 ppm
10:46	Initial Bag Vacuum	0.04	inches H2O	DGM Vac.	2	inches H2O	Bag Temp	133.9	°F	Leak @	Threaded Connection

Bag Concentrations (ppmv) (had to vent bag)

Time	10:47	10:49	10:51	10:53	10:55	10:57	10:59	11:00	11:07	11:11				
ppmv	31.9	44.2	54.8	72.9	81.9	87.3	88.9	87	91	98.6				

Sorbent Tube Sample Collection Parameters

E070A

Time									
11:00	Volume Start	629.8	Liters		Design Sample Flow Rate = 1 liter/min				
11:13	Volume Stop	642.6	Liters	Total Vol	12.8	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.985 L/min	Sorbent Flow$_{STP}$	0.940	L/min

E070B

11:00	Volume Start	619.5	Liters		Design Sample Flow Rate = 1 liter/min				
11:13	Volume Stop	632.4	Liters	Total Vol	12.9	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.992 L/min	Sorbent Flow$_{STP}$	0.948	L/min
	Total ST Vol$_{STP}$	24.54	Liters	DGM Vol$_{STP}$	80.96	Liters	Total Run Vol$_{STP}$	105.50	Liters

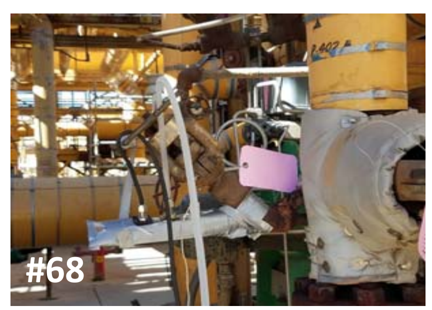
Bagging Parameters

Time											
11:02	Vacuum check	0.04	inches H2O			DGM$_P$	2	inches H2O vacuum	751.7	mmHg
11:04	DGM$_{10L}$ Time	01:31.5	min:sec.frac	DGM Time	1.533	DGM Flow	6.52	DGM Flow$_{STP}$	6.23	liters/minute
11:02	Bag Temp.	140.4	°F	60.2	°C	Sample$_T$	89	°F	31.7	°C

Post-Sample Data

11:22	Post Test M21	Background	11	ppmv	8-sec Dwell	2710	ppmv	Total Dwell	1:00 min:sec	Final M21 3942 ppm
										Leak @ Threaded Connection
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A	hour:min		0:00 hours:min	
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions =	1.44E-04	kg/hr
Percent difference THC ER =	16%	
Acceptable?	Yes	



AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.73E-08
C5 as Pentane	2.73E-08
n-Hexane	3.91E-08
C6 as Hexane	3.91E-08
n-Heptane	3.25E-08
C7 as Heptane	3.25E-08
n-Octane	2.81E-08
C8 as Octane	5.04E-06
n-Nonane	6.51E-07
C9 as Nonane	2.71E-05
n-Decane	1.49E-06
C10 as Decane	3.72E-05
n-Undecane	3.96E-06
C11 as Undecane	3.70E-05
n-Dodecane	2.10E-06
C12 as Dodecane	1.84E-05
n-Tridecane	1.80E-06
C13 as Tridecane	5.46E-06
n-Tetradecane	7.19E-07
C14 as tetradecane	1.70E-06
n-Pentadecane	3.54E-07
C15 as Pentadecane	4.06E-07
n-Hexadecane	3.97E-08
C16 as Hexadecane	2.83E-08
n-Heptadecane	2.80E-08
C17 as Heptadecane	2.80E-08
n-Octadecane	2.83E-08
C18 as Octodecane	2.83E-08
n-Nonadecane	2.84E-08
C19 as Nonadecane	2.84E-08
n-Eicosane	2.83E-08
C20 as Eicosane	2.83E-08
n-Heneicosane	2.86E-08
C21 as Heneicosane	2.86E-08
n-Docosane	2.82E-08
C22 as Docosane	2.82E-08
n-Tricosane	2.84E-08
C23 as Tricosane	2.84E-08
n-Tetracosane	2.84E-08
C24 as Tetracosane	2.84E-08
Total Hydrocarbon	1.44E-04

THC:	7.63E-03	lbs/day	1.39E-03	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E070A	E070A		ND Adj	E071A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.0500	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C5 as Pentane	75.0500	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Hexane	107.5437	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	26	2.62E-08	0	0	0.00E+00	2.62E-08
C6 as Hexane	107.5437	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	26	2.62E-08	0	0	0.00E+00	2.62E-08
n-Heptane	89.3437	ND	45	175.94	ND	0	183	ND	0	45	0.04	5	22	2.18E-08	0	0	0.00E+00	2.18E-08
C7 as Heptane	89.3437	ND	45	175.94	ND	0	183	ND	0	45	0.04	5	22	2.18E-08	0	0	0.00E+00	2.18E-08
n-Octane	77.3125	ND	39	152.25	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C8 as Octane	9439.2906		9,439	152.25	ND	0	158	ND	0	9,439	9.44	996	4596	4.60E-06	0	0	0.00E+00	4.60E-06
n-Nonane	1251.5148		1,252	153.38	ND	0	160	ND	0	1,252	1.25	132	609	6.09E-07	0	0	0.00E+00	6.09E-07
C9 as Nonane	#########		51,057	153.38	ND	0	160	ND	0	51,057	51.06	5386	24861	2.49E-05	0	0	0.00E+00	2.49E-05
n-Decane	2865.6610		2,866	154.77	ND	0	161	ND	0	2,866	2.87	302	1395	1.40E-06	0	0	0.00E+00	1.40E-06
C10 as Decane	#########		70,723	154.77	ND	0	161	ND	0	70,723	70.72	7461	34436	3.44E-05	0	0	0.00E+00	3.44E-05
n-Undecane	7514.0281		7,514	154.37	ND	0	161	ND	0	7,514	7.51	793	3659	3.66E-06	0	0	0.00E+00	3.66E-06
C11 as Undecane	#########		69,526	154.37	ND	0	161	ND	0	69,526	69.53	7335	33853	3.39E-05	0	0	0.00E+00	3.39E-05
n-Dodecane	4005.5110		4,006	153.32	ND	0	159	ND	0	4,006	4.01	423	1950	1.95E-06	0	0	0.00E+00	1.95E-06
C12 as Dodecane	#########		33,910	153.32	ND	0	159	ND	0	33,910	33.91	3577	16511	1.65E-05	0	0	0.00E+00	1.65E-05
n-Tridecane	3327.5009		3,328	153.69	ND	0	160	ND	0	3,328	3.33	351	1620	1.62E-06	0	0	0.00E+00	1.62E-06
C13 as Tridecane	#########		10,225	153.69	ND	0	160	ND	0	10,225	10.23	1079	4979	4.98E-06	0	0	0.00E+00	4.98E-06
n-Tetradecane	1428.3183		1,428	153.54	ND	0	160	ND	0	1,428	1.43	151	695	6.95E-07	0	0	0.00E+00	6.95E-07
C14 as tetradecane	3930.6471		3,931	153.54	ND	0	160	ND	0	3,931	3.93	415	1914	1.91E-06	0	0	0.00E+00	1.91E-06
n-Pentadecane	725.4010	J	725	154.31	ND	0	160	ND	0	725	0.73	77	353	3.53E-07	0	0	0.00E+00	3.53E-07
C15 as Pentadecane	1043.0683		1,043	154.31	ND	0	160	ND	0	1,043	1.04	110	508	5.08E-07	0	0	0.00E+00	5.08E-07
n-Hexadecane	85.6142	J	86	153.48	ND	0	160	ND	0	86	0.09	9	42	4.17E-08	0	0	0.00E+00	4.17E-08
C16 as Hexadecane	77.9375	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heptadecane	77.0312	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C17 as Heptadecane	77.0312	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Octadecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C18 as Octodecane	77.8906	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Nonadecane	78.0469	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C19 as Nonadecane	78.0469	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C20 as Eicosane	77.8594	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Heneicosane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane	78.5937	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	77.7031	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	78.1250	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C24 as Tetracosane	78.2344	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
Total Hydrocarbon			272,031			0			0		272.03	28699	132,456	1.32E-04	0	0	0.00E+00	1.32E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E070B	E070B		ND Adj	E071A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.93644	ND	74	148	ND	0	154	ND	0	74	0.07	8	36	3.63E-08	3.63E-08
C5 as Pentane	148.93644	ND	74	148	ND	0	154	ND	0	74	0.07	8	36	3.63E-08	3.63E-08
n-Hexane	213.42016	ND	107	212	ND	0	220	ND	0	107	0.11	11	52	5.20E-08	5.20E-08
C6 as Hexane	213.42016	ND	107	212	ND	0	220	ND	0	107	0.11	11	52	5.20E-08	5.20E-08
n-Heptane	177.30233	ND	89	176	ND	0	183	ND	0	89	0.09	9	43	4.32E-08	4.32E-08
C7 as Heptane	177.30233	ND	89	176	ND	0	183	ND	0	89	0.09	9	43	4.32E-08	4.32E-08
n-Octane	153.42636	ND	77	152	ND	0	158	ND	0	77	0.08	8	37	3.74E-08	3.74E-08
C8 as Octane	11269.335		11,269	152	ND	0	158	ND	0	11,269	11.27	1189	5487	5.49E-06	5.49E-06
n-Nonane	1424.0006	J	1,424	153	ND	0	160	ND	0	1,424	1.42	150	693	6.93E-07	6.93E-07
C9 as Nonane	60290.913		60,291	153	ND	0	160	ND	0	60,291	60.29	6361	29357	2.94E-05	2.94E-05
n-Decane	3262.9449		3,263	155	ND	0	161	ND	0	3,263	3.26	344	1589	1.59E-06	1.59E-06
C10 as Decane	82117.224		82,117	155	ND	0	161	ND	0	82,117	82.12	8663	39984	4.00E-05	4.00E-05
n-Undecane	8737.5231		8,738	154	ND	0	161	ND	0	8,738	8.74	922	4254	4.25E-06	4.25E-06
C11 as Undecane	82548.692		82,549	154	ND	0	161	ND	0	82,549	82.55	8709	40194	4.02E-05	4.02E-05
n-Dodecane	4632.4105		4,632	153	ND	0	159	ND	0	4,632	4.63	489	2256	2.26E-06	2.26E-06
C12 as Dodecane	41603.21		41,603	153	ND	0	159	ND	0	41,603	41.60	4389	20257	2.03E-05	2.03E-05
n-Tridecane	4072.0089		4,072	154	ND	0	160	ND	0	4,072	4.07	430	1983	1.98E-06	1.98E-06
C13 as Tridecane	12195.302		12,195	154	ND	0	160	ND	0	12,195	12.20	1287	5938	5.94E-06	5.94E-06
n-Tetradecane	1527.0058	J	1,527	154	ND	0	160	ND	0	1,527	1.53	161	744	7.44E-07	7.44E-07
C14 as tetradecane	3046.7433		3,047	154	ND	0	160	ND	0	3,047	3.05	321	1484	1.48E-06	1.48E-06
n-Pentadecane	729.09124	J	729	154	ND	0	160	ND	0	729	0.73	77	355	3.55E-07	3.55E-07
C15 as Pentadecane	626.03713	J	626	154	ND	0	160	ND	0	626	0.63	66	305	3.05E-07	3.05E-07
n-Hexadecane	154.66667	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C16 as Hexadecane	154.66667	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Heptadecane	152.86822	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
C17 as Heptadecane	152.86822	ND	76	152	ND	0	158	ND	0	76	0.08	8	37	3.72E-08	3.72E-08
n-Octadecane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C18 as Octodecane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Nonadecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
C19 as Nonadecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	8	38	3.77E-08	3.77E-08
n-Eicosane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C20 as Eicosane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
n-Heneicosane	155.969	ND	78	155	ND	0	161	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C21 as Heneicosane	155.969	ND	78	155	ND	0	161	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Docosane	154.20155	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
C22 as Docosane	154.20155	ND	77	153	ND	0	159	ND	0	77	0.08	8	38	3.75E-08	3.75E-08
n-Tricosane	155.03876	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C23 as Tricosane	155.03876	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Tetracosane	155.25582	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C24 as Tetracosane	155.25582	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
Total Hydrocarbon			320,091			0			0		320.09	33769	155,857	1.56E-04	1.56E-04

Bagging Data Form — Vacuum Method

Sample Id: E072

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	E-813	
Equipment Subtype:	Gate		**Unit:**	Refinery E	
Line Size:	8 *inches*		**Date:**	5-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.85 *inHg*	758.2 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	86 *°F*	30.0 *°C*	**TVA ID**	37887	
Component Temp:	317 *°F*	158.3 *°C*	**Stream Pressure/Temp:**	40 *psig*	*°F*
Stream Description:	*MPA to T-903 from E-903*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
11:36	Background	-11 *ppmv*	8-sec Dwell	1 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	21 *ppm*
12:17	Initial Bag Vacuum	0.01 *inches H2O*	DGM Vac.	1.8 *inches H2O*	Bag Temp	150.3 *°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	12:20	12:23	12:25	12:27	12:33	12:36								
ppmv	32.6	40	35.9	35.8	24.4	28.4								

Sorbent Tube Sample Collection Parameters

E072A

Time						
12:27	Volume Start	655.4 *Liters*		Design Sample Flow Rate = 1 liter/min		
12:40	Volume Stop	668.1 *Liters*	Total Vol	12.7 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.977 *L/min*	Sorbent Flow$_{STP}$	0.956 *L/min*

E072B

12:27	Volume Start	647.6 *Liters*		Design Sample Flow Rate = 1 liter/min		
12:40	Volume Stop	660.4 *Liters*	Total Vol	12.8 *Liters*		
	Sample Run Time	13 *Minutes*		Sorbent Flow 0.985 *L/min*	Sorbent Flow$_{STP}$	0.963 *L/min*
	Total ST Vol$_{STP}$	24.95 *Liters*	DGM Vol$_{STP}$	79.51 *Liters*	Total Run Vol$_{STP}$	104.46 *Liters*

Bagging Parameters

Time								
12:28	Vacuum check	0.015 *inches H2O*			DGM$_P$	1.8 *inches H2O vacuum*	754.8 *mmHg*
12:32	DGM$_{10L}$ Time	01:36.2 *min:sec.frac*	DGM Time	1.600	DGM Flow	6.25	DGM Flow$_{STP}$	6.12 *liters/minute*
12:29	Bag Temp.	165.7 *°F*	74.3 *°C*		Sample$_T$	78 *°F*		25.6 *°C*

Post-Sample Data

12:48	Post Test M21	Background -17 *ppmv*	8-sec Dwell	6 *ppmv*	Total Dwell	2:30 *min:sec*	Final M21	46 *ppm*
							Leak @	Packing
Condensate accumulation: starting time		N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*		
Organic condensate collected		N/A *ml*						
Density of organic condensate		N/A *g/ml*						

Average THC emissions = 1.58E-05 kg/hr
Percent difference THC ER = 32%

Acceptable? No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.72E-08
C5 as Pentane	2.72E-08
n-Hexane	3.90E-08
C6 as Hexane	3.90E-08
n-Heptane	3.24E-08
C7 as Heptane	1.26E-05
n-Octane	2.80E-08
C8 as Octane	4.64E-08
n-Nonane	2.82E-08
C9 as Nonane	5.59E-08
n-Decane	2.85E-08
C10 as Decane	2.55E-07
n-Undecane	2.84E-08
C11 as Undecane	2.35E-07
n-Dodecane	1.17E-07
C12 as Dodecane	2.43E-07
n-Tridecane	1.16E-07
C13 as Tridecane	5.43E-07
n-Tetradecane	2.16E-07
C14 as tetradecane	3.39E-07
n-Pentadecane	8.85E-08
C15 as Pentadecane	5.65E-08
n-Hexadecane	2.83E-08
C16 as Hexadecane	2.83E-08
n-Heptadecane	2.79E-08
C17 as Heptadecane	2.79E-08
n-Octadecane	2.82E-08
C18 as Octodecane	2.82E-08
n-Nonadecane	2.83E-08
C19 as Nonadecane	2.83E-08
n-Eicosane	2.82E-08
C20 as Eicosane	2.82E-08
n-Heneicosane	2.85E-08
C21 as Heneicosane	2.85E-08
n-Docosane	2.82E-08
C22 as Docosane	2.82E-08
n-Tricosane	2.83E-08
C23 as Tricosane	1.09E-07
n-Tetracosane	2.84E-08
C24 as Tetracosane	2.84E-08
Total Hydrocarbon	1.58E-05

THC: 8.36E-04 lbs/day 1.53E-04 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E072A	E072A		ND Adj	E073A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	75.6409	ND	38	147.79	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	108.3906	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
C6 as Hexane	108.3906	ND	54	211.78	ND	0	220	ND	0	54	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
n-Heptane	90.0472	ND	45	175.94	ND	0	183	ND	0	45	0.05	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
C7 as Heptane	#########		19,990	175.94	ND	0	183	ND	0	19,990	19.99	2088	9637	9.64E-06	0	0	0.00E+00	9.64E-06
n-Octane	77.9213	ND	39	152.25	ND	0	158	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C8 as Octane	115.2813	J	115	152.25	ND	0	158	ND	0	115	0.12	12	56	5.56E-08	0	0	0.00E+00	5.56E-08
n-Nonane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C9 as Nonane	153.9756	J	154	153.38	ND	0	160	ND	0	154	0.15	16	74	7.42E-08	0	0	0.00E+00	7.42E-08
n-Decane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C10 as Decane	564.5444	J	565	154.77	ND	0	161	ND	0	565	0.56	59	272	2.72E-07	0	0	0.00E+00	2.72E-07
n-Undecane	79.0079	ND	40	154.37	ND	0	161	ND	0	40	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C11 as Undecane	609.9764	J	610	154.37	ND	0	161	ND	0	610	0.61	64	294	2.94E-07	0	0	0.00E+00	2.94E-07
n-Dodecane	198.8107	J	199	153.32	ND	0	159	ND	0	199	0.20	21	96	9.59E-08	0	0	0.00E+00	9.59E-08
C12 as Dodecane	553.5050	J	554	153.32	ND	0	159	ND	0	554	0.55	58	267	2.67E-07	0	0	0.00E+00	2.67E-07
n-Tridecane	279.1154	J	279	153.69	ND	0	160	ND	0	279	0.28	29	135	1.35E-07	0	0	0.00E+00	1.35E-07
C13 as Tridecane	1595.8857		1,596	153.69	ND	0	160	ND	0	1,596	1.60	167	769	7.69E-07	0	0	0.00E+00	7.69E-07
n-Tetradecane	553.5078	J	554	153.54	ND	0	160	ND	0	554	0.55	58	267	2.67E-07	0	0	0.00E+00	2.67E-07
C14 as tetradecane	1064.0694		1,064	153.54	ND	0	160	ND	0	1,064	1.06	111	513	5.13E-07	0	0	0.00E+00	5.13E-07
n-Pentadecane	191.4751	J	191	154.31	ND	0	160	ND	0	191	0.19	20	92	9.23E-08	0	0	0.00E+00	9.23E-08
C15 as Pentadecane	156.1450	J	156	154.31	ND	0	160	ND	0	156	0.16	16	75	7.53E-08	0	0	0.00E+00	7.53E-08
n-Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C16 as Hexadecane	78.5512	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C17 as Heptadecane	77.6378	ND	39	151.69	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Octadecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C18 as Octodecane	78.5039	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C19 as Nonadecane	78.6614	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C20 as Eicosane	78.4724	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
C21 as Heneicosane	79.2126	ND	40	154.77	ND	0	161	ND	0	40	0.04	4	19	1.91E-08	0	0	0.00E+00	1.91E-08
n-Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C22 as Docosane	78.3150	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tricosane	78.7402	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C23 as Tricosane	375.7477	J	376	153.85	ND	0	160	ND	0	376	0.38	39	181	1.81E-07	0	0	0.00E+00	1.81E-07
n-Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C24 as Tetracosane	78.8504	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
Total Hydrocarbon			27,456			0			0		27.46	2868	13,237	1.32E-05	0	0	0.00E+00	1.32E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E072B	E072B		ND Adj	E073A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	148	ND	0	154	ND	0	75	0.08	8	36	3.62E-08	3.62E-08
C5 as Pentane	150.1	ND	75	148	ND	0	154	ND	0	75	0.08	8	36	3.62E-08	3.62E-08
n-Hexane	215.0875	ND	108	212	ND	0	220	ND	0	108	0.11	11	52	5.18E-08	5.18E-08
C6 as Hexane	215.0875	ND	108	212	ND	0	220	ND	0	108	0.11	11	52	5.18E-08	5.18E-08
n-Heptane	178.6875	ND	89	176	ND	0	183	ND	0	89	0.09	9	43	4.31E-08	4.31E-08
C7 as Heptane	32358.344		32,358	176	ND	0	183	ND	0	32,358	32.36	3380	15601	1.56E-05	1.56E-05
n-Octane	154.625	ND	77	152	ND	0	158	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C8 as Octane	154.625	ND	77	152	ND	0	158	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Nonane	155.78125	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C9 as Nonane	155.78125	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Decane	157.1875	ND	79	155	ND	0	161	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C10 as Decane	492.92742	J	493	155	ND	0	161	ND	0	493	0.49	51	238	2.38E-07	2.38E-07
n-Undecane	156.78125	ND	78	154	ND	0	161	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C11 as Undecane	365.5982	J	366	154	ND	0	161	ND	0	366	0.37	38	176	1.76E-07	1.76E-07
n-Dodecane	286.57354	J	287	153	ND	0	159	ND	0	287	0.29	30	138	1.38E-07	1.38E-07
C12 as Dodecane	455.07418	J	455	153	ND	0	159	ND	0	455	0.46	48	219	2.19E-07	2.19E-07
n-Tridecane	201.73499	J	202	154	ND	0	160	ND	0	202	0.20	21	97	9.73E-08	9.73E-08
C13 as Tridecane	654.71001	J	655	154	ND	0	160	ND	0	655	0.65	68	316	3.16E-07	3.16E-07
n-Tetradecane	344.55464	J	345	154	ND	0	160	ND	0	345	0.34	36	166	1.66E-07	1.66E-07
C14 as tetradecane	343.76772	J	344	154	ND	0	160	ND	0	344	0.34	36	166	1.66E-07	1.66E-07
n-Pentadecane	175.5017	J	176	154	ND	0	160	ND	0	176	0.18	18	85	8.46E-08	8.46E-08
C15 as Pentadecane	156.71875	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Hexadecane	155.875	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C16 as Hexadecane	155.875	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Heptadecane	154.0625	ND	77	152	ND	0	158	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
C17 as Heptadecane	154.0625	ND	77	152	ND	0	158	ND	0	77	0.08	8	37	3.71E-08	3.71E-08
n-Octadecane	155.78125	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C18 as Octodecane	155.78125	ND	78	153	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Nonadecane	156.09375	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C19 as Nonadecane	156.09375	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Eicosane	155.71875	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.75E-08	3.75E-08
C20 as Eicosane	155.71875	ND	78	153	ND	0	159	ND	0	78	0.08	8	38	3.75E-08	3.75E-08
n-Heneicosane	157.1875	ND	79	155	ND	0	161	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
C21 as Heneicosane	157.1875	ND	79	155	ND	0	161	ND	0	79	0.08	8	38	3.79E-08	3.79E-08
n-Docosane	155.40625	ND	78	153	ND	0	159	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
C22 as Docosane	155.40625	ND	78	153	ND	0	159	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
n-Tricosane	156.25	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C23 as Tricosane	156.25	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Tetracosane	156.46875	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C24 as Tetracosane	156.46875	ND	78	154	ND	0	160	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
Total Hydrocarbon			38,082			0			0		38.08	3978	18,360	1.84E-05	1.84E-05

Bagging Data Form — Vacuum Method

Sample Id: E074

WSPA — Western States Petroleum Association

Equipment type:	Valve			**Component ID:**	E-1117	
Equipment Subtype:	MOV			**Unit:**	Refinery E	
Line Size:	10 inches			**Date:**	5-Nov-18	
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR	
Barometric pressure	29.81 inHg	757.2 mmHg		**Sample Pump A**	LP52979	
				Sample Pump B	LP52975	
Ambient Temp:	80.2 °F	26.8 °C		**TVA ID**	37887	
Component Temp:	94 °F	34.4 °C		**Stream Pressure/Temp:**	10 psig	°F
Stream Description:	*Sludge*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
13:15	Background	-1	ppmv	8-sec Dwell	0	ppmv	Total Dwell	5:00	min:sec	Final M21	24 ppm
14:14	Initial Bag Vacuum	0.005	inches H2O	DGM Vac.	1.6	inches H2O	Bag Temp		°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	14:19	14:20	14:22	14:24	14:36	14:38
ppmv	8	10.3	10.6	10.5	11.8	11.8

Sorbent Tube Sample Collection Parameters

E074A

Time									
14:26	Volume Start	668.1	Liters		Design Sample Flow Rate = 1 liter/min				
14:39	Volume Stop	681.0	Liters	Total Vol	12.9	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.992 L/min	Sorbent Flow$_{STP}$	0.976	L/min

E074B

Time									
14:26	Volume Start	660.4	Liters		Design Sample Flow Rate = 1 liter/min				
14:39	Volume Stop	673.3	Liters	Total Vol	12.9	Liters			
	Sample Run Time	13	Minutes		Sorbent Flow	0.992 L/min	Sorbent Flow$_{STP}$	0.976	L/min

Total ST Vol$_{STP}$ 25.37 Liters — DGM Vol$_{STP}$ 79.06 Liters — Total Run Vol$_{STP}$ 104.43 Liters

Bagging Parameters

Time									
14:32	Vacuum check	0.005	inches H2O			DGM$_P$	1.6 inches H2O vacuum	754.2	mmHg
14:29	DGM$_{10L}$ Time	01:37.1	min:sec.frac	DGM Time	1.617	DGM Flow	6.19	DGM Flow$_{STP}$ 6.08	liters/minute
14:32	Bag Temp.	84.4	°F	29.1	°C	Sample$_T$	75 °F	23.9	°C

Post-Sample Data

14:52	Post Test M21	Background	-7 ppmv	8-sec Dwell	11 ppmv	Total Dwell	2:00 min:sec	Final M21	30 ppm
								Leak @	Stem

Condensate accumulation: starting time	N/A	hour:min	Final time	N/A hour:min	0:00 hours:min
Organic condensate collected	N/A	ml			
Density of organic condensate	N/A	g/ml			

Average THC emissions =	1.79E-06 kg/hr
Percent difference THC ER =	21%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.69E-08
C5 as Pentane	2.69E-08
n-Hexane	3.86E-08
C6 as Hexane	3.86E-08
n-Heptane	3.20E-08
C7 as Heptane	3.20E-08
n-Octane	2.77E-08
C8 as Octane	3.98E-08
n-Nonane	2.79E-08
C9 as Nonane	5.42E-08
n-Decane	2.82E-08
C10 as Decane	4.63E-07
n-Undecane	2.81E-08
C11 as Undecane	2.81E-08
n-Dodecane	2.79E-08
C12 as Dodecane	2.79E-08
n-Tridecane	4.13E-08
C13 as Tridecane	5.59E-08
n-Tetradecane	5.80E-08
C14 as tetradecane	6.68E-08
n-Pentadecane	5.23E-08
C15 as Pentadecane	6.30E-08
n-Hexadecane	2.80E-08
C16 as Hexadecane	2.80E-08
n-Heptadecane	2.76E-08
C17 as Heptadecane	2.76E-08
n-Octadecane	2.79E-08
C18 as Octodecane	2.79E-08
n-Nonadecane	2.80E-08
C19 as Nonadecane	2.80E-08
n-Eicosane	2.79E-08
C20 as Eicosane	2.79E-08
n-Heneicosane	2.82E-08
C21 as Heneicosane	2.82E-08
n-Docosane	2.79E-08
C22 as Docosane	2.79E-08
n-Tricosane	2.80E-08
C23 as Tricosane	2.80E-08
n-Tetracosane	2.81E-08
C24 as Tetracosane	2.81E-08
Total Hydrocarbon	1.79E-06

THC:	9.46E-05	lbs/day	1.73E-05	tons/yr

E074A

Component	ANALYTICAL RESULTS E074A µg/m³	Flag	ND Adj µg/m³	BACKGROUND E075A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	LIQUID RESULTS Capture µg	#E0XX µg/min	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	74.4682	ND	37	145.55	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C5 as Pentane	74.4682	ND	37	145.55	ND	0	154	ND	0	37	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Hexane	106.7101	ND	53	208.57	ND	0	220	ND	0	53	0.05	6	26	2.57E-08	0	0	0.00E+00	2.57E-08
C6 as Hexane	106.7101	ND	53	208.57	ND	0	220	ND	0	53	0.05	6	26	2.57E-08	0	0	0.00E+00	2.57E-08
n-Heptane	88.6512	ND	44	173.27	ND	0	183	ND	0	44	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
C7 as Heptane	88.6512	ND	44	173.27	ND	0	183	ND	0	44	0.04	5	21	2.14E-08	0	0	0.00E+00	2.14E-08
n-Octane	76.7132	ND	38	149.94	ND	0	158	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C8 as Octane	88.6353	J	89	149.94	ND	0	158	ND	0	89	0.09	9	43	4.27E-08	0	0	0.00E+00	4.27E-08
n-Nonane	77.2868	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C9 as Nonane	147.5925	J	148	151.06	ND	0	160	ND	0	148	0.15	15	71	7.11E-08	0	0	0.00E+00	7.11E-08
n-Decane	77.9845	ND	39	152.42	ND	0	161	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C10 as Decane	914.8094		915	152.42	ND	0	161	ND	0	915	0.91	96	441	4.41E-07	0	0	0.00E+00	4.41E-07
n-Undecane	77.7829	ND	39	152.03	ND	0	161	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C11 as Undecane	77.7829	ND	39	152.03	ND	0	161	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Dodecane	77.2558	ND	39	151	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C12 as Dodecane	77.2558	ND	39	151	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Tridecane	93.9579	J	94	151.36	ND	0	160	ND	0	94	0.09	10	45	4.53E-08	0	0	0.00E+00	4.53E-08
C13 as Tridecane	154.6678	J	155	151.36	ND	0	160	ND	0	155	0.15	16	75	7.45E-08	0	0	0.00E+00	7.45E-08
n-Tetradecane	163.5012	J	164	151.21	ND	0	160	ND	0	164	0.16	17	79	7.88E-08	0	0	0.00E+00	7.88E-08
C14 as tetradecane	199.6764	J	200	151.21	ND	0	160	ND	0	200	0.20	21	96	9.62E-08	0	0	0.00E+00	9.62E-08
n-Pentadecane	139.0838	J	139	151.97	ND	0	160	ND	0	139	0.14	15	67	6.70E-08	0	0	0.00E+00	6.70E-08
C15 as Pentadecane	183.5142	J	184	151.97	ND	0	160	ND	0	184	0.18	19	88	8.84E-08	0	0	0.00E+00	8.84E-08
n-Hexadecane	77.3333	ND	39	151.15	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C16 as Hexadecane	77.3333	ND	39	151.15	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Heptadecane	76.4341	ND	38	149.39	ND	0	158	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C17 as Heptadecane	76.4341	ND	38	149.39	ND	0	158	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Octadecane	77.2868	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C18 as Octodecane	77.2868	ND	39	151.06	ND	0	160	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Nonadecane	77.4419	ND	39	151.36	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C19 as Nonadecane	77.4419	ND	39	151.36	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Eicosane	77.2558	ND	39	151	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C20 as Eicosane	77.2558	ND	39	151	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Heneicosane	77.9845	ND	39	152.42	ND	0	161	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C21 as Heneicosane	77.9845	ND	39	152.42	ND	0	161	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Docosane	77.1008	ND	39	150.7	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
C22 as Docosane	77.1008	ND	39	150.7	ND	0	159	ND	0	39	0.04	4	19	1.86E-08	0	0	0.00E+00	1.86E-08
n-Tricosane	77.5194	ND	39	151.52	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C23 as Tricosane	77.5194	ND	39	151.52	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Tetracosane	77.6279	ND	39	151.73	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C24 as Tetracosane	77.6279	ND	39	151.73	ND	0	160	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
Total Hydrocarbon			3,322			0			0		3.32	347	1,601	1.60E-06	0	0	0.00E+00	1.60E-06

E074B

Component	ANALYTICAL RESULTS E074B µg/m³	Flag	ND Adj µg/m³	BACKGROUND E075A µg/m³	Flag	ND Adj µg/m³	TRIP BLANK #E009A µg/m³	Flag	ND Adj µg/m³	ADJUSTED G/V CONCENTRATION µg/m³	µg/L	TOTAL G/V MASS µg	G/V EMISSION RATE µg/hr	kg/hr	COMBINED EMISSION RATE kg/hr
n-Pentane	148.93644	ND	74	146	ND	0	154	ND	0	74	0.07	8	36	3.59E-08	3.59E-08
C5 as Pentane	148.93644	ND	74	146	ND	0	154	ND	0	74	0.07	8	36	3.59E-08	3.59E-08
n-Hexane	213.42016	ND	107	209	ND	0	220	ND	0	107	0.11	11	51	5.14E-08	5.14E-08
C6 as Hexane	213.42016	ND	107	209	ND	0	220	ND	0	107	0.11	11	51	5.14E-08	5.14E-08
n-Heptane	177.30233	ND	89	173	ND	0	183	ND	0	89	0.09	9	43	4.27E-08	4.27E-08
C7 as Heptane	177.30233	ND	89	173	ND	0	183	ND	0	89	0.09	9	43	4.27E-08	4.27E-08
n-Octane	153.42636	ND	77	150	ND	0	158	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
C8 as Octane	153.42636	ND	77	150	ND	0	158	ND	0	77	0.08	8	37	3.70E-08	3.70E-08
n-Nonane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C9 as Nonane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Decane	155.969	ND	78	152	ND	0	161	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C10 as Decane	1006.0589	J	1,006	152	ND	0	161	ND	0	1,006	1.01	105	485	4.85E-07	4.85E-07
n-Undecane	155.5659	ND	78	152	ND	0	161	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
C11 as Undecane	155.5659	ND	78	152	ND	0	161	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
n-Dodecane	154.51163	ND	77	151	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C12 as Dodecane	154.51163	ND	77	151	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Tridecane	154.88373	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C13 as Tridecane	154.88373	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Tetradecane	154.72869	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C14 as tetradecane	154.72869	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Pentadecane	155.50388	ND	78	152	ND	0	160	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
C15 as Pentadecane	155.50388	ND	78	152	ND	0	160	ND	0	78	0.08	8	37	3.75E-08	3.75E-08
n-Hexadecane	154.66667	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C16 as Hexadecane	154.66667	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Heptadecane	152.86822	ND	76	149	ND	0	158	ND	0	76	0.08	8	37	3.68E-08	3.68E-08
C17 as Heptadecane	152.86822	ND	76	149	ND	0	158	ND	0	76	0.08	8	37	3.68E-08	3.68E-08
n-Octadecane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C18 as Octodecane	154.57365	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Nonadecane	154.88373	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C19 as Nonadecane	154.88373	ND	77	151	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Eicosane	154.51163	ND	77	151	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C20 as Eicosane	154.51163	ND	77	151	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Heneicosane	155.969	ND	78	152	ND	0	161	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
C21 as Heneicosane	155.969	ND	78	152	ND	0	161	ND	0	78	0.08	8	38	3.76E-08	3.76E-08
n-Docosane	154.20155	ND	77	151	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
C22 as Docosane	154.20155	ND	77	151	ND	0	159	ND	0	77	0.08	8	37	3.72E-08	3.72E-08
n-Tricosane	155.03876	ND	78	152	ND	0	160	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
C23 as Tricosane	155.03876	ND	78	152	ND	0	160	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
n-Tetracosane	155.25582	ND	78	152	ND	0	160	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
C24 as Tetracosane	155.25582	ND	78	152	ND	0	160	ND	0	78	0.08	8	37	3.74E-08	3.74E-08
Total Hydrocarbon			4,099			0			0		4.10	428	1,976	1.98E-06	1.98E-06

Bagging Data Form — Vacuum Method

Sample Id E076

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	E-3	
Equipment Subtype:	Gate		**Unit:**	Refinery E	
Line Size:	3/4 *inches*		**Date:**	6-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.93 *inHg*	760.2 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	77 *°F*	25.0 *°C*	**TVA ID**	37887	
Component Temp:	170 *°F*	76.7 *°C*	**Stream Pressure/Temp:**	40 *psig*	*°F*

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Stream Description: *Frac Bottoms P504 Suction from T502 bottoms*

Pre-Sample Data

Time											
9:32	Background	-1	*ppmv*	8-sec Dwell	12	*ppmv*	Total Dwell	2:30	*min:sec*	Final M21	87 *ppm*
10:00	Initial Bag Vacuum	0.005	*inches H2O*	DGM Vac.	1.6	*inches H2O*	Bag Temp	126.1	*°F*	Leak @	Packing

Bag Concentrations (ppmv)

Time	10:02	10:04	10:06	10:08	10:10	10:12	10:17	10:23						
ppmv	14.7	16.6	17.6	18.2	18.4	18.5	18.8	20.6						

Sorbent Tube Sample Collection Parameters

E076A

Time										
10:12	Volume Start	683.3	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:25	Volume Stop	696.5	*Liters*	Total Vol	13.2	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.015	*L/min*	$\text{Sorbent Flow}_{STP}$	1.006	*L/min*

E076B

Time										
10:12	Volume Start	675.2	*Liters*		Design Sample Flow Rate = 1 liter/min					
10:25	Volume Stop	688.0	*Liters*	Total Vol	12.8	*Liters*				
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985	*L/min*	$\text{Sorbent Flow}_{STP}$	0.976	*L/min*
	$\text{Total ST Vol}_{STP}$	25.76	*Liters*	DGM Vol_{STP}	79.68	*Liters*	$\text{Total Run Vol}_{STP}$	105.44	*Liters*	

Bagging Parameters

Time										
10:17	Vacuum check	0.005	*inches H2O*			DGM_P	1.6	*inches H2O vacuum*	757.2	*mmHg*
10:15	DGM_{10L} Time	01:37.0	*min:sec.frac*	DGM Time	1.617	DGM Flow	6.19	DGM Flow_{STP}	6.13	*liters/minute*
10:17	Bag Temp.	140	*°F*	60.0	*°C*	Sample_T	73	*°F*	22.8	*°C*

Post-Sample Data

10:32	Post Test M21	Background	-3	*ppmv*	8-sec Dwell	45	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21 91 *ppm* Leak @ Packing

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	1.30E-05 kg/hr
Percent difference THC ER =	29%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.71E-08
C5 as Pentane	2.71E-08
n-Hexane	3.89E-08
C6 as Hexane	3.89E-08
n-Heptane	3.23E-08
C7 as Heptane	3.23E-08
n-Octane	2.79E-08
C8 as Octane	1.89E-07
n-Nonane	2.81E-08
C9 as Nonane	1.78E-06
n-Decane	1.02E-07
C10 as Decane	3.35E-06
n-Undecane	2.83E-07
C11 as Undecane	3.27E-06
n-Dodecane	1.87E-07
C12 as Dodecane	1.84E-06
n-Tridecane	2.40E-07
C13 as Tridecane	7.26E-07
n-Tetradecane	1.16E-07
C14 as tetradecane	3.94E-08
n-Pentadecane	4.07E-08
C15 as Pentadecane	3.77E-08
n-Hexadecane	2.82E-08
C16 as Hexadecane	2.82E-08
n-Heptadecane	2.78E-08
C17 as Heptadecane	2.78E-08
n-Octadecane	2.81E-08
C18 as Octodecane	2.81E-08
n-Nonadecane	2.82E-08
C19 as Nonadecane	2.82E-08
n-Eicosane	2.81E-08
C20 as Eicosane	2.81E-08
n-Heneicosane	2.84E-08
C21 as Heneicosane	2.84E-08
n-Docosane	2.81E-08
C22 as Docosane	2.81E-08
n-Tricosane	2.82E-08
C23 as Tricosane	2.82E-08
n-Tetracosane	2.83E-08
C24 as Tetracosane	2.83E-08
Total Hydrocarbon	1.30E-05

THC:	6.86E-04	lbs/day	1.25E-04	tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E076A	E076A		ND Adj	E077A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	72.7758	ND	36	148.94	ND	0	154	ND	0	36	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C5 as Pentane	72.7758	ND	36	148.94	ND	0	154	ND	0	36	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Hexane	104.2848	ND	52	213.42	ND	0	220	ND	0	52	0.05	5	25	2.54E-08	0	0	0.00E+00	2.54E-08
C6 as Hexane	104.2848	ND	52	213.42	ND	0	220	ND	0	52	0.05	5	25	2.54E-08	0	0	0.00E+00	2.54E-08
n-Heptane	86.6364	ND	43	177.3	ND	0	183	ND	0	43	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
C7 as Heptane	86.6364	ND	43	177.3	ND	0	183	ND	0	43	0.04	5	21	2.11E-08	0	0	0.00E+00	2.11E-08
n-Octane	74.9697	ND	37	153.43	ND	0	158	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C8 as Octane	375.1843	J	375	153.43	ND	0	158	ND	0	375	0.38	40	183	1.83E-07	0	0	0.00E+00	1.83E-07
n-Nonane	75.5303	ND	38	154.57	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C9 as Nonane	3154.9931		3,155	154.57	ND	0	160	ND	0	3,155	3.15	333	1535	1.54E-06	0	0	0.00E+00	1.54E-06
n-Decane	181.4639	J	181	155.97	ND	0	161	ND	0	181	0.18	19	88	8.83E-08	0	0	0.00E+00	8.83E-08
C10 as Decane	5977.5150		5,978	155.97	ND	0	161	ND	0	5,978	5.98	630	2909	2.91E-06	0	0	0.00E+00	2.91E-06
n-Undecane	497.7716	J	498	155.57	ND	0	161	ND	0	498	0.50	52	242	2.42E-07	0	0	0.00E+00	2.42E-07
C11 as Undecane	5742.9926		5,743	155.57	ND	0	161	ND	0	5,743	5.74	606	2795	2.79E-06	0	0	0.00E+00	2.79E-06
n-Dodecane	330.8919	J	331	154.51	ND	0	159	ND	0	331	0.33	35	161	1.61E-07	0	0	0.00E+00	1.61E-07
C12 as Dodecane	3219.8852		3,220	154.51	ND	0	159	ND	0	3,220	3.22	340	1567	1.57E-06	0	0	0.00E+00	1.57E-06
n-Tridecane	450.2366	J	450	154.88	ND	0	160	ND	0	450	0.45	47	219	2.19E-07	0	0	0.00E+00	2.19E-07
C13 as Tridecane	1318.7016		1,319	154.88	ND	0	160	ND	0	1,319	1.32	139	642	6.42E-07	0	0	0.00E+00	6.42E-07
n-Tetradecane	221.4045	J	221	154.73	ND	0	160	ND	0	221	0.22	23	108	1.08E-07	0	0	0.00E+00	1.08E-07
C14 as tetradecane	84.0491	J	84	154.73	ND	0	160	ND	0	84	0.08	9	41	4.09E-08	0	0	0.00E+00	4.09E-08
n-Pentadecane	89.0657	J	89	155.5	ND	0	160	ND	0	89	0.09	9	43	4.33E-08	0	0	0.00E+00	4.33E-08
C15 as Pentadecane	76.7154	J	77	155.5	ND	0	160	ND	0	77	0.08	8	37	3.73E-08	0	0	0.00E+00	3.73E-08
n-Hexadecane	75.5758	ND	38	154.67	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C16 as Hexadecane	75.5758	ND	38	154.67	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Heptadecane	74.6970	ND	37	152.87	ND	0	158	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C17 as Heptadecane	74.6970	ND	37	152.87	ND	0	158	ND	0	37	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Octadecane	75.5303	ND	38	154.57	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C18 as Octodecane	75.5303	ND	38	154.57	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Nonadecane	75.6818	ND	38	154.88	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C19 as Nonadecane	75.6818	ND	38	154.88	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Eicosane	75.5000	ND	38	154.51	ND	0	159	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C20 as Eicosane	75.5000	ND	38	154.51	ND	0	159	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Heneicosane	76.2121	ND	38	155.97	ND	0	161	ND	0	38	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
C21 as Heneicosane	76.2121	ND	38	155.97	ND	0	161	ND	0	38	0.04	4	19	1.85E-08	0	0	0.00E+00	1.85E-08
n-Docosane	75.3485	ND	38	154.2	ND	0	159	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
C22 as Docosane	75.3485	ND	38	154.2	ND	0	159	ND	0	38	0.04	4	18	1.83E-08	0	0	0.00E+00	1.83E-08
n-Tricosane	75.7576	ND	38	155.04	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
C23 as Tricosane	75.7576	ND	38	155.04	ND	0	160	ND	0	38	0.04	4	18	1.84E-08	0	0	0.00E+00	1.84E-08
n-Tetracosane	75.8636	ND	38	155.26	ND	0	160	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
C24 as Tetracosane	75.8636	ND	38	155.26	ND	0	160	ND	0	38	0.04	4	18	1.85E-08	0	0	0.00E+00	1.85E-08
Total Hydrocarbon			22,740			0			0		22.74	2398	11,066	1.11E-05	0	0	0.00E+00	1.11E-05

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E076B	E076B		ND Adj	E077A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	150.1	ND	75	149	ND	0	154	ND	0	75	0.08	8	37	3.65E-08	3.65E-08
C5 as Pentane	150.1	ND	75	149	ND	0	154	ND	0	75	0.08	8	37	3.65E-08	3.65E-08
n-Hexane	215.0875	ND	108	213	ND	0	220	ND	0	108	0.11	11	52	5.23E-08	5.23E-08
C6 as Hexane	215.0875	ND	108	213	ND	0	220	ND	0	108	0.11	11	52	5.23E-08	5.23E-08
n-Heptane	178.6875	ND	89	177	ND	0	183	ND	0	89	0.09	9	43	4.35E-08	4.35E-08
C7 as Heptane	178.6875	ND	89	177	ND	0	183	ND	0	89	0.09	9	43	4.35E-08	4.35E-08
n-Octane	154.625	ND	77	153	ND	0	158	ND	0	77	0.08	8	38	3.76E-08	3.76E-08
C8 as Octane	401.65103	J	402	153	ND	0	158	ND	0	402	0.40	42	195	1.95E-07	1.95E-07
n-Nonane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C9 as Nonane	4154.8679		4,155	155	ND	0	160	ND	0	4,155	4.15	438	2022	2.02E-06	2.02E-06
n-Decane	239.35287	J	239	156	ND	0	161	ND	0	239	0.24	25	116	1.16E-07	1.16E-07
C10 as Decane	7783.3321		7,783	156	ND	0	161	ND	0	7,783	7.78	821	3788	3.79E-06	3.79E-06
n-Undecane	664.30014	J	664	156	ND	0	161	ND	0	664	0.66	70	323	3.23E-07	3.23E-07
C11 as Undecane	7714.8431		7,715	156	ND	0	161	ND	0	7,715	7.71	813	3754	3.75E-06	3.75E-06
n-Dodecane	436.16122	J	436	155	ND	0	159	ND	0	436	0.44	46	212	2.12E-07	2.12E-07
C12 as Dodecane	4361.8948		4,362	155	ND	0	159	ND	0	4,362	4.36	460	2123	2.12E-06	2.12E-06
n-Tridecane	535.68852	J	536	155	ND	0	160	ND	0	536	0.54	56	261	2.61E-07	2.61E-07
C13 as Tridecane	1664.4933		1,664	155	ND	0	160	ND	0	1,664	1.66	176	810	8.10E-07	8.10E-07
n-Tetradecane	253.32176	J	253	155	ND	0	160	ND	0	253	0.25	27	123	1.23E-07	1.23E-07
C14 as tetradecane	155.9375	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Pentadecane	156.71875	ND	78	156	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C15 as Pentadecane	156.71875	ND	78	156	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
n-Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C16 as Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C17 as Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
n-Octadecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C18 as Octodecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C19 as Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C20 as Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
C21 as Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	8	38	3.82E-08	3.82E-08
n-Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C22 as Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C23 as Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
C24 as Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.81E-08	3.81E-08
Total Hydrocarbon			30,547			0			0		30.55	3221	14,866	1.49E-05	1.49E-05

Bagging Data Form — Vacuum Method

Sample Id: E078

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	E-444	
Equipment Subtype:	Gate		**Unit:**	Refinery E	
Line Size:	3	*inches*	**Date:**	6-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.89 *inHg*	759.2 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	80.5 *°F*	26.9 *°C*	**TVA ID**	36502	
Component Temp:	136 *°F*	57.8 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*LCCO P/S LAGO to Unit*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time								
12:00	Background	1 *ppmv*	8-sec Dwell	32 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	140 *ppm*
12:31	Initial Bag Vacuum	0.03 *inches H2O*	DGM Vac.	1.6 *inches H2O*	Bag Temp	110.7 *°F*	Leak @	Stem

Bag Concentrations (ppmv)

Time	12:33	12:35	12:37	12:39	12:41	12:46	12:51	12:54						
ppmv	16.7	17.4	17.6	17.7	17.9	17.8	18.1	18.4						

Sorbent Tube Sample Collection Parameters

E078A

Time						
12:41	Volume Start	696.5 *Liters*		Design Sample Flow Rate = 1 liter/min		
12:54	Volume Stop	709.5 *Liters*	Total Vol	13.0 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	1.000 *L/min*	$Sorbent Flow_{STP}$	0.982 *L/min*

E078B

12:41	Volume Start	688.0 *Liters*		Design Sample Flow Rate = 1 liter/min		
12:54	Volume Stop	701.3 *Liters*	Total Vol	13.3 *Liters*		
	Sample Run Time	13 *Minutes*	Sorbent Flow	1.023 *L/min*	$Sorbent Flow_{STP}$	1.005 *L/min*
	$Total ST Vol_{STP}$	25.83 *Liters*	$DGM Vol_{STP}$	75.85 *Liters*	$Total Run Vol_{STP}$	101.68 *Liters*

Bagging Parameters

Time						
12:42	Vacuum check	0.06 *inches H2O*		DGM_P 1.6 *inches H2O vacuum*		756.2 *mmHg*
12:45	DGM_{10L} Time	01:40.8 *min:sec.frac*	DGM Time 1.683	DGM Flow 5.94	$DGM Flow_{STP}$	5.83 *liters/minute*
12:43	Bag Temp.	112.1 *°F*	44.5 *°C*	$Sample_T$ 77 *°F*		25.0 *°C*

Post-Sample Data

13:02 Post Test M21	Background 12 *ppmv*	8-sec Dwell 50 *ppmv*	Total Dwell 2:00 *min:sec*	Final M21 215 *ppm*		
				Leak @ Stem		

Condensate accumulation: starting time N/A *hour:min* — Final time N/A *hour:min* — 0:00 *hours:min*
Organic condensate collected N/A *ml*
Density of organic condensate N/A *g/ml*

Average THC emissions =	6.48E-06 kg/hr
Percent difference THC ER =	33%
Acceptable?	No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.56E-08
C5 as Pentane	2.56E-08
n-Hexane	3.67E-08
C6 as Hexane	3.67E-08
n-Heptane	3.05E-08
C7 as Heptane	3.05E-08
n-Octane	4.56E-08
C8 as Octane	3.00E-07
n-Nonane	5.96E-08
C9 as Nonane	9.77E-07
n-Decane	1.01E-07
C10 as Decane	1.37E-06
n-Undecane	1.57E-07
C11 as Undecane	9.74E-07
n-Dodecane	1.23E-07
C12 as Dodecane	6.82E-07
n-Tridecane	1.85E-07
C13 as Tridecane	4.11E-07
n-Tetradecane	1.73E-07
C14 as tetradecane	1.35E-07
n-Pentadecane	6.44E-08
C15 as Pentadecane	4.90E-08
n-Hexadecane	3.57E-08
C16 as Hexadecane	2.66E-08
n-Heptadecane	2.63E-08
C17 as Heptadecane	2.63E-08
n-Octadecane	2.66E-08
C18 as Octodecane	2.66E-08
n-Nonadecane	2.66E-08
C19 as Nonadecane	2.66E-08
n-Eicosane	2.66E-08
C20 as Eicosane	2.66E-08
n-Heneicosane	2.68E-08
C21 as Heneicosane	2.68E-08
n-Docosane	2.65E-08
C22 as Docosane	2.65E-08
n-Tricosane	2.67E-08
C23 as Tricosane	2.67E-08
n-Tetracosane	2.67E-08
C24 as Tetracosane	2.67E-08
Total Hydrocarbon	6.48E-06

THC:	3.43E-04	lbs/day	6.26E-05	tons/yr

E078A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E078A	E078A		ND Adj	E079A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.8954	ND	37	147.79	ND	0	154	ND	0	37	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
C5 as Pentane	73.8954	ND	37	147.79	ND	0	154	ND	0	37	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
n-Hexane	105.8892	ND	53	211.78	ND	0	220	ND	0	53	0.05	5	25	2.48E-08	0	0	0.00E+00	2.48E-08
C6 as Hexane	105.8892	ND	53	211.78	ND	0	220	ND	0	53	0.05	5	25	2.48E-08	0	0	0.00E+00	2.48E-08
n-Heptane	87.9692	ND	44	175.94	ND	0	183	ND	0	44	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C7 as Heptane	87.9692	ND	44	175.94	ND	0	183	ND	0	44	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Octane	119.7579	J	120	152.25	ND	0	158	ND	0	120	0.12	12	56	5.62E-08	0	0	0.00E+00	5.62E-08
C8 as Octane	837.9359		838	152.25	ND	0	158	ND	0	838	0.84	85	393	3.93E-07	0	0	0.00E+00	3.93E-07
n-Nonane	179.1760	J	179	153.38	ND	0	160	ND	0	179	0.18	18	84	8.41E-08	0	0	0.00E+00	8.41E-08
C9 as Nonane	2477.6899		2,478	153.38	ND	0	160	ND	0	2,478	2.48	252	1163	1.16E-06	0	0	0.00E+00	1.16E-06
n-Decane	223.9315	J	224	154.77	ND	0	161	ND	0	224	0.22	23	105	1.05E-07	0	0	0.00E+00	1.05E-07
C10 as Decane	3347.6455		3,348	154.77	ND	0	161	ND	0	3,348	3.35	340	1571	1.57E-06	0	0	0.00E+00	1.57E-06
n-Undecane	382.7211	J	383	154.37	ND	0	161	ND	0	383	0.38	39	180	1.80E-07	0	0	0.00E+00	1.80E-07
C11 as Undecane	2418.0852		2,418	154.37	ND	0	161	ND	0	2,418	2.42	246	1135	1.13E-06	0	0	0.00E+00	1.13E-06
n-Dodecane	299.5178	J	300	153.32	ND	0	159	ND	0	300	0.30	30	141	1.41E-07	0	0	0.00E+00	1.41E-07
C12 as Dodecane	1806.8284		1,807	153.32	ND	0	159	ND	0	1,807	1.81	184	848	8.48E-07	0	0	0.00E+00	8.48E-07
n-Tridecane	513.6938	J	514	153.69	ND	0	160	ND	0	514	0.51	52	241	2.41E-07	0	0	0.00E+00	2.41E-07
C13 as Tridecane	1201.3934		1,201	153.69	ND	0	160	ND	0	1,201	1.20	122	564	5.64E-07	0	0	0.00E+00	5.64E-07
n-Tetradecane	430.1941	J	430	153.54	ND	0	160	ND	0	430	0.43	44	202	2.02E-07	0	0	0.00E+00	2.02E-07
C14 as tetradecane	498.9170	J	499	153.54	ND	0	160	ND	0	499	0.50	51	234	2.34E-07	0	0	0.00E+00	2.34E-07
n-Pentadecane	198.8366	J	199	154.31	ND	0	160	ND	0	199	0.20	20	93	9.33E-08	0	0	0.00E+00	9.33E-08
C15 as Pentadecane	133.2325	J	133	154.31	ND	0	160	ND	0	133	0.13	14	63	6.25E-08	0	0	0.00E+00	6.25E-08
n-Hexadecane	77.1516	J	77	153.48	ND	0	160	ND	0	77	0.08	8	36	3.62E-08	0	0	0.00E+00	3.62E-08
C16 as Hexadecane	76.7385	ND	38	153.48	ND	0	160	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Heptadecane	75.8462	ND	38	151.69	ND	0	158	ND	0	38	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C17 as Heptadecane	75.8462	ND	38	151.69	ND	0	158	ND	0	38	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Octadecane	76.6923	ND	38	153.38	ND	0	160	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C18 as Octodecane	76.6923	ND	38	153.38	ND	0	160	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Nonadecane	76.8462	ND	38	153.69	ND	0	160	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C19 as Nonadecane	76.8462	ND	38	153.69	ND	0	160	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Eicosane	76.6615	ND	38	153.32	ND	0	159	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C20 as Eicosane	76.6615	ND	38	153.32	ND	0	159	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Heneicosane	77.3846	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C21 as Heneicosane	77.3846	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Docosane	76.5077	ND	38	153.02	ND	0	159	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C22 as Docosane	76.5077	ND	38	153.02	ND	0	159	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Tricosane	76.9231	ND	38	153.85	ND	0	160	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C23 as Tricosane	76.9231	ND	38	153.85	ND	0	160	ND	0	38	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Tetracosane	77.0308	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C24 as Tetracosane	77.0308	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
Total Hydrocarbon			16,067			0			0		16.07	1634	7,540	7.54E-06	0	0	0.00E+00	7.54E-06

E078B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E078B	E078B		ND Adj	E079A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	144.45714	ND	72	148	ND	0	154	ND	0	72	0.07	7	34	3.39E-08	3.39E-08
C5 as Pentane	144.45714	ND	72	148	ND	0	154	ND	0	72	0.07	7	34	3.39E-08	3.39E-08
n-Hexane	207.0015	ND	104	212	ND	0	220	ND	0	104	0.10	11	49	4.86E-08	4.86E-08
C6 as Hexane	207.0015	ND	104	212	ND	0	220	ND	0	104	0.10	11	49	4.86E-08	4.86E-08
n-Heptane	171.96992	ND	86	176	ND	0	183	ND	0	86	0.09	9	40	4.04E-08	4.04E-08
C7 as Heptane	171.96992	ND	86	176	ND	0	183	ND	0	86	0.09	9	40	4.04E-08	4.04E-08
n-Octane	148.81203	ND	74	152	ND	0	158	ND	0	74	0.07	8	35	3.49E-08	3.49E-08
C8 as Octane	440.67405	J	441	152	ND	0	158	ND	0	441	0.44	45	207	2.07E-07	2.07E-07
n-Nonane	149.92481	ND	75	153	ND	0	160	ND	0	75	0.07	8	35	3.52E-08	3.52E-08
C9 as Nonane	1684.0637		1,684	153	ND	0	160	ND	0	1,684	1.68	171	790	7.90E-07	7.90E-07
n-Decane	206.48715	J	206	155	ND	0	161	ND	0	206	0.21	21	97	9.69E-08	9.69E-08
C10 as Decane	2483.7887		2,484	155	ND	0	161	ND	0	2,484	2.48	253	1166	1.17E-06	1.17E-06
n-Undecane	288.38713	J	288	154	ND	0	161	ND	0	288	0.29	29	135	1.35E-07	1.35E-07
C11 as Undecane	1731.1872		1,731	154	ND	0	161	ND	0	1,731	1.73	176	812	8.12E-07	8.12E-07
n-Dodecane	222.90295	J	223	153	ND	0	159	ND	0	223	0.22	23	105	1.05E-07	1.05E-07
C12 as Dodecane	1101.4843	J	1,101	153	ND	0	159	ND	0	1,101	1.10	112	517	5.17E-07	5.17E-07
n-Tridecane	276.74959	J	277	154	ND	0	160	ND	0	277	0.28	28	130	1.30E-07	1.30E-07
C13 as Tridecane	548.46402	J	548	154	ND	0	160	ND	0	548	0.55	56	257	2.57E-07	2.57E-07
n-Tetradecane	308.50926	J	309	154	ND	0	160	ND	0	309	0.31	31	145	1.45E-07	1.45E-07
C14 as tetradecane	150.07519	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.52E-08	3.52E-08
n-Pentadecane	150.82707	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.54E-08	3.54E-08
C15 as Pentadecane	150.82707	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.54E-08	3.54E-08
n-Hexadecane	150.01504	ND	75	153	ND	0	160	ND	0	75	0.08	8	35	3.52E-08	3.52E-08
C16 as Hexadecane	150.01504	ND	75	153	ND	0	160	ND	0	75	0.08	8	35	3.52E-08	3.52E-08
n-Heptadecane	148.27067	ND	74	152	ND	0	158	ND	0	74	0.07	8	35	3.48E-08	3.48E-08
C17 as Heptadecane	148.27067	ND	74	152	ND	0	158	ND	0	74	0.07	8	35	3.48E-08	3.48E-08
n-Octadecane	149.92481	ND	75	153	ND	0	160	ND	0	75	0.07	8	35	3.52E-08	3.52E-08
C18 as Octodecane	149.92481	ND	75	153	ND	0	160	ND	0	75	0.07	8	35	3.52E-08	3.52E-08
n-Nonadecane	150.22556	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.53E-08	3.53E-08
C19 as Nonadecane	150.22556	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.53E-08	3.53E-08
n-Eicosane	149.86466	ND	75	153	ND	0	159	ND	0	75	0.07	8	35	3.52E-08	3.52E-08
C20 as Eicosane	149.86466	ND	75	153	ND	0	159	ND	0	75	0.07	8	35	3.52E-08	3.52E-08
n-Heneicosane	151.27819	ND	76	155	ND	0	161	ND	0	76	0.08	8	35	3.55E-08	3.55E-08
C21 as Heneicosane	151.27819	ND	76	155	ND	0	161	ND	0	76	0.08	8	35	3.55E-08	3.55E-08
n-Docosane	149.56391	ND	75	153	ND	0	159	ND	0	75	0.07	8	35	3.51E-08	3.51E-08
C22 as Docosane	149.56391	ND	75	153	ND	0	159	ND	0	75	0.07	8	35	3.51E-08	3.51E-08
n-Tricosane	150.37594	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.53E-08	3.53E-08
C23 as Tricosane	150.37594	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.53E-08	3.53E-08
n-Tetracosane	150.58646	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.53E-08	3.53E-08
C24 as Tetracosane	150.58646	ND	75	154	ND	0	160	ND	0	75	0.08	8	35	3.53E-08	3.53E-08
Total Hydrocarbon			11,541			0			0		11.54	1174	5,416	5.42E-06	5.42E-06

Bagging Data Form — Vacuum Method

Sample Id: E080

WSPA Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	E-556		
Equipment Subtype:	Reducing Union		**Unit:**	Refinery E		
Line Size:	3/4	*inches*	**Date:**	7-Nov-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	29.98 *inHg*	761.5 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	74 *°F*	23.3 *°C*	**TVA ID**	36502		
Component Temp:	93 *°F*	33.9 *°C*	**Stream Pressure/Temp:**	48	*psig*	*°F*
Stream Description:	*LCCO to Tk 1712*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m^3 = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
9:24	Background	6	*ppmv*	8-sec Dwell	6	*ppmv*	Total Dwell	7:00	*min:sec*	Final M21	10.4 *ppm*
9:55	Initial Bag Vacuum	0.06	*inches H2O*	DGM Vac.	1.6	*inches H2O*	Bag Temp	82.2	*°F*	Leak @	Small size of reducing union

Bag Concentrations (ppmv) (had to vent bag)

Time	9:58	10:00	10:02	10:04	10:06	10:08	10:15	10:22						
ppmv	5	7	7.8	7.4	8.9	7.3	7.3	7.6						

Sorbent Tube Sample Collection Parameters

E080A

Time									
10:09	Volume Start	712.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:22	Volume Stop	724.9	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent $Flow_{STP}$	0.956	*L/min*

E080B

10:09	Volume Start	703.3	*Liters*		Design Sample Flow Rate = 1 liter/min				
10:22	Volume Stop	716.2	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent $Flow_{STP}$	0.956	*L/min*
	Total ST Vol_{STP}	24.86	*Liters*	DGM Vol_{STP}	67.11	*Liters*	Total Run Vol_{STP}	91.97	*Liters*

Bagging Parameters

Time										
10:13	Vacuum check	0.06	*inches H2O*			DGM_P	1.6	*inches H2O vacuum*	758.5	*mmHg*
10:12	DGM_{10L} Time	01:51.9	*min:sec.frac*	DGM Time	1.867	DGM Flow	5.36	DGM $Flow_{STP}$	5.16	*liters/minute*
10:14	Bag Temp.	84.7	*°F*	29.3	*°C*	$Sample_T$	89	*°F*	31.7	*°C*

Post-Sample Data

10:30	Post Test M21	Background	3	*ppmv*	8-sec Dwell	3	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21	11 *ppm*
										Leak @	Small size of reducing union
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*		
Organic condensate collected			N/A	*ml*							
Density of organic condensate			N/A	*g/ml*							

Average THC emissions =	1.13E-06	kg/hr
Percent difference THC ER =	47%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.37E-08
C5 as Pentane	2.37E-08
n-Hexane	3.40E-08
C6 as Hexane	3.40E-08
n-Heptane	2.82E-08
C7 as Heptane	2.82E-08
n-Octane	2.44E-08
C8 as Octane	2.44E-08
n-Nonane	2.46E-08
C9 as Nonane	2.46E-08
n-Decane	2.48E-08
C10 as Decane	9.47E-08
n-Undecane	2.48E-08
C11 as Undecane	2.48E-08
n-Dodecane	2.46E-08
C12 as Dodecane	2.46E-08
n-Tridecane	3.36E-08
C13 as Tridecane	4.31E-08
n-Tetradecane	4.55E-08
C14 as tetradecane	2.46E-08
n-Pentadecane	2.48E-08
C15 as Pentadecane	2.48E-08
n-Hexadecane	2.46E-08
C16 as Hexadecane	2.46E-08
n-Heptadecane	2.43E-08
C17 as Heptadecane	2.43E-08
n-Octadecane	2.46E-08
C18 as Octodecane	2.46E-08
n-Nonadecane	2.47E-08
C19 as Nonadecane	2.47E-08
n-Eicosane	2.46E-08
C20 as Eicosane	2.46E-08
n-Heneicosane	2.48E-08
C21 as Heneicosane	2.48E-08
n-Docosane	2.45E-08
C22 as Docosane	2.45E-08
n-Tricosane	2.47E-08
C23 as Tricosane	2.47E-08
n-Tetracosane	2.47E-08
C24 as Tetracosane	2.47E-08
Total Hydrocarbon	1.13E-06

THC:	**5.97E-05**	**lbs/day**	**1.09E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E080A	E080A		ND Adj	E081A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.4682	ND	37	147.79	ND	0	154	ND	0	37	0.04	3	16	1.58E-08	0	0	0.00E+00	1.58E-08
C5 as Pentane	74.4682	ND	37	147.79	ND	0	154	ND	0	37	0.04	3	16	1.58E-08	0	0	0.00E+00	1.58E-08
n-Hexane	106.7101	ND	53	211.78	ND	0	220	ND	0	53	0.05	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
C6 as Hexane	106.7101	ND	53	211.78	ND	0	220	ND	0	53	0.05	5	23	2.26E-08	0	0	0.00E+00	2.26E-08
n-Heptane	88.6512	ND	44	175.94	ND	0	183	ND	0	44	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C7 as Heptane	88.6512	ND	44	175.94	ND	0	183	ND	0	44	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Octane	76.7132	ND	38	152.25	ND	0	158	ND	0	38	0.04	4	16	1.63E-08	0	0	0.00E+00	1.63E-08
C8 as Octane	76.7132	ND	38	152.25	ND	0	158	ND	0	38	0.04	4	16	1.63E-08	0	0	0.00E+00	1.63E-08
n-Nonane	77.2868	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
C9 as Nonane	77.2868	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Decane	77.9845	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
C10 as Decane	260.1508	J	260	154.77	ND	0	161	ND	0	260	0.26	24	110	1.10E-07	0	0	0.00E+00	1.10E-07
n-Undecane	77.7829	ND	39	154.37	ND	0	161	ND	0	39	0.04	4	17	1.65E-08	0	0	0.00E+00	1.65E-08
C11 as Undecane	77.7829	ND	39	154.37	ND	0	161	ND	0	39	0.04	4	17	1.65E-08	0	0	0.00E+00	1.65E-08
n-Dodecane	77.2558	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
C12 as Dodecane	77.2558	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Tridecane	80.9942	J	81	153.69	ND	0	160	ND	0	81	0.08	7	34	3.44E-08	0	0	0.00E+00	3.44E-08
C13 as Tridecane	125.4621	J	125	153.69	ND	0	160	ND	0	125	0.13	12	53	5.33E-08	0	0	0.00E+00	5.33E-08
n-Tetradecane	136.9976	J	137	153.54	ND	0	160	ND	0	137	0.14	13	58	5.82E-08	0	0	0.00E+00	5.82E-08
C14 as tetradecane	77.3643	ND	39	153.54	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Pentadecane	77.7519	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	17	1.65E-08	0	0	0.00E+00	1.65E-08
C15 as Pentadecane	77.7519	ND	39	154.31	ND	0	160	ND	0	39	0.04	4	17	1.65E-08	0	0	0.00E+00	1.65E-08
n-Hexadecane	77.3333	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
C16 as Hexadecane	77.3333	ND	39	153.48	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Heptadecane	76.4341	ND	38	151.69	ND	0	158	ND	0	38	0.04	4	16	1.62E-08	0	0	0.00E+00	1.62E-08
C17 as Heptadecane	76.4341	ND	38	151.69	ND	0	158	ND	0	38	0.04	4	16	1.62E-08	0	0	0.00E+00	1.62E-08
n-Octadecane	77.2868	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
C18 as Octodecane	77.2868	ND	39	153.38	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Nonadecane	77.4419	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
C19 as Nonadecane	77.4419	ND	39	153.69	ND	0	160	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Eicosane	77.2558	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
C20 as Eicosane	77.2558	ND	39	153.32	ND	0	159	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Heneicosane	77.9845	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
C21 as Heneicosane	77.9845	ND	39	154.77	ND	0	161	ND	0	39	0.04	4	17	1.66E-08	0	0	0.00E+00	1.66E-08
n-Docosane	77.1008	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
C22 as Docosane	77.1008	ND	39	153.02	ND	0	159	ND	0	39	0.04	4	16	1.64E-08	0	0	0.00E+00	1.64E-08
n-Tricosane	77.5194	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	16	1.65E-08	0	0	0.00E+00	1.65E-08
C23 as Tricosane	77.5194	ND	39	153.85	ND	0	160	ND	0	39	0.04	4	16	1.65E-08	0	0	0.00E+00	1.65E-08
n-Tetracosane	77.6279	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	16	1.65E-08	0	0	0.00E+00	1.65E-08
C24 as Tetracosane	77.6279	ND	39	154.06	ND	0	160	ND	0	39	0.04	4	16	1.65E-08	0	0	0.00E+00	1.65E-08
Total Hydrocarbon			2,034			0			0		2.03	187	863	8.63E-07	0	0	0.00E+00	8.63E-07

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E080B	E080B		ND Adj	E081A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.93644	ND	74	148	ND	0	154	ND	0	74	0.07	7	32	3.16E-08	3.16E-08
C5 as Pentane	148.93644	ND	74	148	ND	0	154	ND	0	74	0.07	7	32	3.16E-08	3.16E-08
n-Hexane	213.42016	ND	107	212	ND	0	220	ND	0	107	0.11	10	45	4.53E-08	4.53E-08
C6 as Hexane	213.42016	ND	107	212	ND	0	220	ND	0	107	0.11	10	45	4.53E-08	4.53E-08
n-Heptane	177.30233	ND	89	176	ND	0	183	ND	0	89	0.09	8	38	3.76E-08	3.76E-08
C7 as Heptane	177.30233	ND	89	176	ND	0	183	ND	0	89	0.09	8	38	3.76E-08	3.76E-08
n-Octane	153.42636	ND	77	152	ND	0	158	ND	0	77	0.08	7	33	3.26E-08	3.26E-08
C8 as Octane	153.42636	ND	77	152	ND	0	158	ND	0	77	0.08	7	33	3.26E-08	3.26E-08
n-Nonane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
C9 as Nonane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
n-Decane	155.969	ND	78	155	ND	0	161	ND	0	78	0.08	7	33	3.31E-08	3.31E-08
C10 as Decane	186.18903	J	186	155	ND	0	161	ND	0	186	0.19	17	79	7.90E-08	7.90E-08
n-Undecane	155.5659	ND	78	154	ND	0	161	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
C11 as Undecane	155.5659	ND	78	154	ND	0	161	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
n-Dodecane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
C12 as Dodecane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
n-Tridecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	7	33	3.29E-08	3.29E-08
C13 as Tridecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	7	33	3.29E-08	3.29E-08
n-Tetradecane	154.72869	ND	77	154	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
C14 as tetradecane	154.72869	ND	77	154	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
n-Pentadecane	155.50388	ND	78	154	ND	0	160	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
C15 as Pentadecane	155.50388	ND	78	154	ND	0	160	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
n-Hexadecane	154.66667	ND	77	153	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
C16 as Hexadecane	154.66667	ND	77	153	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
n-Heptadecane	152.86822	ND	76	152	ND	0	158	ND	0	76	0.08	7	32	3.24E-08	3.24E-08
C17 as Heptadecane	152.86822	ND	76	152	ND	0	158	ND	0	76	0.08	7	32	3.24E-08	3.24E-08
n-Octadecane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
C18 as Octodecane	154.57365	ND	77	153	ND	0	160	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
n-Nonadecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	7	33	3.29E-08	3.29E-08
C19 as Nonadecane	154.88373	ND	77	154	ND	0	160	ND	0	77	0.08	7	33	3.29E-08	3.29E-08
n-Eicosane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
C20 as Eicosane	154.51163	ND	77	153	ND	0	159	ND	0	77	0.08	7	33	3.28E-08	3.28E-08
n-Heneicosane	155.969	ND	78	155	ND	0	161	ND	0	78	0.08	7	33	3.31E-08	3.31E-08
C21 as Heneicosane	155.969	ND	78	155	ND	0	161	ND	0	78	0.08	7	33	3.31E-08	3.31E-08
n-Docosane	154.20155	ND	77	153	ND	0	159	ND	0	77	0.08	7	33	3.27E-08	3.27E-08
C22 as Docosane	154.20155	ND	77	153	ND	0	159	ND	0	77	0.08	7	33	3.27E-08	3.27E-08
n-Tricosane	155.03876	ND	78	154	ND	0	160	ND	0	78	0.08	7	33	3.29E-08	3.29E-08
C23 as Tricosane	155.03876	ND	78	154	ND	0	160	ND	0	78	0.08	7	33	3.29E-08	3.29E-08
n-Tetracosane	155.25582	ND	78	154	ND	0	160	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
C24 as Tetracosane	155.25582	ND	78	154	ND	0	160	ND	0	78	0.08	7	33	3.30E-08	3.30E-08
Total Hydrocarbon			3,279			0			0		3.28	302	1,392	1.39E-06	1.39E-06

Bagging Data Form **Vacuum Method**

Sample Id E082

Equipment type:	Valve			**Component ID:**	E-536		
Equipment Subtype:	Gate			**Unit:**	Refinery E		
Line Size:	2	*inches*		**Date:**	7-Nov-18		
Phase (G, LL, HL):	HL			**Analysis team:**	EG/DR		
Barometric pressure	29.93 *inHg*	760.2	*mmHg*	**Sample Pump A**	LP52979		
				Sample Pump B	LP52975		
Ambient Temp:	82.6 °F	28.1	°C	**TVA ID**	36502		
Component Temp:	95 °F	35.0	°C	**Stream Pressure/Temp:**		*psig*	°F
Stream Description:	*LAGO Mixed Feed to D-401 Direct*						

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
12:01	Background	10	*ppmv*	8-sec Dwell	12	*ppmv*	Total Dwell	7:00	*min:sec*	Final M21	44 *ppm*
12:42	Initial Bag Vacuum	0.07	*inches H2O*	DGM Vac.	1.7	*inches H2O*	Bag Temp	89.1	°F	Leak @	Stem

Bag Concentrations (ppmv)

Time	12:43	12:45	12:47	12:49	12:51	12:53	13:05:00 PM							
ppmv	10.5	12.5	13.1	13.3	13.5	13.6	13.5							

Sorbent Tube Sample Collection Parameters

E082A

Time									
12:54	Volume Start	724.9	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:07	Volume Stop	737.8	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.985	*L/min*

E082B

12:54	Volume Start	716.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
13:07	Volume Stop	729.3	*Liters*	Total Vol	13.1	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	1.008 *L/min*	Sorbent Flow$_{STP}$	1.000	*L/min*
	Total ST Vol$_{STP}$	25.81	*Liters*	DGM Vol$_{STP}$	74.46	*Liters*	Total Run Vol$_{STP}$	100.27	*Liters*

Bagging Parameters

Time									
12:55	Vacuum check	0.065	*inches H2O*			DGM$_P$	1.6 *inches H2O vacuum*	757.2	*mmHg*
12:58	DGM$_{10L}$ Time	01:43.6	*min:sec.frac*	DGM Time	1.733	DGM Flow	5.77 DGM Flow$_{STP}$	5.73	*liters/minute*
12:56	Bag Temp.	87.8	°F	31.0	°C	Sample$_T$	72 °F	22.2	°C

Post-Sample Data

13:35	Post Test M21	Background	10 *ppmv*	8-sec Dwell	14 *ppmv*	Total Dwell	2:30	*min:sec*	Final M21	47 *ppm*
									Leak @	Stem

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A *hour:min*	0:00	*hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	3.56E-06 kg/hr
Percent difference THC ER =	13%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.56E-08
C5 as Pentane	2.56E-08
n-Hexane	3.67E-08
C6 as Hexane	3.67E-08
n-Heptane	3.05E-08
C7 as Heptane	3.05E-08
n-Octane	2.64E-08
C8 as Octane	2.64E-08
n-Nonane	2.66E-08
C9 as Nonane	1.59E-07
n-Decane	2.68E-08
C10 as Decane	9.59E-07
n-Undecane	1.01E-07
C11 as Undecane	8.38E-07
n-Dodecane	3.83E-08
C12 as Dodecane	4.09E-07
n-Tridecane	7.05E-08
C13 as Tridecane	9.00E-08
n-Tetradecane	4.73E-08
C14 as tetradecane	2.66E-08
n-Pentadecane	2.67E-08
C15 as Pentadecane	2.67E-08
n-Hexadecane	2.66E-08
C16 as Hexadecane	2.66E-08
n-Heptadecane	2.63E-08
C17 as Heptadecane	2.63E-08
n-Octadecane	2.66E-08
C18 as Octodecane	2.66E-08
n-Nonadecane	2.66E-08
C19 as Nonadecane	2.66E-08
n-Eicosane	2.65E-08
C20 as Eicosane	2.65E-08
n-Heneicosane	2.68E-08
C21 as Heneicosane	2.68E-08
n-Docosane	2.65E-08
C22 as Docosane	2.65E-08
n-Tricosane	2.66E-08
C23 as Tricosane	2.66E-08
n-Tetracosane	2.67E-08
C24 as Tetracosane	2.67E-08
Total Hydrocarbon	3.56E-06

THC:	**1.89E-04**	**lbs/day**	**3.44E-05**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E082A	E082A		ND Adj	E083A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.4682	ND	37	144.46	ND	0	154	ND	0	37	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
C5 as Pentane	74.4682	ND	37	144.46	ND	0	154	ND	0	37	0.04	4	17	1.72E-08	0	0	0.00E+00	1.72E-08
n-Hexane	106.7101	ND	53	207	ND	0	220	ND	0	53	0.05	5	25	2.47E-08	0	0	0.00E+00	2.47E-08
C6 as Hexane	106.7101	ND	53	207	ND	0	220	ND	0	53	0.05	5	25	2.47E-08	0	0	0.00E+00	2.47E-08
n-Heptane	88.6512	ND	44	171.97	ND	0	183	ND	0	44	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
C7 as Heptane	88.6512	ND	44	171.97	ND	0	183	ND	0	44	0.04	4	21	2.05E-08	0	0	0.00E+00	2.05E-08
n-Octane	76.7132	ND	38	148.81	ND	0	158	ND	0	38	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C8 as Octane	76.7132	ND	38	148.81	ND	0	158	ND	0	38	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Nonane	77.2868	ND	39	149.92	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C9 as Nonane	609.5102	J	610	149.92	ND	0	160	ND	0	610	0.61	61	282	2.82E-07	0	0	0.00E+00	2.82E-07
n-Decane	77.9845	ND	39	151.28	ND	0	161	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C10 as Decane	1978.2066		1,978	151.28	ND	0	161	ND	0	1,978	1.98	198	915	9.15E-07	0	0	0.00E+00	9.15E-07
n-Undecane	209.3834	J	209	150.89	ND	0	161	ND	0	209	0.21	21	97	9.69E-08	0	0	0.00E+00	9.69E-08
C11 as Undecane	1670.8264		1,671	150.89	ND	0	161	ND	0	1,671	1.67	168	773	7.73E-07	0	0	0.00E+00	7.73E-07
n-Dodecane	89.5879	J	90	149.86	ND	0	159	ND	0	90	0.09	9	41	4.15E-08	0	0	0.00E+00	4.15E-08
C12 as Dodecane	819.3787		819	149.86	ND	0	159	ND	0	819	0.82	82	379	3.79E-07	0	0	0.00E+00	3.79E-07
n-Tridecane	131.5355	J	132	150.23	ND	0	160	ND	0	132	0.13	13	61	6.09E-08	0	0	0.00E+00	6.09E-08
C13 as Tridecane	312.7905	J	313	150.23	ND	0	160	ND	0	313	0.31	31	145	1.45E-07	0	0	0.00E+00	1.45E-07
n-Tetradecane	128.1417	J	128	150.08	ND	0	160	ND	0	128	0.13	13	59	5.93E-08	0	0	0.00E+00	5.93E-08
C14 as tetradecane	77.3643	ND	39	150.08	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Pentadecane	77.7519	ND	39	150.83	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C15 as Pentadecane	77.7519	ND	39	150.83	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Hexadecane	77.3333	ND	39	150.02	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C16 as Hexadecane	77.3333	ND	39	150.02	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Heptadecane	76.4341	ND	38	148.27	ND	0	158	ND	0	38	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C17 as Heptadecane	76.4341	ND	38	148.27	ND	0	158	ND	0	38	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Octadecane	77.2868	ND	39	149.92	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C18 as Octodecane	77.2868	ND	39	149.92	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Nonadecane	77.4419	ND	39	150.23	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C19 as Nonadecane	77.4419	ND	39	150.23	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Eicosane	77.2558	ND	39	149.86	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C20 as Eicosane	77.2558	ND	39	149.86	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Heneicosane	77.9845	ND	39	151.28	ND	0	161	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C21 as Heneicosane	77.9845	ND	39	151.28	ND	0	161	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Docosane	77.1008	ND	39	149.56	ND	0	159	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
C22 as Docosane	77.1008	ND	39	149.56	ND	0	159	ND	0	39	0.04	4	18	1.78E-08	0	0	0.00E+00	1.78E-08
n-Tricosane	77.5194	ND	39	150.38	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C23 as Tricosane	77.5194	ND	39	150.38	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Tetracosane	77.6279	ND	39	150.59	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C24 as Tetracosane	77.6279	ND	39	150.59	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
Total Hydrocarbon			7,186			0			0		7.19	721	3,325	3.33E-06	0	0	0.00E+00	3.33E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E082B	E082B		ND Adj	E083A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146.66259	ND	73	144	ND	0	154	ND	0	73	0.07	7	34	3.39E-08	3.39E-08
C5 as Pentane	146.66259	ND	73	144	ND	0	154	ND	0	73	0.07	7	34	3.39E-08	3.39E-08
n-Hexane	210.16183	ND	105	207	ND	0	220	ND	0	105	0.11	11	49	4.86E-08	4.86E-08
C6 as Hexane	210.16183	ND	105	207	ND	0	220	ND	0	105	0.11	11	49	4.86E-08	4.86E-08
n-Heptane	174.59541	ND	87	172	ND	0	183	ND	0	87	0.09	9	40	4.04E-08	4.04E-08
C7 as Heptane	174.59541	ND	87	172	ND	0	183	ND	0	87	0.09	9	40	4.04E-08	4.04E-08
n-Octane	151.08397	ND	76	149	ND	0	158	ND	0	76	0.08	8	35	3.50E-08	3.50E-08
C8 as Octane	151.08397	ND	76	149	ND	0	158	ND	0	76	0.08	8	35	3.50E-08	3.50E-08
n-Nonane	152.21374	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
C9 as Nonane	152.21374	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
n-Decane	153.58778	ND	77	151	ND	0	161	ND	0	77	0.08	8	36	3.55E-08	3.55E-08
C10 as Decane	2167.6088		2,168	151	ND	0	161	ND	0	2,168	2.17	217	1003	1.00E-06	1.00E-06
n-Undecane	228.6005	J	229	151	ND	0	161	ND	0	229	0.23	23	106	1.06E-07	1.06E-07
C11 as Undecane	1952.3549		1,952	151	ND	0	161	ND	0	1,952	1.95	196	903	9.03E-07	9.03E-07
n-Dodecane	152.15267	ND	76	150	ND	0	159	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
C12 as Dodecane	949.61771	J	950	150	ND	0	159	ND	0	950	0.95	95	439	4.39E-07	4.39E-07
n-Tridecane	173.18162	J	173	150	ND	0	160	ND	0	173	0.17	17	80	8.01E-08	8.01E-08
C13 as Tridecane	152.51908	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.53E-08	3.53E-08
n-Tetradecane	152.36641	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.53E-08	3.53E-08
C14 as tetradecane	152.36641	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.53E-08	3.53E-08
n-Pentadecane	153.12977	ND	77	151	ND	0	160	ND	0	77	0.08	8	35	3.54E-08	3.54E-08
C15 as Pentadecane	153.12977	ND	77	151	ND	0	160	ND	0	77	0.08	8	35	3.54E-08	3.54E-08
n-Hexadecane	152.30534	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
C16 as Hexadecane	152.30534	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
n-Heptadecane	150.53435	ND	75	148	ND	0	158	ND	0	75	0.08	8	35	3.48E-08	3.48E-08
C17 as Heptadecane	150.53435	ND	75	148	ND	0	158	ND	0	75	0.08	8	35	3.48E-08	3.48E-08
n-Octadecane	152.21374	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
C18 as Octodecane	152.21374	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
n-Nonadecane	152.51908	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.53E-08	3.53E-08
C19 as Nonadecane	152.51908	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.53E-08	3.53E-08
n-Eicosane	152.15267	ND	76	150	ND	0	159	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
C20 as Eicosane	152.15267	ND	76	150	ND	0	159	ND	0	76	0.08	8	35	3.52E-08	3.52E-08
n-Heneicosane	153.58778	ND	77	151	ND	0	161	ND	0	77	0.08	8	36	3.55E-08	3.55E-08
C21 as Heneicosane	153.58778	ND	77	151	ND	0	161	ND	0	77	0.08	8	36	3.55E-08	3.55E-08
n-Docosane	151.84732	ND	76	150	ND	0	159	ND	0	76	0.08	8	35	3.51E-08	3.51E-08
C22 as Docosane	151.84732	ND	76	150	ND	0	159	ND	0	76	0.08	8	35	3.51E-08	3.51E-08
n-Tricosane	152.67175	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.53E-08	3.53E-08
C23 as Tricosane	152.67175	ND	76	150	ND	0	160	ND	0	76	0.08	8	35	3.53E-08	3.53E-08
n-Tetracosane	152.88549	ND	76	151	ND	0	160	ND	0	76	0.08	8	35	3.54E-08	3.54E-08
C24 as Tetracosane	152.88549	ND	76	151	ND	0	160	ND	0	76	0.08	8	35	3.54E-08	3.54E-08
Total Hydrocarbon			8,211			0			0		8.21	823	3,800	3.80E-06	3.80E-06

Bagging Data Form — Vacuum Method

Sample Id: E085

Equipment type:	Valve		**Component ID:**	E-1517	
Equipment Subtype:	Gate		**Unit:**	Refinery E	
Line Size:	6 inches		**Date:**	8-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	29.98 inHg	761.5 mmHg	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	78 °F	25.6 °C	**TVA ID**	37887	
Component Temp:	°F	-17.8 °C	**Stream Pressure/Temp:**	82 psig	°F
Stream Description:	Diesel from E101				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
11:22	Background	-7	ppmv	8-sec Dwell	16	ppmv	Total Dwell	2:00	min:sec	Final M21	41 ppm
11:54	Initial Bag Vacuum	0.06	inches H2O	DGM Vac.	2	inches H2O	Bag Temp	80.2	°F	Leak @	Packing

Bag Concentrations (ppmv) (had to vent bag)

Time	11:55	11:57	11:59	12:01	12:03	12:05	12:07	12:09	12:16	12:20				
ppmv	1.6	3.4	4.2	4.7	5.3	5.5	5.8	6.1	7.4	7.6				

Sorbent Tube Sample Collection Parameters

E085A

Time									
12:09	Volume Start	743.0	Liters		Design Sample Flow Rate = 1 liter/min				
12:22	Volume Stop	756.0	Liters	Total Vol	13.0	Liters			
	Sample Run Time	13	Minutes	Sorbent Flow	1.000	L/min	$Sorbent Flow_{STP}$	0.996	L/min

E085B

Time									
12:09	Volume Start	732.8	Liters		Design Sample Flow Rate = 1 liter/min				
12:22	Volume Stop	746.2	Liters	Total Vol	13.4	Liters			
	Sample Run Time	13	Minutes	Sorbent Flow	1.031	L/min	$Sorbent Flow_{STP}$	1.026	L/min
	$Total ST Vol_{STP}$	26.28	Liters	$DGM Vol_{STP}$	84.40	Liters	$Total Run Vol_{STP}$	110.69	Liters

Bagging Parameters

Time									
12:10	Vacuum check	0.06	inches H2O			DGM_P	1.9	inches H2O vacuum	757.9 mmHg
12:11	DGM_{10L} Time	01:31.5	min:sec.frac	DGM Time	1.533	DGM Flow	6.52	$DGM Flow_{STP}$	6.49 liters/minute
12:11	Bag Temp.	86	°F	30.0	°C	$Sample_T$	71	°F	21.7 °C

Post-Sample Data

12:29	Post Test M21	Background	-6	ppmv	8-sec Dwell	19 ppmv	Total Dwell	2:00 min:sec	Final M21	46 ppm
									Leak @	Packing
Condensate accumulation: starting time			N/A	hour:min	Final time	N/A hour:min		0:00 hours:min		
Organic condensate collected			N/A	ml						
Density of organic condensate			N/A	g/ml						

Average THC emissions =	2.39E-06 kg/hr
Percent difference THC ER =	1%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.77E-08
C5 as Pentane	2.77E-08
n-Hexane	3.98E-08
C6 as Hexane	3.98E-08
n-Heptane	3.30E-08
C7 as Heptane	3.30E-08
n-Octane	2.86E-08
C8 as Octane	5.99E-08
n-Nonane	4.19E-08
C9 as Nonane	1.75E-07
n-Decane	7.50E-08
C10 as Decane	5.23E-07
n-Undecane	1.22E-07
C11 as Undecane	2.40E-07
n-Dodecane	9.08E-08
C12 as Dodecane	1.02E-07
n-Tridecane	4.88E-08
C13 as Tridecane	2.89E-08
n-Tetradecane	4.79E-08
C14 as tetradecane	2.88E-08
n-Pentadecane	2.90E-08
C15 as Pentadecane	2.90E-08
n-Hexadecane	2.88E-08
C16 as Hexadecane	2.88E-08
n-Heptadecane	2.85E-08
C17 as Heptadecane	2.85E-08
n-Octadecane	2.88E-08
C18 as Octodecane	2.88E-08
n-Nonadecane	2.89E-08
C19 as Nonadecane	2.89E-08
n-Eicosane	2.88E-08
C20 as Eicosane	2.88E-08
n-Heneicosane	2.91E-08
C21 as Heneicosane	2.91E-08
n-Docosane	2.87E-08
C22 as Docosane	2.87E-08
n-Tricosane	2.89E-08
C23 as Tricosane	2.89E-08
n-Tetracosane	2.89E-08
C24 as Tetracosane	2.89E-08
Total Hydrocarbon	2.39E-06

THC:	1.26E-04	lbs/day	2.31E-05 tons/yr

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E085A	E085A		ND Adj	E086A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	73.8954	ND	37	143.38	ND	0	154	ND	0	37	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C5 as Pentane	73.8954	ND	37	143.38	ND	0	154	ND	0	37	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Hexane	105.8892	ND	53	205.46	ND	0	220	ND	0	53	0.05	6	27	2.70E-08	0	0	0.00E+00	2.70E-08
C6 as Hexane	105.8892	ND	53	205.46	ND	0	220	ND	0	53	0.05	6	27	2.70E-08	0	0	0.00E+00	2.70E-08
n-Heptane	87.9692	ND	44	170.69	ND	0	183	ND	0	44	0.04	5	22	2.25E-08	0	0	0.00E+00	2.25E-08
C7 as Heptane	87.9692	ND	44	170.69	ND	0	183	ND	0	44	0.04	5	22	2.25E-08	0	0	0.00E+00	2.25E-08
n-Octane	76.1231	ND	38	147.7	ND	0	158	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C8 as Octane	160.5227	J	161	147.7	ND	0	158	ND	0	161	0.16	18	82	8.20E-08	0	0	0.00E+00	8.20E-08
n-Nonane	89.8277	J	90	148.81	ND	0	160	ND	0	90	0.09	10	46	4.59E-08	0	0	0.00E+00	4.59E-08
C9 as Nonane	611.5312	J	612	148.81	ND	0	160	ND	0	612	0.61	68	312	3.12E-07	0	0	0.00E+00	3.12E-07
n-Decane	218.6715	J	219	150.15	ND	0	161	ND	0	219	0.22	24	112	1.12E-07	0	0	0.00E+00	1.12E-07
C10 as Decane	1035.6283		1,036	150.15	ND	0	161	ND	0	1,036	1.04	115	529	5.29E-07	0	0	0.00E+00	5.29E-07
n-Undecane	235.5354	J	236	149.76	ND	0	161	ND	0	236	0.24	26	120	1.20E-07	0	0	0.00E+00	1.20E-07
C11 as Undecane	534.1856	J	534	149.76	ND	0	161	ND	0	534	0.53	59	273	2.73E-07	0	0	0.00E+00	2.73E-07
n-Dodecane	195.2316	J	195	148.75	ND	0	159	ND	0	195	0.20	22	100	9.97E-08	0	0	0.00E+00	9.97E-08
C12 as Dodecane	246.0702	J	246	148.75	ND	0	159	ND	0	246	0.25	27	126	1.26E-07	0	0	0.00E+00	1.26E-07
n-Tridecane	116.4154	J	116	149.1	ND	0	160	ND	0	116	0.12	13	59	5.95E-08	0	0	0.00E+00	5.95E-08
C13 as Tridecane	76.8462	ND	38	149.1	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetradecane	112.8744	J	113	148.96	ND	0	160	ND	0	113	0.11	12	58	5.77E-08	0	0	0.00E+00	5.77E-08
C14 as tetradecane	76.7692	ND	38	148.96	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Pentadecane	77.1538	ND	39	149.7	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C15 as Pentadecane	77.1538	ND	39	149.7	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
n-Hexadecane	76.7385	ND	38	148.9	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C16 as Hexadecane	76.7385	ND	38	148.9	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heptadecane	75.8462	ND	38	147.16	ND	0	158	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
C17 as Heptadecane	75.8462	ND	38	147.16	ND	0	158	ND	0	38	0.04	4	19	1.94E-08	0	0	0.00E+00	1.94E-08
n-Octadecane	76.6923	ND	38	148.81	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C18 as Octodecane	76.6923	ND	38	148.81	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Nonadecane	76.8462	ND	38	149.1	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C19 as Nonadecane	76.8462	ND	38	149.1	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Eicosane	76.6615	ND	38	148.75	ND	0	159	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C20 as Eicosane	76.6615	ND	38	148.75	ND	0	159	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Heneicosane	77.3846	ND	39	150.15	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
C21 as Heneicosane	77.3846	ND	39	150.15	ND	0	161	ND	0	39	0.04	4	20	1.98E-08	0	0	0.00E+00	1.98E-08
n-Docosane	76.5077	ND	38	148.45	ND	0	159	ND	0	38	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C22 as Docosane	76.5077	ND	38	148.45	ND	0	159	ND	0	38	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Tricosane	76.9231	ND	38	149.25	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
C23 as Tricosane	76.9231	ND	38	149.25	ND	0	160	ND	0	38	0.04	4	20	1.96E-08	0	0	0.00E+00	1.96E-08
n-Tetracosane	77.0308	ND	39	149.46	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
C24 as Tetracosane	77.0308	ND	39	149.46	ND	0	160	ND	0	39	0.04	4	20	1.97E-08	0	0	0.00E+00	1.97E-08
Total Hydrocarbon			4,707			0			0		4.71	521	2,405	2.40E-06	0	0	0.00E+00	2.40E-06

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V			COMBINED
E085B	E085B		ND Adj	E086A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE			EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr		kg/hr
n-Pentane	143.37911	ND	72	143	ND	0	154	ND	0	72	0.07	8	37	3.66E-08		3.66E-08
C5 as Pentane	143.37911	ND	72	143	ND	0	154	ND	0	72	0.07	8	37	3.66E-08		3.66E-08
n-Hexane	205.45672	ND	103	205	ND	0	220	ND	0	103	0.10	11	52	5.25E-08		5.25E-08
C6 as Hexane	205.45672	ND	103	205	ND	0	220	ND	0	103	0.10	11	52	5.25E-08		5.25E-08
n-Heptane	170.68657	ND	85	171	ND	0	183	ND	0	85	0.09	9	44	4.36E-08		4.36E-08
C7 as Heptane	170.68657	ND	85	171	ND	0	183	ND	0	85	0.09	9	44	4.36E-08		4.36E-08
n-Octane	147.7015	ND	74	148	ND	0	158	ND	0	74	0.07	8	38	3.77E-08		3.77E-08
C8 as Octane	147.7015	ND	74	148	ND	0	158	ND	0	74	0.07	8	38	3.77E-08		3.77E-08
n-Nonane	148.80597	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
C9 as Nonane	148.80597	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
n-Decane	150.14926	ND	75	150	ND	0	161	ND	0	75	0.08	8	38	3.84E-08		3.84E-08
C10 as Decane	1013.082	J	1,013	150	ND	0	161	ND	0	1,013	1.01	112	518	5.18E-07		5.18E-07
n-Undecane	241.38277	J	241	150	ND	0	161	ND	0	241	0.24	27	123	1.23E-07		1.23E-07
C11 as Undecane	404.83224	J	405	150	ND	0	161	ND	0	405	0.40	45	207	2.07E-07		2.07E-07
n-Dodecane	160.30292	J	160	149	ND	0	159	ND	0	160	0.16	18	82	8.19E-08		8.19E-08
C12 as Dodecane	152.75083	J	153	149	ND	0	159	ND	0	153	0.15	17	78	7.80E-08		7.80E-08
n-Tridecane	149.10448	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.81E-08		3.81E-08
C13 as Tridecane	149.10448	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.81E-08		3.81E-08
n-Tetradecane	148.95523	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
C14 as tetradecane	148.95523	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
n-Pentadecane	149.7015	ND	75	150	ND	0	160	ND	0	75	0.07	8	38	3.82E-08		3.82E-08
C15 as Pentadecane	149.7015	ND	75	150	ND	0	160	ND	0	75	0.07	8	38	3.82E-08		3.82E-08
n-Hexadecane	148.89553	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
C16 as Hexadecane	148.89553	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
n-Heptadecane	147.16418	ND	74	147	ND	0	158	ND	0	74	0.07	8	38	3.76E-08		3.76E-08
C17 as Heptadecane	147.16418	ND	74	147	ND	0	158	ND	0	74	0.07	8	38	3.76E-08		3.76E-08
n-Octadecane	148.80597	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
C18 as Octodecane	148.80597	ND	74	149	ND	0	160	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
n-Nonadecane	149.10448	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.81E-08		3.81E-08
C19 as Nonadecane	149.10448	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.81E-08		3.81E-08
n-Eicosane	148.74627	ND	74	149	ND	0	159	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
C20 as Eicosane	148.74627	ND	74	149	ND	0	159	ND	0	74	0.07	8	38	3.80E-08		3.80E-08
n-Heneicosane	150.14926	ND	75	150	ND	0	161	ND	0	75	0.08	8	38	3.84E-08		3.84E-08
C21 as Heneicosane	150.14926	ND	75	150	ND	0	161	ND	0	75	0.08	8	38	3.84E-08		3.84E-08
n-Docosane	148.44777	ND	74	148	ND	0	159	ND	0	74	0.07	8	38	3.79E-08		3.79E-08
C22 as Docosane	148.44777	ND	74	148	ND	0	159	ND	0	74	0.07	8	38	3.79E-08		3.79E-08
n-Tricosane	149.25374	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.81E-08		3.81E-08
C23 as Tricosane	149.25374	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.81E-08		3.81E-08
n-Tetracosane	149.46269	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.82E-08		3.82E-08
C24 as Tetracosane	149.46269	ND	75	149	ND	0	160	ND	0	75	0.07	8	38	3.82E-08		3.82E-08
Total Hydrocarbon			4,651			0			0		4.65	515	2,376	2.38E-06		2.38E-06

Bagging Data Form	**Vacuum Method**	**Sample Id**	**E087**
Equipment type:	Valve	**Component ID:**	**E-2230**
Equipment Subtype:	Gate	**Unit:**	Refinery E
Line Size:	6 *inches*	**Date:**	8-Nov-18
Phase (G, LL, HL):	HL	**Analysis team:**	EG/DR
Barometric pressure	29.96 *inHg* / 761.0 *mmHg*	**Sample Pump A**	LP52979
		Sample Pump B	LP52975
Ambient Temp:	90.8 *°F* / 32.7 *°C*	**TVA ID**	37887
Component Temp:	280 *°F* / 137.8 *°C*	**Stream Pressure/Temp:**	*psig* *°F*
Stream Description:	*Jet to HP*		

WSPA
Western States Petroleum Association

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time											
14:18	Background	10	*ppmv*	8-sec Dwell	47	*ppmv*	Total Dwell	3:00	*min:sec*	Final M21	353 *ppm*
14:19	Initial Bag Vacuum	0.105	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	177.8	*°F*	Leak @	Packing

Bag Concentrations (ppmv) (had to vent bag)

Time	14:20	14:22	14:24	14:26	14:28	14:30	14:32	14:34	14:36	14:38	14:40	14:45	14:52
ppmv	28.6	37.1	43.1	49.2	53.9	57.5	61.2	64.1	66.5	69.5	71.1	69.5	100

Sorbent Tube Sample Collection Parameters

E087A

Time									
14:40	Volume Start	756.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:53	Volume Stop	769.1	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent $Flow_{STP}$	0.953	*L/min*

E087B

14:40	Volume Start	746.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:53	Volume Stop	759.1	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent $Flow_{STP}$	0.953	*L/min*
	Total ST Vol_{STP}	24.79	*Liters*	DGM Vol_{STP}	75.69	*Liters*	Total Run Vol_{STP}	100.48	*Liters*

Bagging Parameters

Time										
14:41	Vacuum check	0.08	*inches H2O*			DGM_P	1.8	*inches H2O vacuum*	757.6	*mmHg*
14:44	DGM_{10L} Time	01:38.6	*min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM $Flow_{STP}$	5.82	*liters/minute*
14:42	Bag Temp.	191.3	*°F*	88.5	*°C*	$Sample_T$	90	*°F*	32.2	*°C*

Post-Sample Data

15:00	Post Test M21	Background	9	*ppmv*	8-sec Dwell	644	*ppmv*	Total Dwell	2:00 *min:sec*	Final M21 1126 *ppm*
										Leak @ Packing
Condensate accumulation: starting time			N/A	*hour:min*	Final time	N/A	*hour:min*		0:00 *hours:min*	
Organic condensate collected			N/A	*ml*						
Density of organic condensate			N/A	*g/ml*						

Average THC emissions =	1.18E-04	kg/hr
Percent difference THC ER =	22%	
Acceptable?	No	

AVERAGE EMISSION RATES

Component	**Avg ER kg/hr**
n-Pentane	2.55E-08
C5 as Pentane	2.55E-08
n-Hexane	2.99E-08
C6 as Hexane	2.99E-08
n-Heptane	2.85E-08
C7 as Heptane	2.85E-08
n-Octane	3.35E-07
C8 as Octane	2.70E-06
n-Nonane	1.41E-06
C9 as Nonane	8.05E-06
n-Decane	2.96E-06
C10 as Decane	1.44E-05
n-Undecane	4.82E-06
C11 as Undecane	2.09E-05
n-Dodecane	6.95E-06
C12 as Dodecane	2.39E-05
n-Tridecane	5.78E-06
C13 as Tridecane	1.65E-05
n-Tetradecane	2.80E-06
C14 as tetradecane	4.80E-06
n-Pentadecane	4.72E-07
C15 as Pentadecane	1.33E-07
n-Hexadecane	3.72E-08
C16 as Hexadecane	2.69E-08
n-Heptadecane	2.66E-08
C17 as Heptadecane	2.66E-08
n-Octadecane	2.69E-08
C18 as Octodecane	2.69E-08
n-Nonadecane	2.69E-08
C19 as Nonadecane	2.69E-08
n-Eicosane	2.69E-08
C20 as Eicosane	2.69E-08
n-Heneicosane	2.71E-08
C21 as Heneicosane	2.71E-08
n-Docosane	2.68E-08
C22 as Docosane	2.68E-08
n-Tricosane	2.70E-08
C23 as Tricosane	2.70E-08
n-Tetracosane	2.70E-08
C24 as Tetracosane	2.70E-08
Total Hydrocarbon	1.18E-04

THC:	**6.22E-03**	**lbs/day**	**1.13E-03**	**tons/yr**

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E087A	E087A		ND Adj	E088A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
C5 as Pentane	74.4682	ND	37	148.94	ND	0	154	ND	0	37	0.04	4	17	1.73E-08	0	0	0.00E+00	1.73E-08
n-Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	5	25	2.47E-08	0	0	0.00E+00	2.47E-08
C6 as Hexane	106.7101	ND	53	213.42	ND	0	220	ND	0	53	0.05	5	25	2.47E-08	0	0	0.00E+00	2.47E-08
n-Heptane	88.6512	ND	44	177.3	ND	0	183	ND	0	44	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C7 as Heptane	88.6512	ND	44	177.3	ND	0	183	ND	0	44	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Octane	831.0205		831	153.43	ND	0	158	ND	0	831	0.83	83	385	3.85E-07	0	0	0.00E+00	3.85E-07
C8 as Octane	6735.1423		6,735	153.43	ND	0	158	ND	0	6,735	6.74	677	3123	3.12E-06	0	0	0.00E+00	3.12E-06
n-Nonane	3452.9029		3,453	154.57	ND	0	160	ND	0	3,453	3.45	347	1601	1.60E-06	0	0	0.00E+00	1.60E-06
C9 as Nonane	#########		19,505	154.57	ND	0	160	ND	0	19,505	19.50	1960	9045	9.05E-06	0	0	0.00E+00	9.05E-06
n-Decane	7132.6160		7,133	155.97	ND	0	161	ND	0	7,133	7.13	717	3308	3.31E-06	0	0	0.00E+00	3.31E-06
C10 as Decane	#########		34,651	155.97	ND	0	161	ND	0	34,651	34.65	3482	16069	1.61E-05	0	0	0.00E+00	1.61E-05
n-Undecane	#########		11,547	155.57	ND	0	161	ND	0	11,547	11.55	1160	5355	5.35E-06	0	0	0.00E+00	5.35E-06
C11 as Undecane	#########		50,145	155.57	ND	0	161	ND	0	50,145	50.15	5039	23255	2.33E-05	0	0	0.00E+00	2.33E-05
n-Dodecane	#########		16,606	154.51	ND	0	159	ND	0	16,606	16.61	1669	7701	7.70E-06	0	0	0.00E+00	7.70E-06
C12 as Dodecane	#########		57,361	154.51	ND	0	159	ND	0	57,361	57.36	5764	26601	2.66E-05	0	0	0.00E+00	2.66E-05
n-Tridecane	#########		13,734	154.88	ND	0	160	ND	0	13,734	13.73	1380	6369	6.37E-06	0	0	0.00E+00	6.37E-06
C13 as Tridecane	#########		39,316	154.88	ND	0	160	ND	0	39,316	39.32	3950	18233	1.82E-05	0	0	0.00E+00	1.82E-05
n-Tetradecane	6545.6847		6,546	154.73	ND	0	160	ND	0	6,546	6.55	658	3036	3.04E-06	0	0	0.00E+00	3.04E-06
C14 as tetradecane	#########		11,397	154.73	ND	0	160	ND	0	11,397	11.40	1145	5285	5.29E-06	0	0	0.00E+00	5.29E-06
n-Pentadecane	1149.8847		1,150	155.5	ND	0	160	ND	0	1,150	1.15	116	533	5.33E-07	0	0	0.00E+00	5.33E-07
C15 as Pentadecane	410.3790	J	410	155.5	ND	0	160	ND	0	410	0.41	41	190	1.90E-07	0	0	0.00E+00	1.90E-07
n-Hexadecane	83.1309	J	83	154.67	ND	0	160	ND	0	83	0.08	8	39	3.86E-08	0	0	0.00E+00	3.86E-08
C16 as Hexadecane	77.3333	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Heptadecane	76.4341	ND	38	152.87	ND	0	158	ND	0	38	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
C17 as Heptadecane	76.4341	ND	38	152.87	ND	0	158	ND	0	38	0.04	4	18	1.77E-08	0	0	0.00E+00	1.77E-08
n-Octadecane	77.2868	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C18 as Octodecane	77.2868	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Nonadecane	77.4419	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C19 as Nonadecane	77.4419	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Eicosane	77.2558	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C20 as Eicosane	77.2558	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
C21 as Heneicosane	77.9845	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	18	1.81E-08	0	0	0.00E+00	1.81E-08
n-Docosane	77.1008	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
C22 as Docosane	77.1008	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	18	1.79E-08	0	0	0.00E+00	1.79E-08
n-Tricosane	77.5194	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C23 as Tricosane	77.5194	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
n-Tetracosane	77.6279	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
C24 as Tetracosane	77.6279	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	18	1.80E-08	0	0	0.00E+00	1.80E-08
Total Hydrocarbon			281,531			0			0		281.53	28288	130,559	1.31E-04	0	0	0.00E+00	1.31E-04

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E087B	E087B		ND Adj	E088A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	145.14729	ND	73	149	ND	0	154	ND	0	73	0.07	7	34	3.37E-08	3.37E-08
C5 as Pentane	145.14729	ND	73	149	ND	0	154	ND	0	73	0.07	7	34	3.37E-08	3.37E-08
n-Hexane	150.7907	ND	75	213	ND	0	220	ND	0	75	0.08	8	35	3.50E-08	3.50E-08
C6 as Hexane	150.7907	ND	75	213	ND	0	220	ND	0	75	0.08	8	35	3.50E-08	3.50E-08
n-Heptane	157.5814	ND	79	177	ND	0	183	ND	0	79	0.08	8	37	3.65E-08	3.65E-08
C7 as Heptane	157.5814	ND	79	177	ND	0	183	ND	0	79	0.08	8	37	3.65E-08	3.65E-08
n-Octane	615.10615	J	615	153	ND	0	158	ND	0	615	0.62	62	285	2.85E-07	2.85E-07
C8 as Octane	4923.2066		4,923	153	ND	0	158	ND	0	4,923	4.92	495	2283	2.28E-06	2.28E-06
n-Nonane	2642.1644		2,642	155	ND	0	160	ND	0	2,642	2.64	265	1225	1.23E-06	1.23E-06
C9 as Nonane	15198.713		15,199	155	ND	0	160	ND	0	15,199	15.20	1527	7048	7.05E-06	7.05E-06
n-Decane	5616.2785		5,616	156	ND	0	161	ND	0	5,616	5.62	564	2605	2.60E-06	2.60E-06
C10 as Decane	27299.293		27,299	156	ND	0	161	ND	0	27,299	27.30	2743	12660	1.27E-05	1.27E-05
n-Undecane	9235.1546		9,235	156	ND	0	161	ND	0	9,235	9.24	928	4283	4.28E-06	4.28E-06
C11 as Undecane	39892.997		39,893	156	ND	0	161	ND	0	39,893	39.89	4008	18500	1.85E-05	1.85E-05
n-Dodecane	13369.523		13,370	155	ND	0	159	ND	0	13,370	13.37	1343	6200	6.20E-06	6.20E-06
C12 as Dodecane	45864.976		45,865	155	ND	0	159	ND	0	45,865	45.86	4608	21270	2.13E-05	2.13E-05
n-Tridecane	11201.207		11,201	155	ND	0	160	ND	0	11,201	11.20	1125	5195	5.19E-06	5.19E-06
C13 as Tridecane	31656.031		31,656	155	ND	0	160	ND	0	31,656	31.66	3181	14680	1.47E-05	1.47E-05
n-Tetradecane	5530.2944		5,530	155	ND	0	160	ND	0	5,530	5.53	556	2565	2.56E-06	2.56E-06
C14 as tetradecane	9294.7095		9,295	155	ND	0	160	ND	0	9,295	9.29	934	4310	4.31E-06	4.31E-06
n-Pentadecane	884.17461	J	884	156	ND	0	160	ND	0	884	0.88	89	410	4.10E-07	4.10E-07
C15 as Pentadecane	162.81135	J	163	156	ND	0	160	ND	0	163	0.16	16	76	7.55E-08	7.55E-08
n-Hexadecane	154.66667	ND	77	155	ND	0	160	ND	0	77	0.08	8	36	3.59E-08	3.59E-08
C16 as Hexadecane	154.66667	ND	77	155	ND	0	160	ND	0	77	0.08	8	36	3.59E-08	3.59E-08
n-Heptadecane	152.86822	ND	76	153	ND	0	158	ND	0	76	0.08	8	35	3.54E-08	3.54E-08
C17 as Heptadecane	152.86822	ND	76	153	ND	0	158	ND	0	76	0.08	8	35	3.54E-08	3.54E-08
n-Octadecane	154.57365	ND	77	155	ND	0	160	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
C18 as Octodecane	154.57365	ND	77	155	ND	0	160	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
n-Nonadecane	154.88373	ND	77	155	ND	0	160	ND	0	77	0.08	8	36	3.59E-08	3.59E-08
C19 as Nonadecane	154.88373	ND	77	155	ND	0	160	ND	0	77	0.08	8	36	3.59E-08	3.59E-08
n-Eicosane	154.51163	ND	77	155	ND	0	159	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
C20 as Eicosane	154.51163	ND	77	155	ND	0	159	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
n-Heneicosane	155.969	ND	78	156	ND	0	161	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
C21 as Heneicosane	155.969	ND	78	156	ND	0	161	ND	0	78	0.08	8	36	3.62E-08	3.62E-08
n-Docosane	154.20155	ND	77	154	ND	0	159	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
C22 as Docosane	154.20155	ND	77	154	ND	0	159	ND	0	77	0.08	8	36	3.58E-08	3.58E-08
n-Tricosane	155.03876	ND	78	155	ND	0	160	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
C23 as Tricosane	155.03876	ND	78	155	ND	0	160	ND	0	78	0.08	8	36	3.59E-08	3.59E-08
n-Tetracosane	155.25582	ND	78	155	ND	0	160	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
C24 as Tetracosane	155.25582	ND	78	155	ND	0	160	ND	0	78	0.08	8	36	3.60E-08	3.60E-08
Total Hydrocarbon			225,232			0			0		225.23	22631	104,451	1.04E-04	1.04E-04

Bagging Data Form — Vacuum Method

Sample Id	E089					
Equipment type:	Connector		**Component ID:**	E-55		
Equipment Subtype:	Bull Plug		**Unit:**	Refinery E		
Line Size:	3/4	inches	**Date:**	9-Nov-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	30.06 inHg	763.5 mmHg	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	76 °F	24.4 °C	**TVA ID**	36502		
Component Temp:	126 °F	52.2 °C	**Stream Pressure/Temp:**	2200	psig	°F
Stream Description:	HCRF					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time									
11:42	Background	0 ppmv	8-sec Dwell	30 ppmv	Total Dwell	3:00 min:sec	Final M21	288 ppm
12:19	Initial Bag Vacuum	0.1 inches H2O	DGM Vac.	2 inches H2O	Bag Temp	80.1 °F	Leak @	Plug

Bag Concentrations (ppmv) (had to vent bag)

Time	12:21	12:23	12:25	12:27	12:29	12:31	12:33	12:39	12:44					
ppmv	12.6	15.2	16	16.6	17	17.3	17.8	17.7	17.9					

Sorbent Tube Sample Collection Parameters

E089A

Time						
12:33	Volume Start	771.5 Liters		Design Sample Flow Rate = 1 liter/min		
12:46	Volume Stop	784.2 Liters	Total Vol	12.7 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.977 L/min	Sorbent Flow$_{STP}$	0.982 L/min

E089B

Time						
12:33	Volume Start	761.0 Liters		Design Sample Flow Rate = 1 liter/min		
12:46	Volume Stop	773.8 Liters	Total Vol	12.8 Liters		
	Sample Run Time	13 Minutes		Sorbent Flow 0.985 L/min	Sorbent Flow$_{STP}$	0.990 L/min

Total ST Vol$_{STP}$ 25.64 Liters — DGM Vol$_{STP}$ 86.19 Liters — Total Run Vol$_{STP}$ 111.83 Liters

Bagging Parameters

Time								
12:35	Vacuum check	0.11 inches H2O			DGM$_P$	2 inches H2O vacuum		759.8 mmHg
12:38	DGM$_{10L}$ Time	01:31.4 min:sec.frac	DGM Time	1.517	DGM Flow	6.59	DGM Flow$_{STP}$	6.63 liters/minute
12:35	Bag Temp.	91.8 °F		33.2 °C	Sample$_T$	67 °F		19.4 °C

Post-Sample Data

12:53	Post Test M21	Background 3 ppmv	8-sec Dwell	101 ppmv	Total Dwell	2:00 min:sec	Final M21	295 ppm
							Leak @	Plug

Condensate accumulation: starting time	N/A hour:min	Final time	N/A hour:min	0:00 hours:min
Organic condensate collected	N/A ml			
Density of organic condensate	N/A g/ml			

Average THC emissions =	1.13E-05 kg/hr
Percent difference THC ER =	18%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.86E-08
C5 as Pentane	2.86E-08
n-Hexane	3.36E-08
C6 as Hexane	3.36E-08
n-Heptane	3.21E-08
C7 as Heptane	3.21E-08
n-Octane	3.00E-08
C8 as Octane	3.39E-07
n-Nonane	6.02E-08
C9 as Nonane	1.64E-06
n-Decane	1.57E-07
C10 as Decane	3.54E-06
n-Undecane	2.75E-07
C11 as Undecane	2.43E-06
n-Dodecane	1.28E-07
C12 as Dodecane	8.03E-07
n-Tridecane	1.65E-07
C13 as Tridecane	4.45E-07
n-Tetradecane	2.16E-07
C14 as tetradecane	1.69E-07
n-Pentadecane	1.02E-07
C15 as Pentadecane	3.04E-08
n-Hexadecane	3.02E-08
C16 as Hexadecane	3.02E-08
n-Heptadecane	2.99E-08
C17 as Heptadecane	2.99E-08
n-Octadecane	3.02E-08
C18 as Octodecane	3.02E-08
n-Nonadecane	3.03E-08
C19 as Nonadecane	3.03E-08
n-Eicosane	3.02E-08
C20 as Eicosane	3.02E-08
n-Heneicosane	3.05E-08
C21 as Heneicosane	3.05E-08
n-Docosane	3.02E-08
C22 as Docosane	3.02E-08
n-Tricosane	3.03E-08
C23 as Tricosane	3.03E-08
n-Tetracosane	3.04E-08
C24 as Tetracosane	3.04E-08
Total Hydrocarbon	1.13E-05

THC: 5.96E-04 lbs/day 1.09E-04 tons/yr

E089A

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E089A	E089A		ND Adj	E090A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.6409	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
C5 as Pentane	75.6409	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	20	1.95E-08	0	0	0.00E+00	1.95E-08
n-Hexane	108.3906	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	28	2.80E-08	0	0	0.00E+00	2.80E-08
C6 as Hexane	108.3906	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	28	2.80E-08	0	0	0.00E+00	2.80E-08
n-Heptane	90.0472	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	23	2.32E-08	0	0	0.00E+00	2.32E-08
C7 as Heptane	90.0472	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	23	2.32E-08	0	0	0.00E+00	2.32E-08
n-Octane	77.9213	ND	39	153.43	ND	0	158	ND	0	39	0.04	4	20	2.01E-08	0	0	0.00E+00	2.01E-08
C8 as Octane	1236.4357		1,236	153.43	ND	0	158	ND	0	1,236	1.24	138	638	6.38E-07	0	0	0.00E+00	6.38E-07
n-Nonane	155.5165	J	156	154.57	ND	0	160	ND	0	156	0.16	17	80	8.03E-08	0	0	0.00E+00	8.03E-08
C9 as Nonane	6276.8240		6,277	154.57	ND	0	160	ND	0	6,277	6.28	702	3240	3.24E-06	0	0	0.00E+00	3.24E-06
n-Decane	275.1384	J	275	155.97	ND	0	161	ND	0	275	0.28	31	142	1.42E-07	0	0	0.00E+00	1.42E-07
C10 as Decane	6622.7914		6,623	155.97	ND	0	161	ND	0	6,623	6.62	741	3418	3.42E-06	0	0	0.00E+00	3.42E-06
n-Undecane	513.2881	J	513	155.57	ND	0	161	ND	0	513	0.51	57	265	2.65E-07	0	0	0.00E+00	2.65E-07
C11 as Undecane	4551.3649		4,551	155.57	ND	0	161	ND	0	4,551	4.55	509	2349	2.35E-06	0	0	0.00E+00	2.35E-06
n-Dodecane	236.3357	J	236	154.51	ND	0	159	ND	0	236	0.24	26	122	1.22E-07	0	0	0.00E+00	1.22E-07
C12 as Dodecane	1458.7859		1,459	154.51	ND	0	159	ND	0	1,459	1.46	163	753	7.53E-07	0	0	0.00E+00	7.53E-07
n-Tridecane	237.7740	J	238	154.88	ND	0	160	ND	0	238	0.24	27	123	1.23E-07	0	0	0.00E+00	1.23E-07
C13 as Tridecane	562.2258	J	562	154.88	ND	0	160	ND	0	562	0.56	63	290	2.90E-07	0	0	0.00E+00	2.90E-07
n-Tetradecane	274.1197	J	274	154.73	ND	0	160	ND	0	274	0.27	31	141	1.41E-07	0	0	0.00E+00	1.41E-07
C14 as tetradecane	163.9425	J	164	154.73	ND	0	160	ND	0	164	0.16	18	85	8.46E-08	0	0	0.00E+00	8.46E-08
n-Pentadecane	141.5139	J	142	155.5	ND	0	160	ND	0	142	0.14	16	73	7.30E-08	0	0	0.00E+00	7.30E-08
C15 as Pentadecane	78.9764	ND	39	155.5	ND	0	160	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C16 as Hexadecane	78.5512	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
C17 as Heptadecane	77.6378	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	2.00E-08	0	0	0.00E+00	2.00E-08
n-Octadecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C18 as Octodecane	78.5039	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C19 as Nonadecane	78.6614	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C20 as Eicosane	78.4724	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C21 as Heneicosane	79.2126	ND	40	155.97	ND	0	161	ND	0	40	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
C22 as Docosane	78.3150	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	20	2.02E-08	0	0	0.00E+00	2.02E-08
n-Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C23 as Tricosane	78.7402	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
n-Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
C24 as Tetracosane	78.8504	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	20	2.03E-08	0	0	0.00E+00	2.03E-08
Total Hydrocarbon			23,766			0			0		23.77	2658	12,266	1.23E-05	0	0	0.00E+00	1.23E-05

E089B

ANALYTICAL RESULTS				BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E089B	E089B		ND Adj	E090A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146.28125	ND	73	149	ND	0	154	ND	0	73	0.07	8	38	3.78E-08	3.78E-08
C5 as Pentane	146.28125	ND	73	149	ND	0	154	ND	0	73	0.07	8	38	3.78E-08	3.78E-08
n-Hexane	151.96875	ND	76	213	ND	0	220	ND	0	76	0.08	8	39	3.92E-08	3.92E-08
C6 as Hexane	151.96875	ND	76	213	ND	0	220	ND	0	76	0.08	8	39	3.92E-08	3.92E-08
n-Heptane	158.8125	ND	79	177	ND	0	183	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C7 as Heptane	158.8125	ND	79	177	ND	0	183	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Octane	154.625	ND	77	153	ND	0	158	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
C8 as Octane	154.625	ND	77	153	ND	0	158	ND	0	77	0.08	9	40	3.99E-08	3.99E-08
n-Nonane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
C9 as Nonane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
n-Decane	333.37461	J	333	156	ND	0	161	ND	0	333	0.33	37	172	1.72E-07	1.72E-07
C10 as Decane	7098.9018		7,099	156	ND	0	161	ND	0	7,099	7.10	794	3664	3.66E-06	3.66E-06
n-Undecane	552.19957	J	552	156	ND	0	161	ND	0	552	0.55	62	285	2.85E-07	2.85E-07
C11 as Undecane	4880.7121		4,881	156	ND	0	161	ND	0	4,881	4.88	546	2519	2.52E-06	2.52E-06
n-Dodecane	258.15723	J	258	155	ND	0	159	ND	0	258	0.26	29	133	1.33E-07	1.33E-07
C12 as Dodecane	1654.6431		1,655	155	ND	0	159	ND	0	1,655	1.65	185	854	8.54E-07	8.54E-07
n-Tridecane	401.38697	J	401	155	ND	0	160	ND	0	401	0.40	45	207	2.07E-07	2.07E-07
C13 as Tridecane	1163.1082	J	1,163	155	ND	0	160	ND	0	1,163	1.16	130	600	6.00E-07	6.00E-07
n-Tetradecane	561.1263	J	561	155	ND	0	160	ND	0	561	0.56	63	290	2.90E-07	2.90E-07
C14 as tetradecane	490.25624	J	490	155	ND	0	160	ND	0	490	0.49	55	253	2.53E-07	2.53E-07
n-Pentadecane	254.86815	J	255	156	ND	0	160	ND	0	255	0.25	29	132	1.32E-07	1.32E-07
C15 as Pentadecane	156.71875	ND	78	156	ND	0	160	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
n-Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
C16 as Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
n-Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
C17 as Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	9	40	3.98E-08	3.98E-08
n-Octadecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
C18 as Octodecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
n-Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.03E-08	4.03E-08
C19 as Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.03E-08	4.03E-08
n-Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
C20 as Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	9	40	4.02E-08	4.02E-08
n-Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
C21 as Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	9	41	4.06E-08	4.06E-08
n-Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	9	40	4.01E-08	4.01E-08
C22 as Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	9	40	4.01E-08	4.01E-08
n-Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.03E-08	4.03E-08
C23 as Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.03E-08	4.03E-08
n-Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
C24 as Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	9	40	4.04E-08	4.04E-08
Total Hydrocarbon			19,897			0			0		19.90	2225	10,270	1.03E-05	1.03E-05

Bagging Data Form — Vacuum Method

Sample Id: E091

WSPA — Western States Petroleum Association

Equipment type:	Connector		**Component ID:**	E-22	
Equipment Subtype:	Bull Plug		**Unit:**	Refinery E	
Line Size:	1 *inches*		**Date:**	9-Nov-18	
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR	
Barometric pressure	30.03 *inHg*	762.8 *mmHg*	**Sample Pump A**	LP52979	
			Sample Pump B	LP52975	
Ambient Temp:	72.8 *°F*	22.7 *°C*	**TVA ID**	36502	
Component Temp:	135 *°F*	57.2 *°C*	**Stream Pressure/Temp:**	*psig*	*°F*
Stream Description:	*HCRF Recycle Feed*				

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time												
13:00	Background	16	*ppmv*	8-sec Dwell	462	*ppmv*	Total Dwell	1:30	*min:sec*	Final M21	982	*ppm*
13:27	Initial Bag Vacuum	0.09	*inches H2O*	DGM Vac.	1.8	*inches H2O*	Bag Temp	79	*°F*	Leak @	Plug	

Bag Concentrations (ppmv) (had to vent bag)

Time	13:28	13:30	13:32	13:34	13:36	13:38	13:40	13:42	13:44	13:46	13:48	13:53	13:55	14:00
ppmv	47	55	68	74	82	89	95	104	108	111	111	126	129	136

Sorbent Tube Sample Collection Parameters

E091A

Time									
13:48	Volume Start	784.2	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:01	Volume Stop	797.0	*Liters*	Total Vol	12.8	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.985 *L/min*	Sorbent Flow$_{STP}$	0.990	*L/min*

E091B

13:48	Volume Start	773.8	*Liters*		Design Sample Flow Rate = 1 liter/min				
14:01	Volume Stop	786.7	*Liters*	Total Vol	12.9	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.992 *L/min*	Sorbent Flow$_{STP}$	0.997	*L/min*
	Total ST Vol$_{STP}$	25.83	*Liters*	DGM Vol$_{STP}$	79.18	*Liters*	Total Run Vol$_{STP}$	105.01	*Liters*

Bagging Parameters

Time										
13:49	Vacuum check	0.12	*inches H2O*			DGM$_P$	1.8	*inches H2O vacuum*	759.4	*mmHg*
13:52	DGM$_{10L}$ Time	01:39.0	*min:sec.frac*	DGM Time	1.650	DGM Flow	6.06	DGM Flow$_{STP}$	6.09	*liters/minute*
13:50	Bag Temp.	79.7	*°F*	26.5	*°C*	Sample$_T$	67	*°F*	19.4	*°C*

Post-Sample Data

14:16 Post Test M21	Background	13	*ppmv*	8-sec Dwell	325	*ppmv*	Total Dwell	2:00	*min:sec*	Final M21	814 *ppm*
										Leak @	Plug

Condensate accumulation: starting time	N/A	*hour:min*	Final time	N/A	*hour:min*	0:00 *hours:min*
Organic condensate collected	N/A	*ml*				
Density of organic condensate	N/A	*g/ml*				

Average THC emissions =	2.47E-04 kg/hr
Percent difference THC ER =	20%
Acceptable?	Yes

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.68E-08
C5 as Pentane	2.68E-08
n-Hexane	3.14E-08
C6 as Hexane	3.14E-08
n-Heptane	3.01E-08
C7 as Heptane	3.01E-08
n-Octane	2.81E-08
C8 as Octane	4.19E-06
n-Nonane	6.83E-07
C9 as Nonane	3.51E-05
n-Decane	1.93E-06
C10 as Decane	7.31E-05
n-Undecane	6.98E-06
C11 as Undecane	7.68E-05
n-Dodecane	3.62E-06
C12 as Dodecane	3.28E-05
n-Tridecane	2.44E-06
C13 as Tridecane	7.44E-06
n-Tetradecane	4.22E-07
C14 as tetradecane	5.51E-07
n-Pentadecane	4.45E-08
C15 as Pentadecane	2.85E-08
n-Hexadecane	2.83E-08
C16 as Hexadecane	2.83E-08
n-Heptadecane	2.80E-08
C17 as Heptadecane	2.80E-08
n-Octadecane	2.83E-08
C18 as Octodecane	2.83E-08
n-Nonadecane	2.84E-08
C19 as Nonadecane	2.84E-08
n-Eicosane	2.83E-08
C20 as Eicosane	2.83E-08
n-Heneicosane	2.86E-08
C21 as Heneicosane	2.86E-08
n-Docosane	2.82E-08
C22 as Docosane	2.82E-08
n-Tricosane	2.84E-08
C23 as Tricosane	2.84E-08
n-Tetracosane	2.84E-08
C24 as Tetracosane	2.84E-08
Total Hydrocarbon	2.47E-04

THC:	**1.31E-02**	**lbs/day**	**2.38E-03**	**tons/yr**

E091A

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		LIQUID RESULTS			COMBINED
E091A	E091A		ND Adj	E092A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		Capture	#E0XX		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	75.0500	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
C5 as Pentane	75.0500	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	18	1.82E-08	0	0	0.00E+00	1.82E-08
n-Hexane	107.5437	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
C6 as Hexane	107.5437	ND	54	213.42	ND	0	220	ND	0	54	0.05	6	26	2.61E-08	0	0	0.00E+00	2.61E-08
n-Heptane	89.3437	ND	45	177.3	ND	0	183	ND	0	45	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
C7 as Heptane	89.3437	ND	45	177.3	ND	0	183	ND	0	45	0.04	5	22	2.17E-08	0	0	0.00E+00	2.17E-08
n-Octane	77.3125	ND	39	153.43	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C8 as Octane	9361.2978		9,361	153.43	ND	0	158	ND	0	9,361	9.36	983	4537	4.54E-06	0	0	0.00E+00	4.54E-06
n-Nonane	1567.7574		1,568	154.57	ND	0	160	ND	0	1,568	1.57	165	760	7.60E-07	0	0	0.00E+00	7.60E-07
C9 as Nonane	#########		79,803	154.57	ND	0	160	ND	0	79,803	79.80	8380	38679	3.87E-05	0	0	0.00E+00	3.87E-05
n-Decane	4471.4104		4,471	155.97	ND	0	161	ND	0	4,471	4.47	470	2167	2.17E-06	0	0	0.00E+00	2.17E-06
C10 as Decane	#########		168,121	155.97	ND	0	161	ND	0	168,121	168.12	17655	81485	8.15E-05	0	0	0.00E+00	8.15E-05
n-Undecane	#########		16,092	155.57	ND	0	161	ND	0	16,092	16.09	1690	7799	7.80E-06	0	0	0.00E+00	7.80E-06
C11 as Undecane	#########		174,936	155.57	ND	0	161	ND	0	174,936	174.94	18371	84788	8.48E-05	0	0	0.00E+00	8.48E-05
n-Dodecane	8317.3956		8,317	154.51	ND	0	159	ND	0	8,317	8.32	873	4031	4.03E-06	0	0	0.00E+00	4.03E-06
C12 as Dodecane	#########		73,184	154.51	ND	0	159	ND	0	73,184	73.18	7685	35471	3.55E-05	0	0	0.00E+00	3.55E-05
n-Tridecane	5340.1995		5,340	154.88	ND	0	160	ND	0	5,340	5.34	561	2588	2.59E-06	0	0	0.00E+00	2.59E-06
C13 as Tridecane	#########		15,663	154.88	ND	0	160	ND	0	15,663	15.66	1645	7592	7.59E-06	0	0	0.00E+00	7.59E-06
n-Tetradecane	848.9434		849	154.73	ND	0	160	ND	0	849	0.85	89	411	4.11E-07	0	0	0.00E+00	4.11E-07
C14 as tetradecane	1108.6180		1,109	154.73	ND	0	160	ND	0	1,109	1.11	116	537	5.37E-07	0	0	0.00E+00	5.37E-07
n-Pentadecane	105.1416	J	105	155.5	ND	0	160	ND	0	105	0.11	11	51	5.10E-08	0	0	0.00E+00	5.10E-08
C15 as Pentadecane	78.3594	ND	39	155.5	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Hexadecane	77.9375	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C16 as Hexadecane	77.9375	ND	39	154.67	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heptadecane	77.0312	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
C17 as Heptadecane	77.0312	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	19	1.87E-08	0	0	0.00E+00	1.87E-08
n-Octadecane	77.8906	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C18 as Octodecane	77.8906	ND	39	154.57	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Nonadecane	78.0469	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C19 as Nonadecane	78.0469	ND	39	154.88	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Eicosane	77.8594	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C20 as Eicosane	77.8594	ND	39	154.51	ND	0	159	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Heneicosane	78.5937	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C21 as Heneicosane	78.5937	ND	39	155.97	ND	0	161	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
n-Docosane	77.7031	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
C22 as Docosane	77.7031	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	19	1.88E-08	0	0	0.00E+00	1.88E-08
n-Tricosane	78.1250	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
C23 as Tricosane	78.1250	ND	39	155.04	ND	0	160	ND	0	39	0.04	4	19	1.89E-08	0	0	0.00E+00	1.89E-08
n-Tetracosane	78.2344	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
C24 as Tetracosane	78.2344	ND	39	155.26	ND	0	160	ND	0	39	0.04	4	19	1.90E-08	0	0	0.00E+00	1.90E-08
Total Hydrocarbon			559,971			0			0		559.97	58805	271,407	2.71E-04	0	0	0.00E+00	2.71E-04

E091B

	ANALYTICAL RESULTS			BACKGROUND			TRIP BLANK			ADJUSTED G/V		TOTAL	G/V		COMBINED
E091B	E091B		ND Adj	E092A		ND Adj	#E009A		ND Adj	CONCENTRATION		G/V MASS	EMISSION RATE		EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	146.28125	ND	73	149	ND	0	154	ND	0	73	0.07	8	35	3.54E-08	3.54E-08
C5 as Pentane	146.28125	ND	73	149	ND	0	154	ND	0	73	0.07	8	35	3.54E-08	3.54E-08
n-Hexane	151.96875	ND	76	213	ND	0	220	ND	0	76	0.08	8	37	3.68E-08	3.68E-08
C6 as Hexane	151.96875	ND	76	213	ND	0	220	ND	0	76	0.08	8	37	3.68E-08	3.68E-08
n-Heptane	158.8125	ND	79	177	ND	0	183	ND	0	79	0.08	8	38	3.85E-08	3.85E-08
C7 as Heptane	158.8125	ND	79	177	ND	0	183	ND	0	79	0.08	8	38	3.85E-08	3.85E-08
n-Octane	154.625	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.75E-08	3.75E-08
C8 as Octane	7922.7125		7,923	153	ND	0	158	ND	0	7,923	7.92	832	3840	3.84E-06	3.84E-06
n-Nonane	1249.9004	J	1,250	155	ND	0	160	ND	0	1,250	1.25	131	606	6.06E-07	6.06E-07
C9 as Nonane	64938.383		64,938	155	ND	0	160	ND	0	64,938	64.94	6819	31474	3.15E-05	3.15E-05
n-Decane	3472.0448		3,472	156	ND	0	161	ND	0	3,472	3.47	365	1683	1.68E-06	1.68E-06
C10 as Decane	133526.47		133,526	156	ND	0	161	ND	0	133,526	133.53	14022	64718	6.47E-05	6.47E-05
n-Undecane	12727.363		12,727	156	ND	0	161	ND	0	12,727	12.73	1337	6169	6.17E-06	6.17E-06
C11 as Undecane	141973.64		141,974	156	ND	0	161	ND	0	141,974	141.97	14909	68812	6.88E-05	6.88E-05
n-Dodecane	6603.6802		6,604	155	ND	0	159	ND	0	6,604	6.60	693	3201	3.20E-06	3.20E-06
C12 as Dodecane	62024.907		62,025	155	ND	0	159	ND	0	62,025	62.02	6513	30062	3.01E-05	3.01E-05
n-Tridecane	4726.5941		4,727	155	ND	0	160	ND	0	4,727	4.73	496	2291	2.29E-06	2.29E-06
C13 as Tridecane	15040.408		15,040	155	ND	0	160	ND	0	15,040	15.04	1579	7290	7.29E-06	7.29E-06
n-Tetradecane	890.70825	J	891	155	ND	0	160	ND	0	891	0.89	94	432	4.32E-07	4.32E-07
C14 as tetradecane	1163.3162	J	1,163	155	ND	0	160	ND	0	1,163	1.16	122	564	5.64E-07	5.64E-07
n-Pentadecane	156.71875	ND	78	156	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
C15 as Pentadecane	156.71875	ND	78	156	ND	0	160	ND	0	78	0.08	8	38	3.80E-08	3.80E-08
n-Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C16 as Hexadecane	155.875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
C17 as Heptadecane	154.0625	ND	77	153	ND	0	158	ND	0	77	0.08	8	37	3.73E-08	3.73E-08
n-Octadecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C18 as Octodecane	155.78125	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
C19 as Nonadecane	156.09375	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.78E-08	3.78E-08
n-Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C20 as Eicosane	155.71875	ND	78	155	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
C21 as Heneicosane	157.1875	ND	79	156	ND	0	161	ND	0	79	0.08	8	38	3.81E-08	3.81E-08
n-Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
C22 as Docosane	155.40625	ND	78	154	ND	0	159	ND	0	78	0.08	8	38	3.77E-08	3.77E-08
n-Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C23 as Tricosane	156.25	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
n-Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
C24 as Tetracosane	156.46875	ND	78	155	ND	0	160	ND	0	78	0.08	8	38	3.79E-08	3.79E-08
Total Hydrocarbon			458,354			0			0		458.35	48134	222,155	2.22E-04	2.22E-04

Bagging Data Form — Vacuum Method

Sample Id E093

WSPA Western States Petroleum Association

Equipment type:	Valve		**Component ID:**	E-514		
Equipment Subtype:	Gate		**Unit:**	Refinery E		
Line Size:	4	*inches*	**Date:**	12-Nov-18		
Phase (G, LL, HL):	HL		**Analysis team:**	EG/DR		
Barometric pressure	30.25 *inHg*	768.4 *mmHg*	**Sample Pump A**	LP52979		
			Sample Pump B	LP52975		
Ambient Temp:	64 °F	17.8 °C	**TVA ID**	37887		
Component Temp:	145 °F	62.8 °C	**Stream Pressure/Temp:**	*psig*	°F	
Stream Description:	*KLGO T-96 Matanel to HCU Feed Diversion*					

CONVERSIONS:
1 inch Hg = 25.4 mmHg
1 inch H2O column = 1.87 mmHg
°F= (F-32)*5/9 °C
1 m³ = 1000 liters
1 kg = 1E+9 µg
1 kg = 2.20462 pounds
1 ton = 2,000 pounds

Pre-Sample Data

Time										
9:59	Background	3	*ppmv*	8-sec Dwell	10	*ppmv*	Total Dwell	3:00 *min:sec*	Final M21	15 *ppm*
10:36	Initial Bag Vacuum	0.08	*inches H2O*	DGM Vac.	2	*inches H2O*	Bag Temp	88.9 °F	Leak @	Packing

Bag Concentrations (ppmv)

Time	10:39	10:41	10:43	10:45	10:47	10:52	10:55							
ppmv	12.1	12.3	12.4	12.5	12.5	12.7	12.8							

Sorbent Tube Sample Collection Parameters

E093A

Time									
10:47	Volume Start	799.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:00	Volume Stop	811.6	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.988	*L/min*

E093B

10:47	Volume Start	789.0	*Liters*		Design Sample Flow Rate = 1 liter/min				
11:00	Volume Stop	801.6	*Liters*	Total Vol	12.6	*Liters*			
	Sample Run Time	13	*Minutes*		Sorbent Flow	0.969 *L/min*	Sorbent $Flow_{STP}$	0.988	*L/min*
	Total ST Vol_{STP}	25.70	*Liters*	DGM Vol_{STP}	87.40	*Liters*	Total Run Vol_{STP}	113.10	*Liters*

Bagging Parameters

Time										
10:48	Vacuum check	0.07	*inches H2O*			DGM_P	2	*inches H2O vacuum*	764.6	*mmHg*
10:52	DGM_{10L} Time	01:31.2	*min:sec.frac*	DGM Time	1.517	DGM Flow	6.59	DGM $Flow_{STP}$	6.72	*liters/minute*
10:49	Bag Temp.	92.8	°F	33.8	°C	$Sample_T$	63	°F	17.2	°C

Post-Sample Data

11:09	Post Test M21	Background	1 *ppmv*	8-sec Dwell	9 *ppmv*	Total Dwell	2:00 *min:sec*	Final M21	14 *ppm*	
								Leak @	Packing	
Condensate accumulation: starting time			N/A *hour:min*	Final time	N/A *hour:min*		0:00 *hours:min*			
Organic condensate collected			N/A *ml*							
Density of organic condensate			N/A *g/ml*							

Average THC emissions = 5.96E-06 kg/hr
Percent difference THC ER = 39%

Acceptable? No

AVERAGE EMISSION RATES

Component	Avg ER kg/hr
n-Pentane	2.93E-08
C5 as Pentane	2.93E-08
n-Hexane	3.44E-08
C6 as Hexane	3.44E-08
n-Heptane	3.29E-08
C7 as Heptane	3.29E-08
n-Octane	3.07E-08
C8 as Octane	4.29E-08
n-Nonane	3.10E-08
C9 as Nonane	3.15E-07
n-Decane	3.13E-08
C10 as Decane	1.05E-06
n-Undecane	9.58E-08
C11 as Undecane	7.27E-07
n-Dodecane	4.80E-08
C12 as Dodecane	6.31E-07
n-Tridecane	1.88E-07
C13 as Tridecane	1.23E-06
n-Tetradecane	2.15E-07
C14 as tetradecane	4.55E-07
n-Pentadecane	8.07E-08
C15 as Pentadecane	4.49E-08
n-Hexadecane	3.10E-08
C16 as Hexadecane	3.10E-08
n-Heptadecane	3.06E-08
C17 as Heptadecane	3.06E-08
n-Octadecane	3.10E-08
C18 as Octodecane	3.10E-08
n-Nonadecane	3.10E-08
C19 as Nonadecane	3.10E-08
n-Eicosane	3.10E-08
C20 as Eicosane	3.10E-08
n-Heneicosane	3.13E-08
C21 as Heneicosane	3.13E-08
n-Docosane	3.09E-08
C22 as Docosane	3.09E-08
n-Tricosane	3.11E-08
C23 as Tricosane	3.11E-08
n-Tetracosane	3.11E-08
C24 as Tetracosane	3.11E-08
Total Hydrocarbon	5.96E-06

THC:	3.16E-04	lbs/day	5.76E-05	tons/yr

E093A

	ANALYTICAL RESULTS E093A		ND Adj	BACKGROUND E094A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		LIQUID RESULTS Capture	#E0XX		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	µg	µg/min	kg/hr	kg/hr
n-Pentane	76.2413	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
C5 as Pentane	76.2413	ND	38	148.94	ND	0	154	ND	0	38	0.04	4	20	1.99E-08	0	0	0.00E+00	1.99E-08
n-Hexane	109.2508	ND	55	213.42	ND	0	220	ND	0	55	0.05	6	29	2.85E-08	0	0	0.00E+00	2.85E-08
C6 as Hexane	109.2508	ND	55	213.42	ND	0	220	ND	0	55	0.05	6	29	2.85E-08	0	0	0.00E+00	2.85E-08
n-Heptane	90.7619	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	24	2.37E-08	0	0	0.00E+00	2.37E-08
C7 as Heptane	90.7619	ND	45	177.3	ND	0	183	ND	0	45	0.05	5	24	2.37E-08	0	0	0.00E+00	2.37E-08
n-Octane	78.5397	ND	39	153.43	ND	0	158	ND	0	39	0.04	4	20	2.05E-08	0	0	0.00E+00	2.05E-08
C8 as Octane	85.6784	J	86	153.43	ND	0	158	ND	0	86	0.09	10	45	4.47E-08	0	0	0.00E+00	4.47E-08
n-Nonane	79.1270	ND	40	154.57	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C9 as Nonane	1126.9431		1,127	154.57	ND	0	160	ND	0	1,127	1.13	127	588	5.88E-07	0	0	0.00E+00	5.88E-07
n-Decane	79.8413	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C10 as Decane	1789.4264		1,789	155.97	ND	0	161	ND	0	1,789	1.79	202	934	9.34E-07	0	0	0.00E+00	9.34E-07
n-Undecane	162.9366	J	163	155.57	ND	0	161	ND	0	163	0.16	18	85	8.51E-08	0	0	0.00E+00	8.51E-08
C11 as Undecane	1290.2409		1,290	155.57	ND	0	161	ND	0	1,290	1.29	146	673	6.73E-07	0	0	0.00E+00	6.73E-07
n-Dodecane	104.9864	J	105	154.51	ND	0	159	ND	0	105	0.10	12	55	5.48E-08	0	0	0.00E+00	5.48E-08
C12 as Dodecane	1590.2387		1,590	154.51	ND	0	159	ND	0	1,590	1.59	180	830	8.30E-07	0	0	0.00E+00	8.30E-07
n-Tridecane	491.1349	J	491	154.88	ND	0	160	ND	0	491	0.49	56	256	2.56E-07	0	0	0.00E+00	2.56E-07
C13 as Tridecane	3632.8405		3,633	154.88	ND	0	160	ND	0	3,633	3.63	411	1896	1.90E-06	0	0	0.00E+00	1.90E-06
n-Tetradecane	515.3106	J	515	154.73	ND	0	160	ND	0	515	0.52	58	269	2.69E-07	0	0	0.00E+00	2.69E-07
C14 as tetradecane	1451.3542		1,451	154.73	ND	0	160	ND	0	1,451	1.45	164	758	7.58E-07	0	0	0.00E+00	7.58E-07
n-Pentadecane	229.7264	J	230	155.5	ND	0	160	ND	0	230	0.23	26	120	1.20E-07	0	0	0.00E+00	1.20E-07
C15 as Pentadecane	92.3643	J	92	155.5	ND	0	160	ND	0	92	0.09	10	48	4.82E-08	0	0	0.00E+00	4.82E-08
n-Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C16 as Hexadecane	79.1746	ND	40	154.67	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Heptadecane	78.2540	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
C17 as Heptadecane	78.2540	ND	39	152.87	ND	0	158	ND	0	39	0.04	4	20	2.04E-08	0	0	0.00E+00	2.04E-08
n-Octadecane	79.1270	ND	40	154.57	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C18 as Octodecane	79.1270	ND	40	154.57	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Nonadecane	79.2857	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C19 as Nonadecane	79.2857	ND	40	154.88	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Eicosane	79.0952	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C20 as Eicosane	79.0952	ND	40	154.51	ND	0	159	ND	0	40	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Heneicosane	79.8413	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
C21 as Heneicosane	79.8413	ND	40	155.97	ND	0	161	ND	0	40	0.04	5	21	2.08E-08	0	0	0.00E+00	2.08E-08
n-Docosane	78.9365	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
C22 as Docosane	78.9365	ND	39	154.2	ND	0	159	ND	0	39	0.04	4	21	2.06E-08	0	0	0.00E+00	2.06E-08
n-Tricosane	79.3651	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C23 as Tricosane	79.3651	ND	40	155.04	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
n-Tetracosane	79.4762	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
C24 as Tetracosane	79.4762	ND	40	155.26	ND	0	160	ND	0	40	0.04	4	21	2.07E-08	0	0	0.00E+00	2.07E-08
Total Hydrocarbon			13,671			0			0		13.67	1546	7,136	7.14E-06	0	0	0.00E+00	7.14E-06

E093B

	ANALYTICAL RESULTS E093B		ND Adj	BACKGROUND E094A		ND Adj	TRIP BLANK #E009A		ND Adj	ADJUSTED G/V CONCENTRATION		TOTAL G/V MASS	G/V EMISSION RATE		COMBINED EMISSION RATE
Component	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	Flag	µg/m³	µg/m³	µg/L	µg	µg/hr	kg/hr	kg/hr
n-Pentane	148.60317	ND	74	149	ND	0	154	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
C5 as Pentane	148.60317	ND	74	149	ND	0	154	ND	0	74	0.07	8	39	3.88E-08	3.88E-08
n-Hexane	154.38095	ND	77	213	ND	0	220	ND	0	77	0.08	9	40	4.03E-08	4.03E-08
C6 as Hexane	154.38095	ND	77	213	ND	0	220	ND	0	77	0.08	9	40	4.03E-08	4.03E-08
n-Heptane	161.33333	ND	81	177	ND	0	183	ND	0	81	0.08	9	42	4.21E-08	4.21E-08
C7 as Heptane	161.33333	ND	81	177	ND	0	183	ND	0	81	0.08	9	42	4.21E-08	4.21E-08
n-Octane	157.07936	ND	79	153	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
C8 as Octane	157.07936	ND	79	153	ND	0	158	ND	0	79	0.08	9	41	4.10E-08	4.10E-08
n-Nonane	158.25396	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C9 as Nonane	158.25396	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Decane	159.68253	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.17E-08	4.17E-08
C10 as Decane	2219.2906		2,219	156	ND	0	161	ND	0	2,219	2.22	251	1158	1.16E-06	1.16E-06
n-Undecane	204.07267	J	204	156	ND	0	161	ND	0	204	0.20	23	107	1.07E-07	1.07E-07
C11 as Undecane	1496.5582	J	1,497	156	ND	0	161	ND	0	1,497	1.50	169	781	7.81E-07	7.81E-07
n-Dodecane	158.19047	ND	79	155	ND	0	159	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C12 as Dodecane	827.38108	J	827	155	ND	0	159	ND	0	827	0.83	94	432	4.32E-07	4.32E-07
n-Tridecane	230.41786	J	230	155	ND	0	160	ND	0	230	0.23	26	120	1.20E-07	1.20E-07
C13 as Tridecane	1079.742	J	1,080	155	ND	0	160	ND	0	1,080	1.08	122	564	5.64E-07	5.64E-07
n-Tetradecane	307.67594	J	308	155	ND	0	160	ND	0	308	0.31	35	161	1.61E-07	1.61E-07
C14 as tetradecane	292.66456	J	293	155	ND	0	160	ND	0	293	0.29	33	153	1.53E-07	1.53E-07
n-Pentadecane	159.20634	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.16E-08	4.16E-08
C15 as Pentadecane	159.20634	ND	80	156	ND	0	160	ND	0	80	0.08	9	42	4.16E-08	4.16E-08
n-Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C16 as Hexadecane	158.3492	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Heptadecane	156.50793	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.08E-08	4.08E-08
C17 as Heptadecane	156.50793	ND	78	153	ND	0	158	ND	0	78	0.08	9	41	4.08E-08	4.08E-08
n-Octadecane	158.25396	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C18 as Octodecane	158.25396	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Nonadecane	158.57142	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C19 as Nonadecane	158.57142	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Eicosane	158.19047	ND	79	155	ND	0	159	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
C20 as Eicosane	158.19047	ND	79	155	ND	0	159	ND	0	79	0.08	9	41	4.13E-08	4.13E-08
n-Heneicosane	159.68253	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.17E-08	4.17E-08
C21 as Heneicosane	159.68253	ND	80	156	ND	0	161	ND	0	80	0.08	9	42	4.17E-08	4.17E-08
n-Docosane	157.87301	ND	79	154	ND	0	159	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
C22 as Docosane	157.87301	ND	79	154	ND	0	159	ND	0	79	0.08	9	41	4.12E-08	4.12E-08
n-Tricosane	158.73015	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
C23 as Tricosane	158.73015	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.14E-08	4.14E-08
n-Tetracosane	158.95238	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.15E-08	4.15E-08
C24 as Tetracosane	158.95238	ND	79	155	ND	0	160	ND	0	79	0.08	9	41	4.15E-08	4.15E-08
Total Hydrocarbon			9,181			0			0		9.18	1038	4,792	4.79E-06	4.79E-06

APPENDIX B-3

Refinery A Sample Results

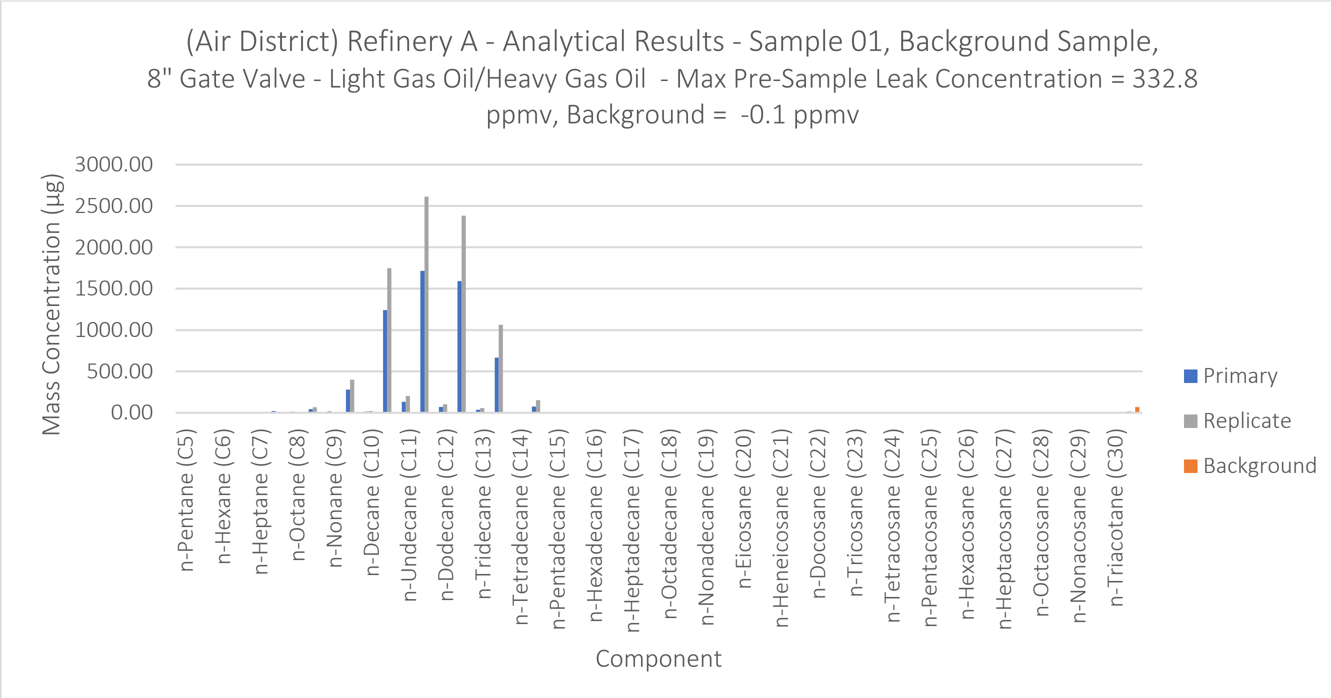


Figure B-3.1 Plot of Analytical Results for Air District Sample AD01 and Associated Background Sample

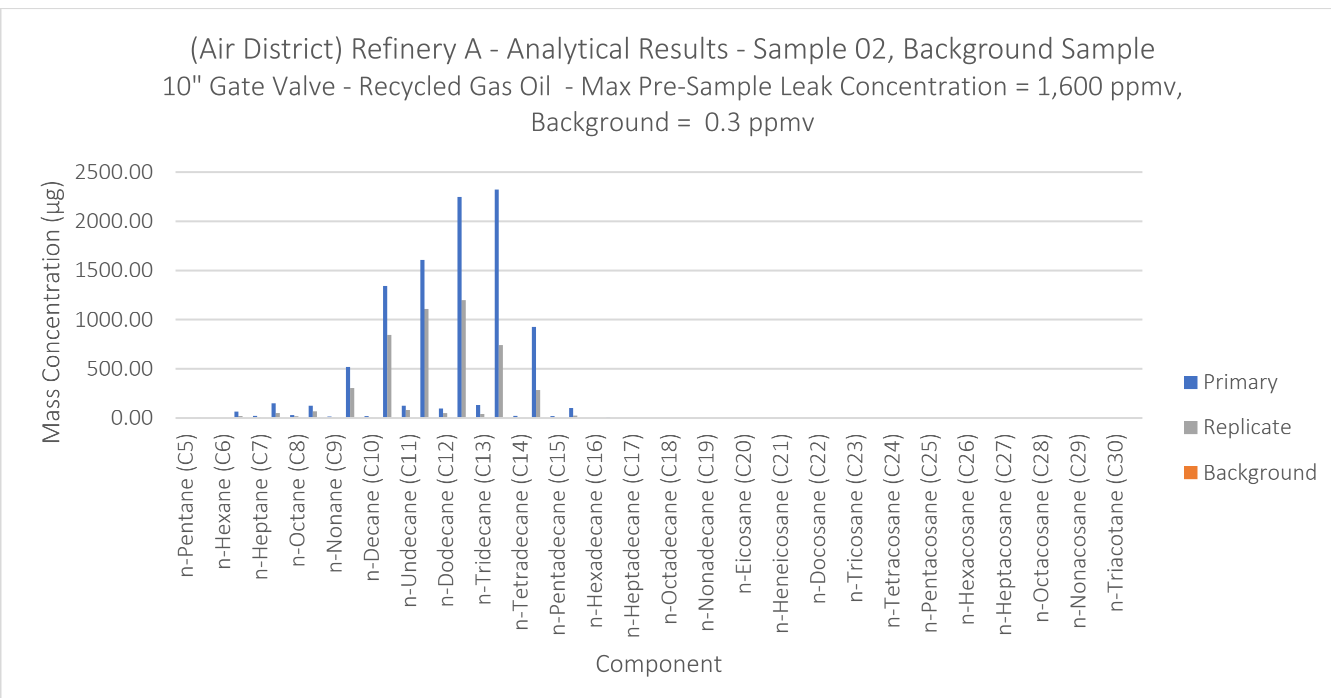


Figure B-3.2. Plot of Analytical Results for Air District Sample AD02 and Associated Background Sample

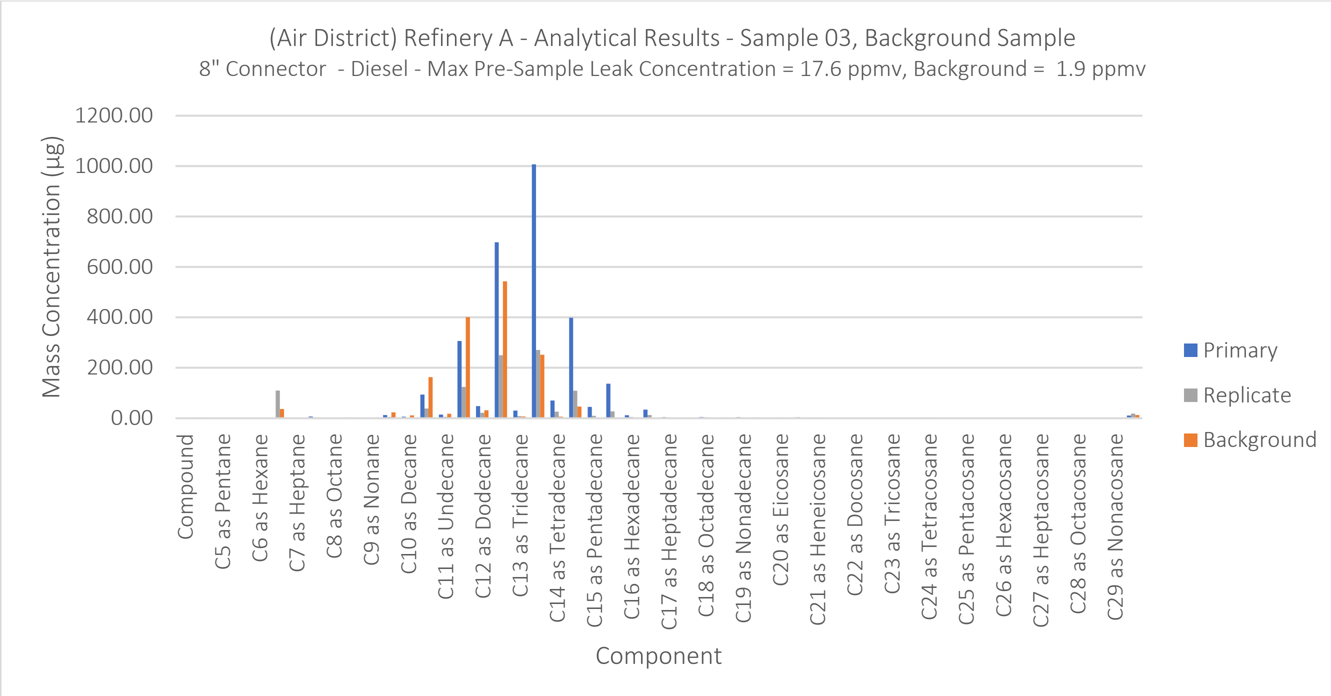


Figure B-3.3. Plot of Analytical Results for Air District Sample AD03 and Associated Background Sample

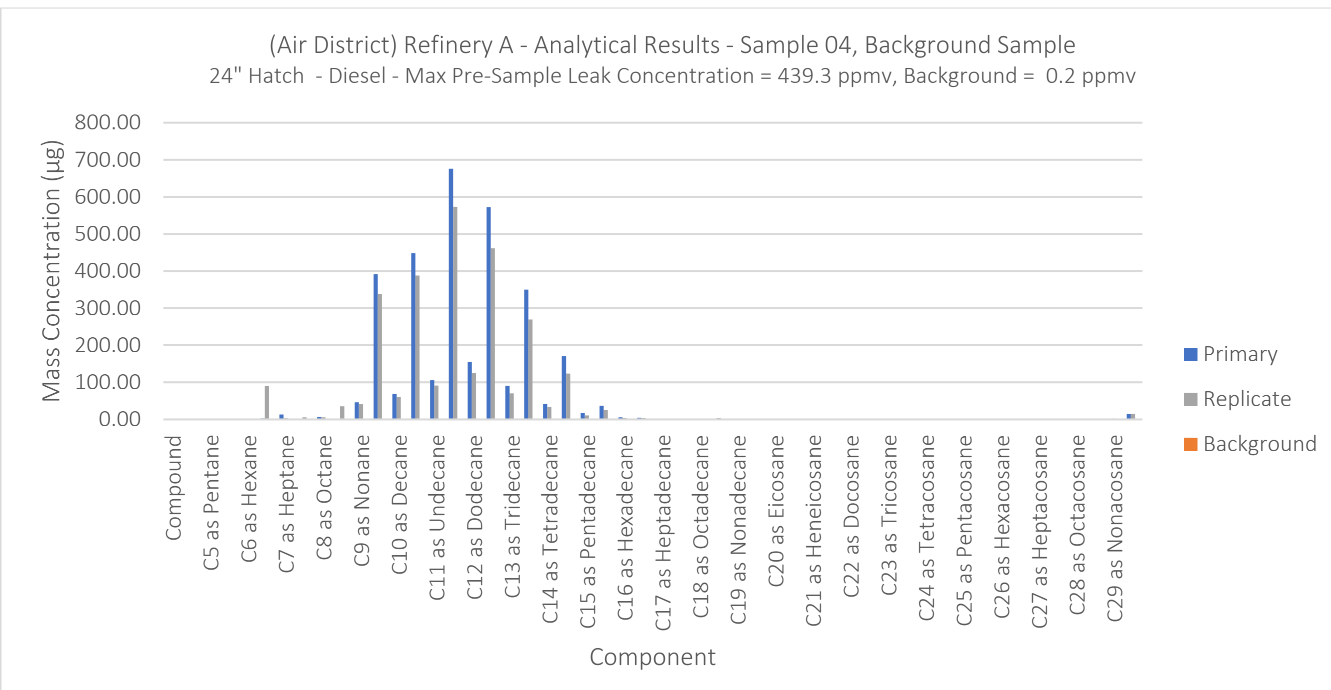


Figure B-3.4. Plot of Analytical Results for Air District Sample AD04 and Associated Background Sample

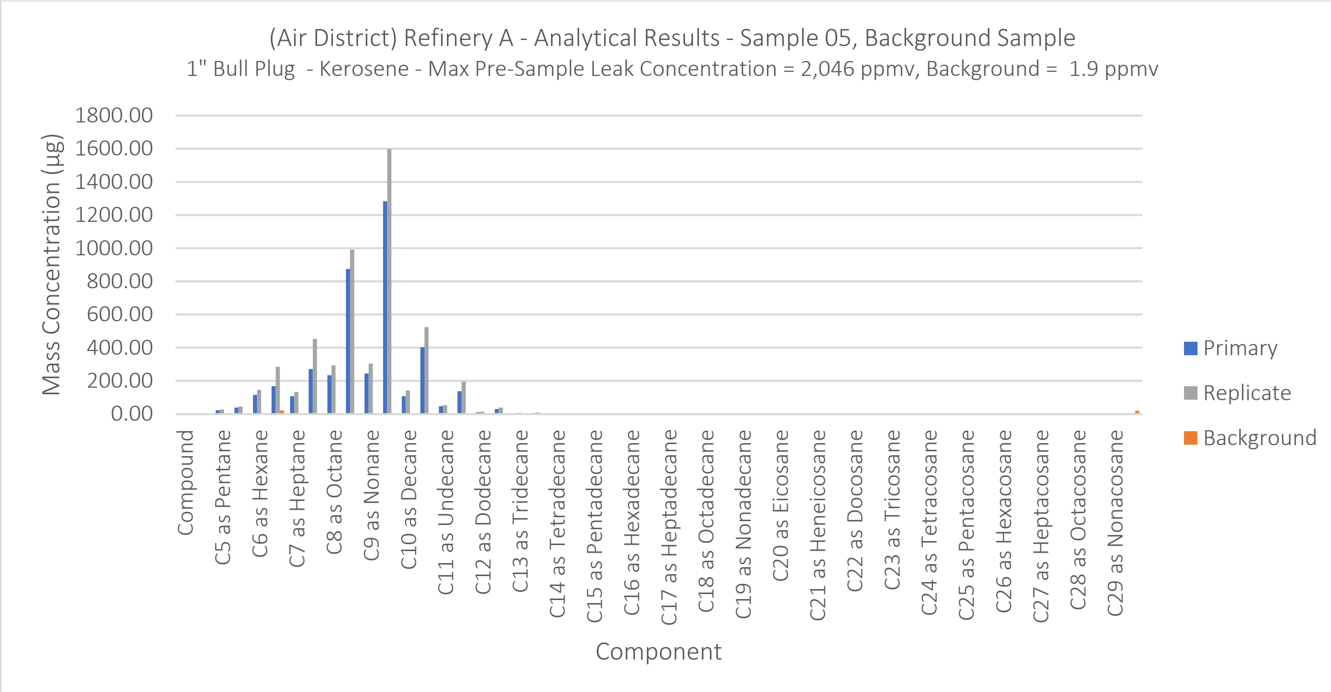


Figure B-3.5. *Plot of Analytical Results for Air District Sample AD05 and Associated Background Sample*

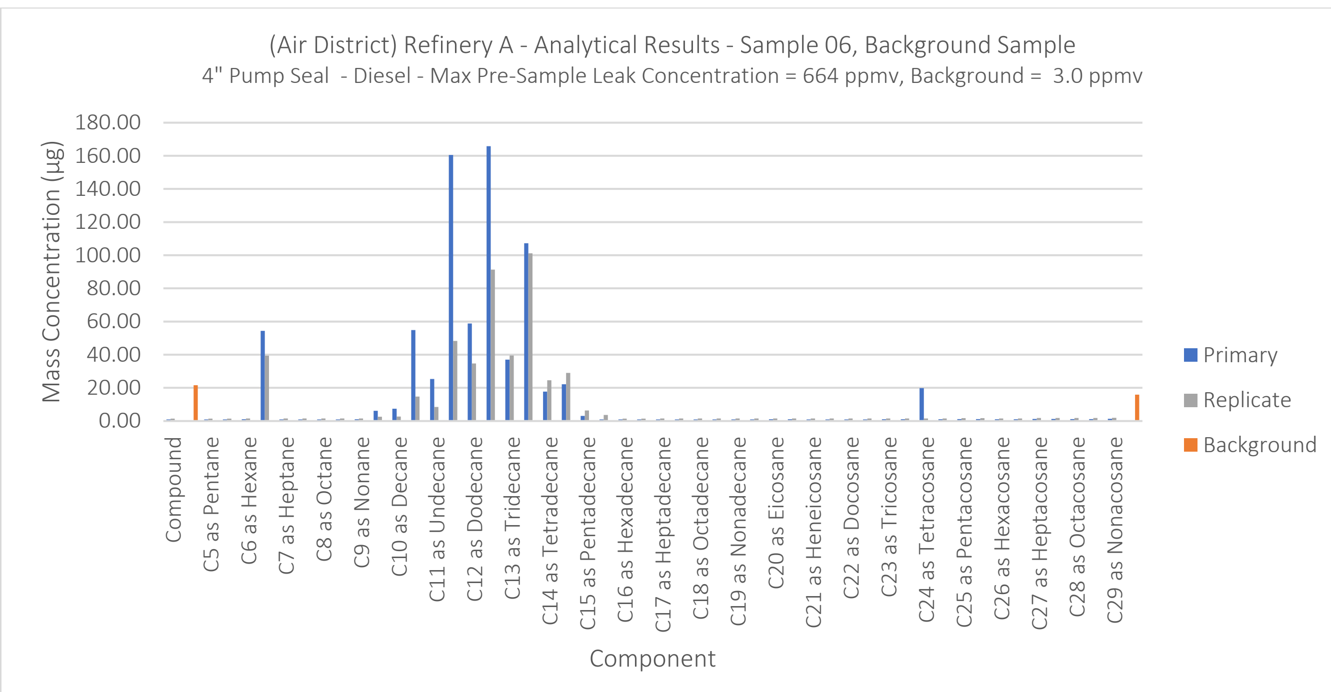


Figure B-3.6. *Plot of Analytical Results for Air District Sample AD06 and Associated Background Sample*

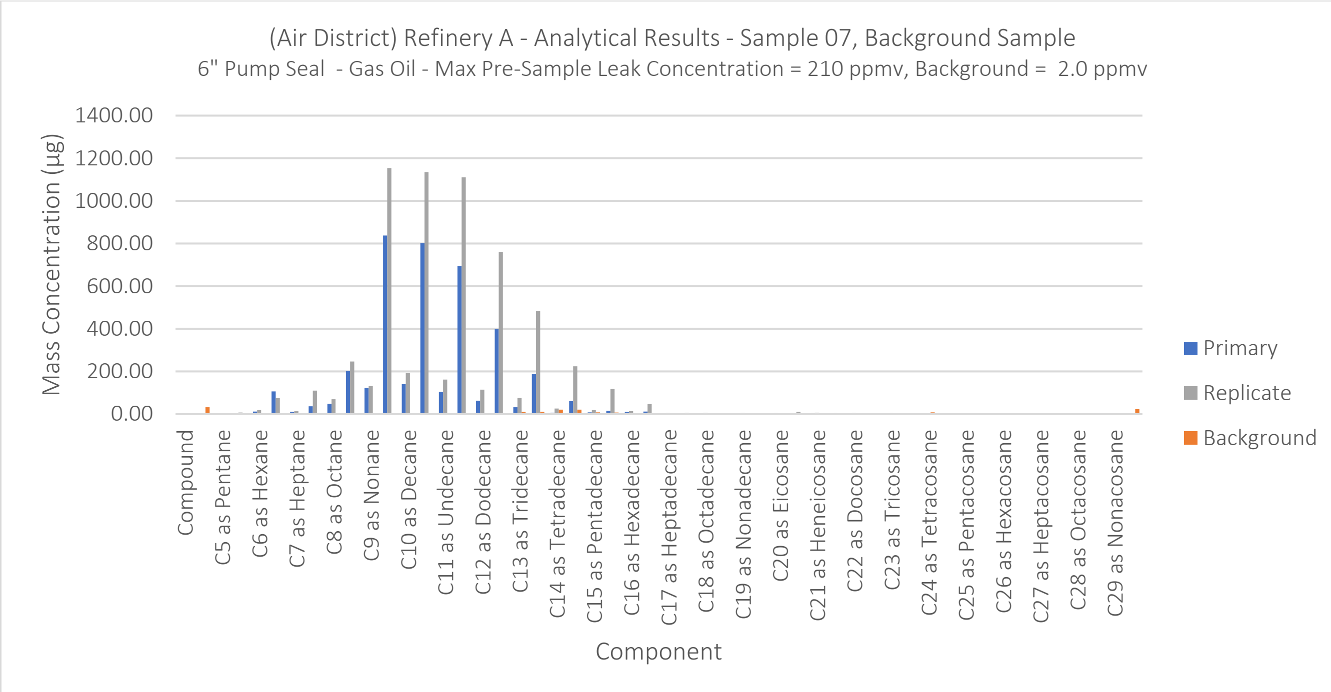


Figure B-3.7. Plot of Analytical Results for Air District Sample AD07 and Associated Background Sample

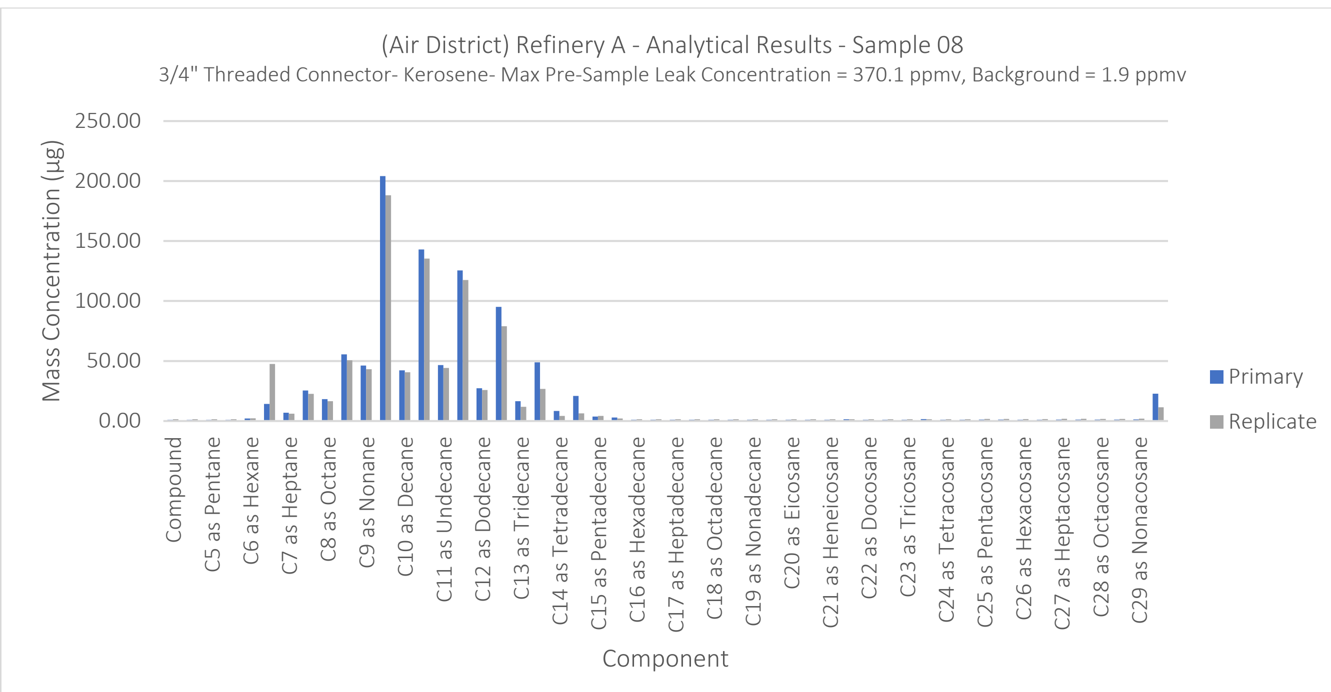


Figure B-3.8. Plot of Analytical Results for Air District Sample AD08 and Associated Background Sample

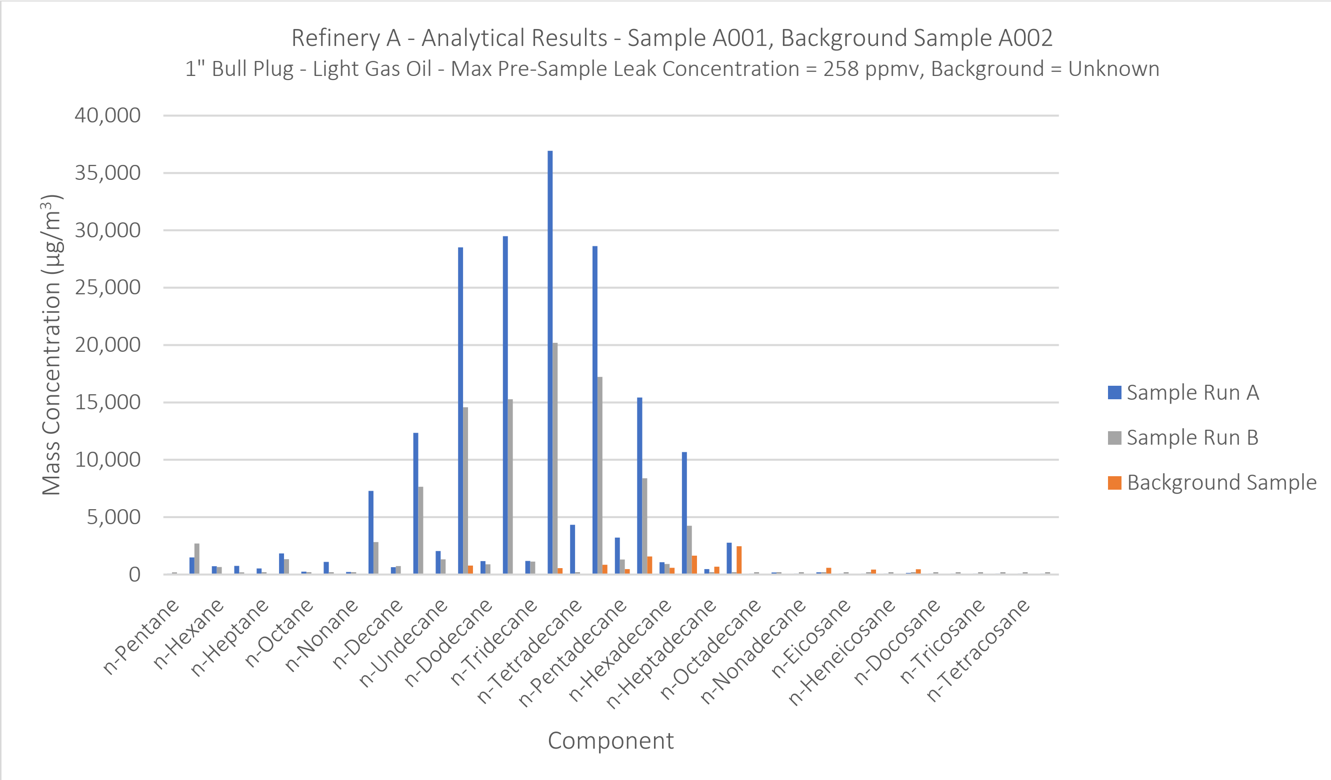


Figure B-3.9. Plot of Analytical Results for Sample A001 and Associated Background Sample

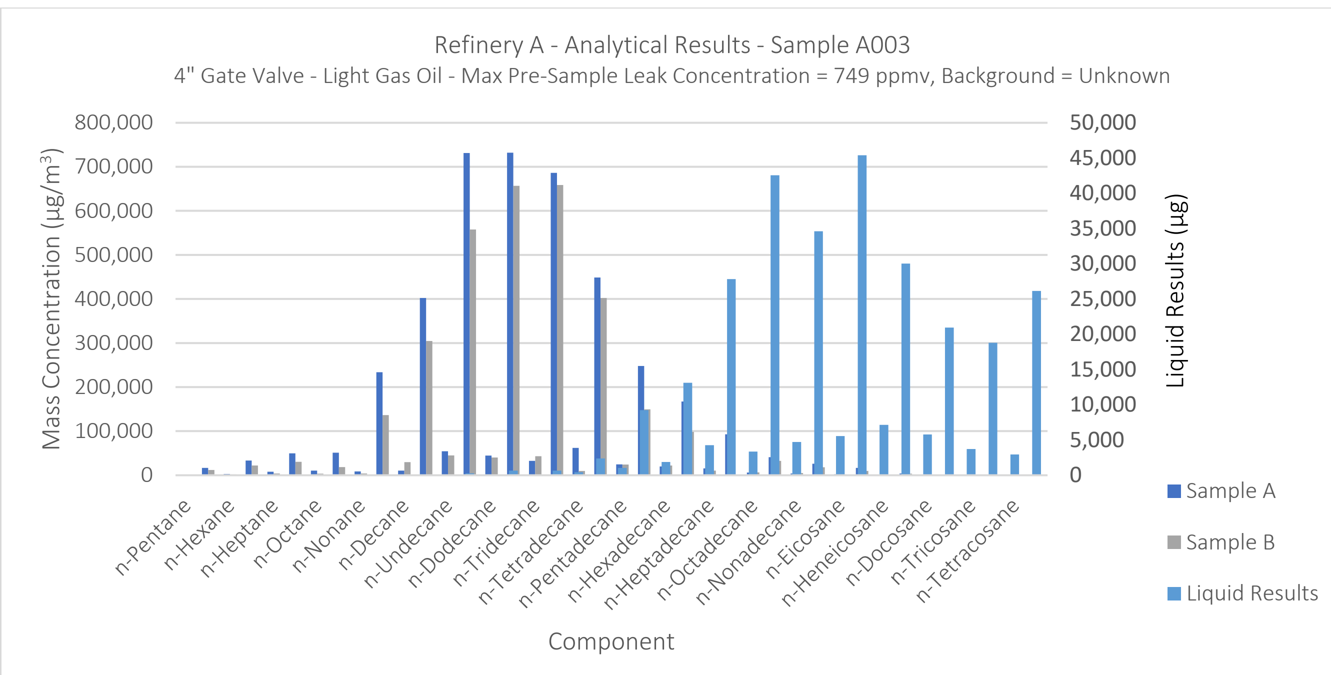


Figure B-3.10. Plot of Analytical Results for Sample A003 and Associated Background Sample

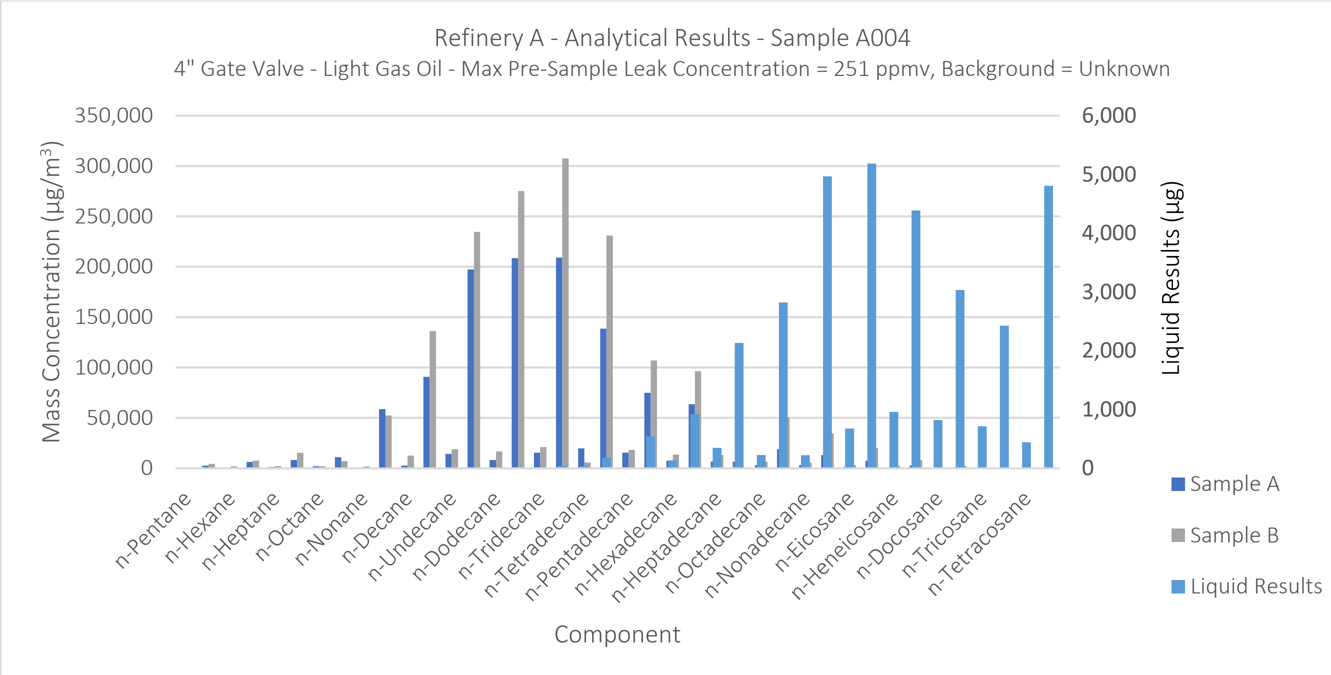


Figure B-3.11. *Plot of Analytical Results for Sample A004 and Associated Background Sample*

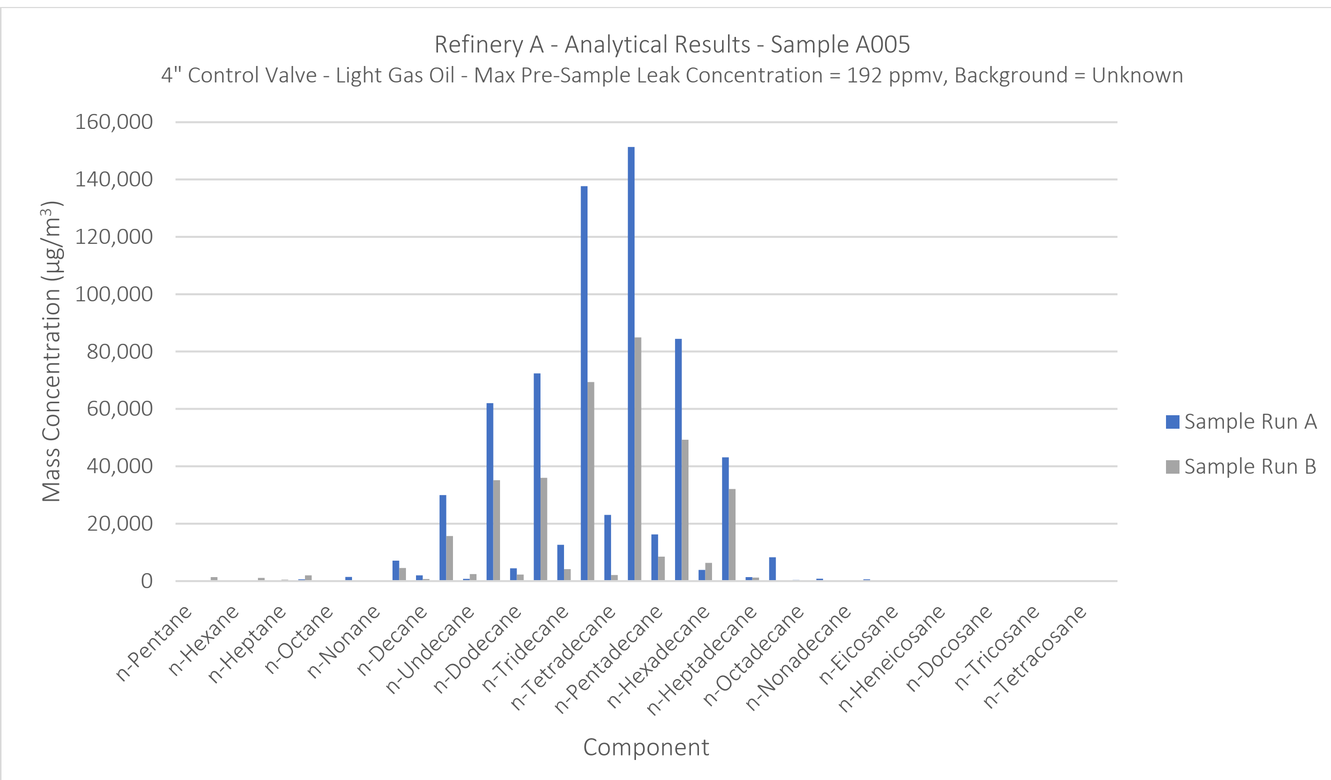


Figure B-3.12. *Plot of Analytical Results for Sample A005 and Associated Background Sample*

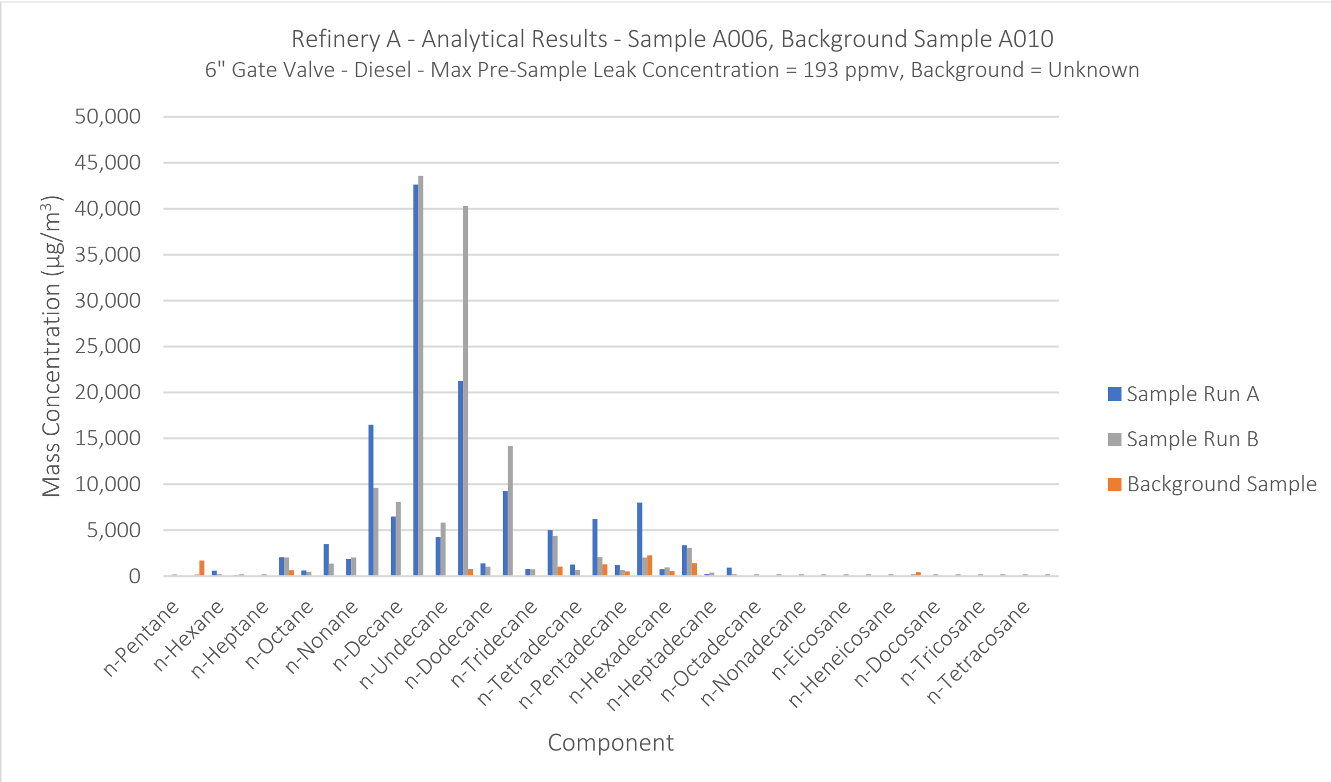


Figure B-3.13. Plot of Analytical Results for Sample A006 and Associated Background Sample

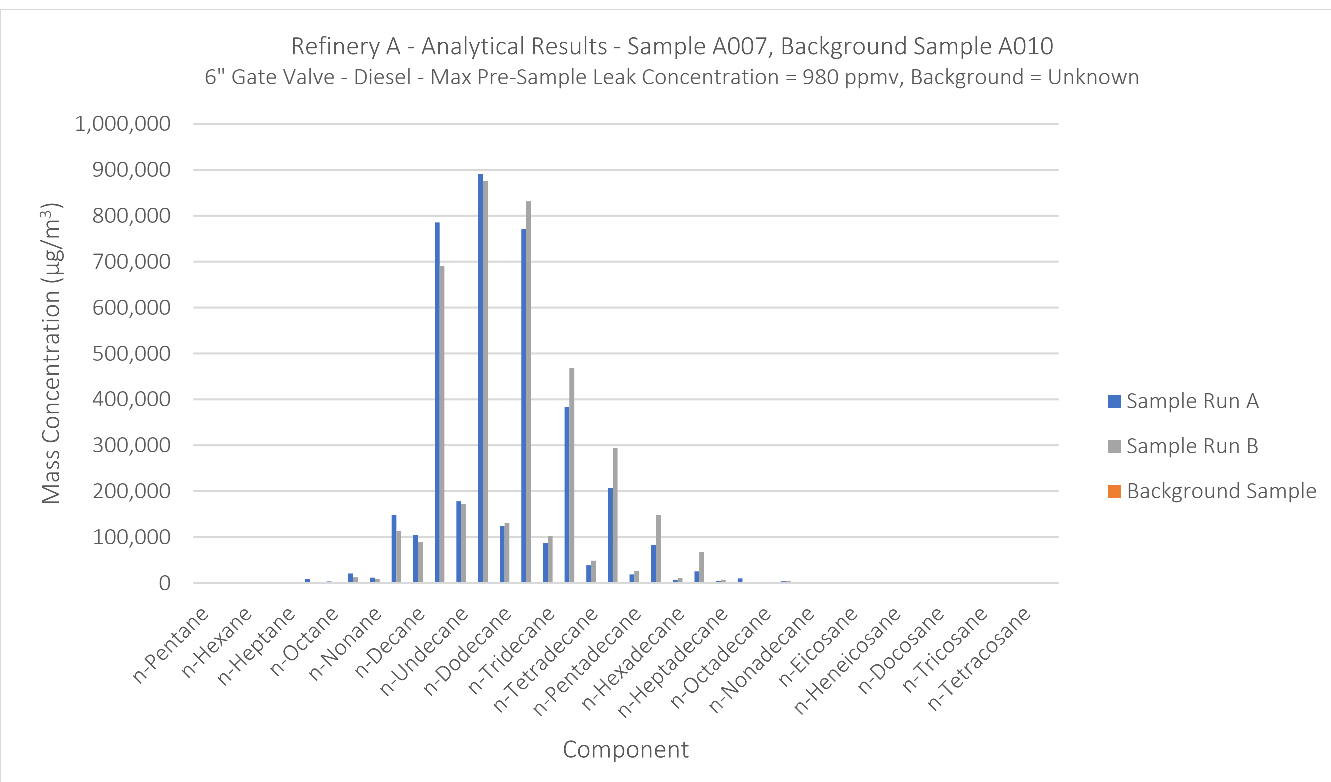


Figure B-3.14. Plot of Analytical Results for Sample A007 and Associated Background Sample

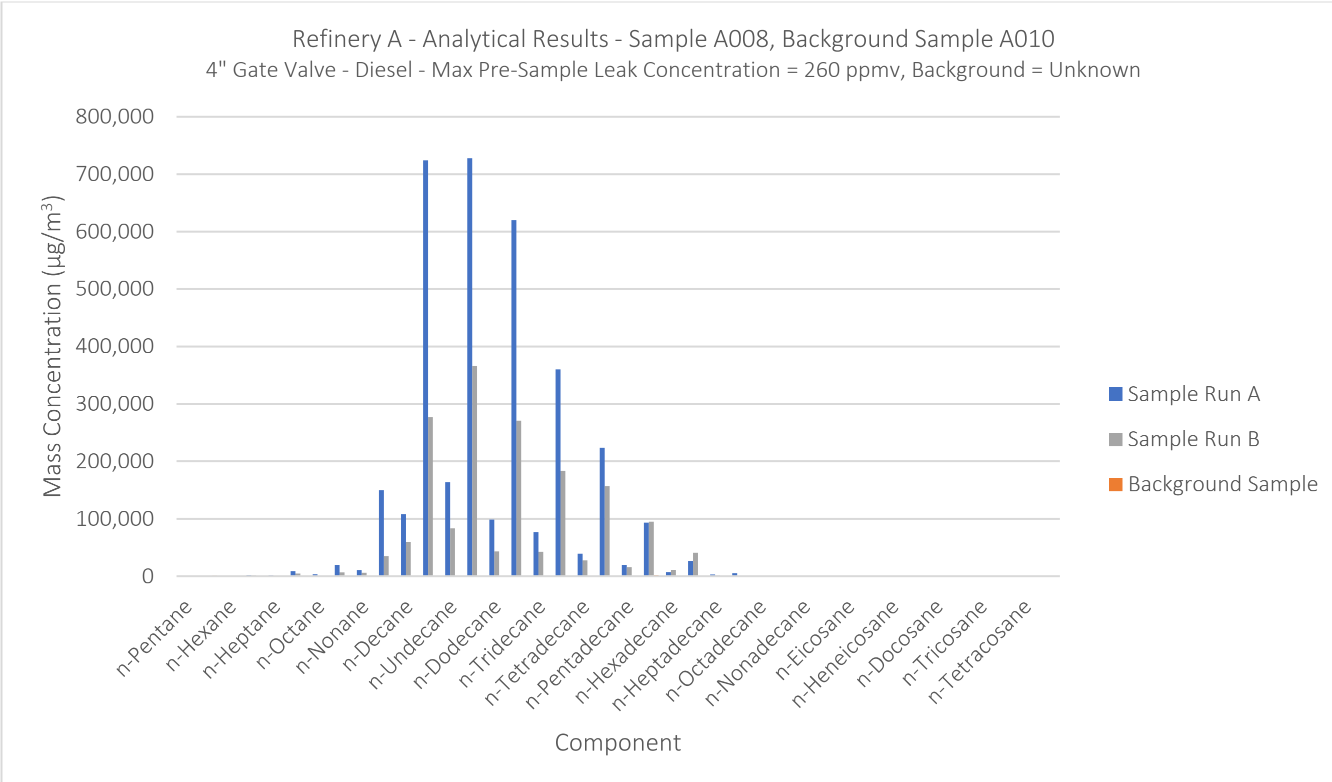


Figure B-3.15. Plot of Analytical Results for Sample A008 and Associated Background Sample

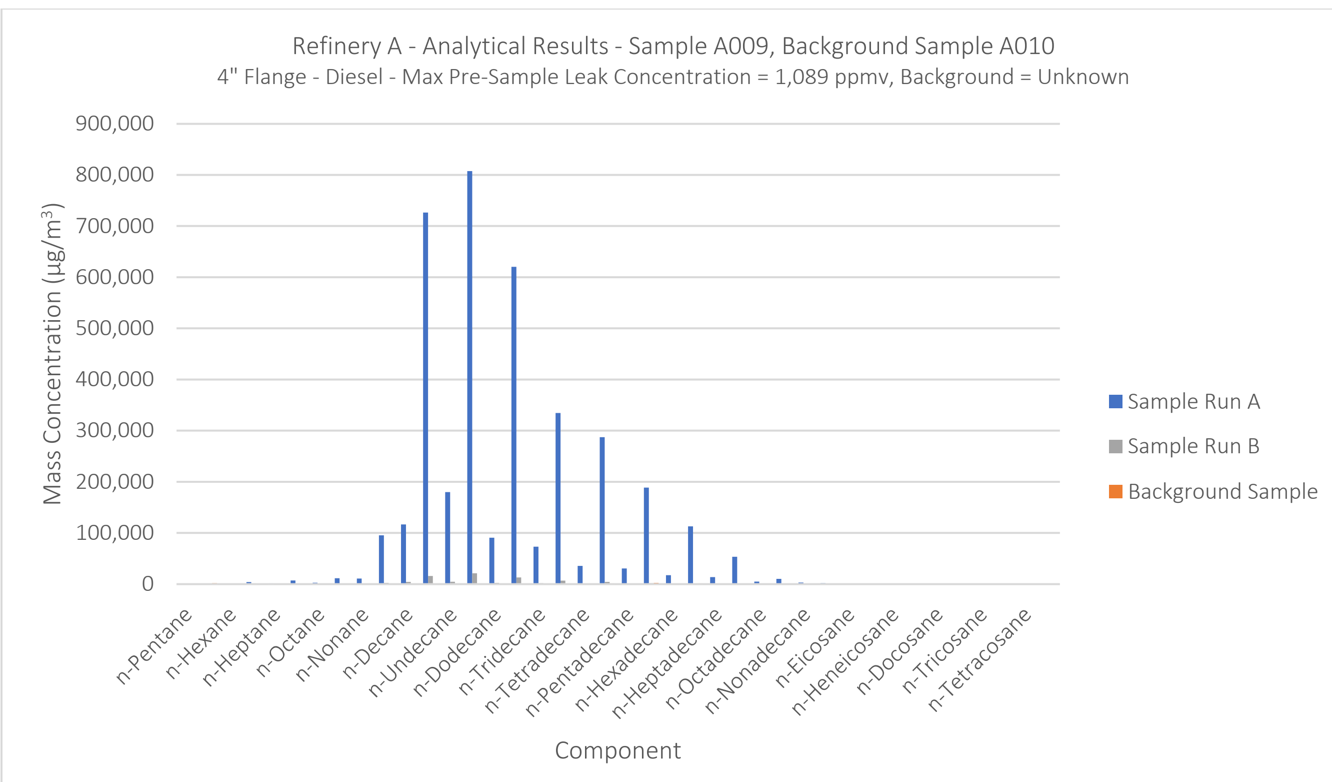


Figure B-3.16. Plot of Analytical Results for Sample A009 and Associated Background Sample

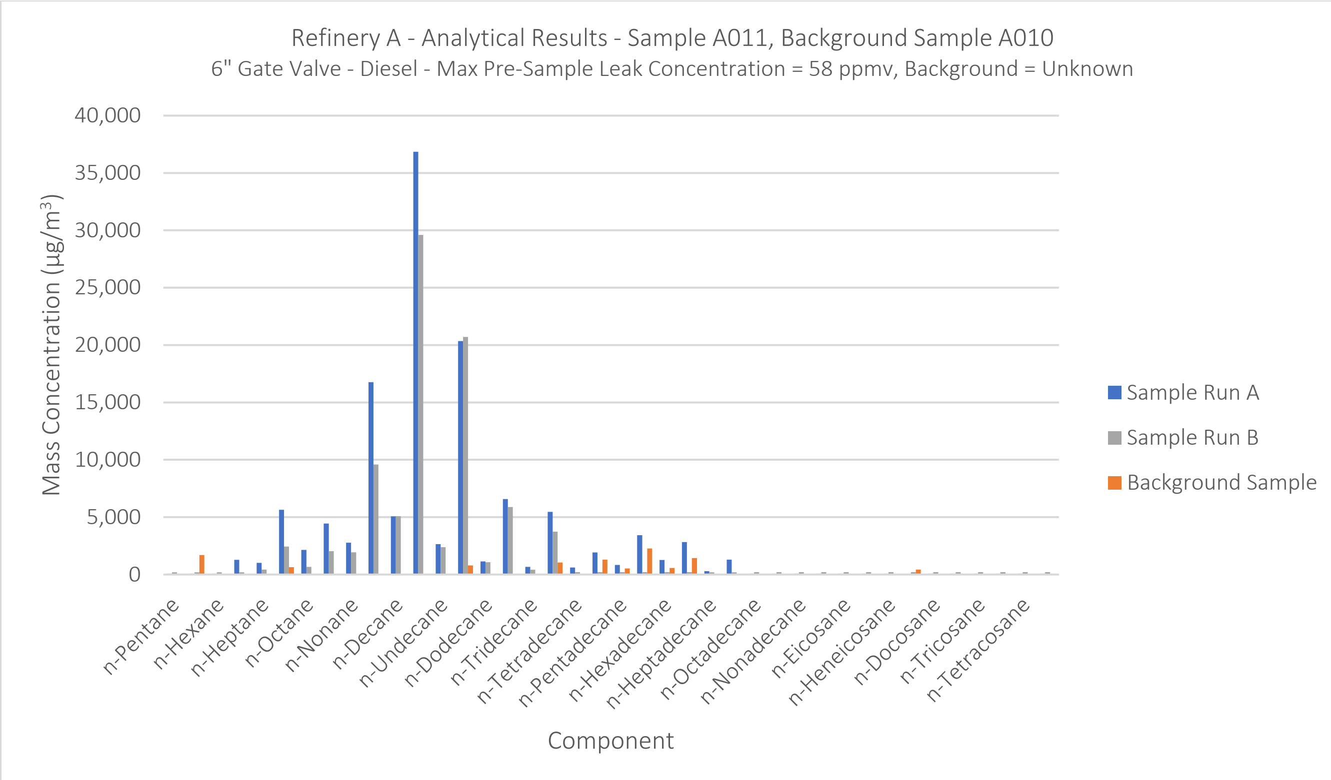


Figure B-3.17. *Plot of Analytical Results for Sample A011 and Associated Background Sample*

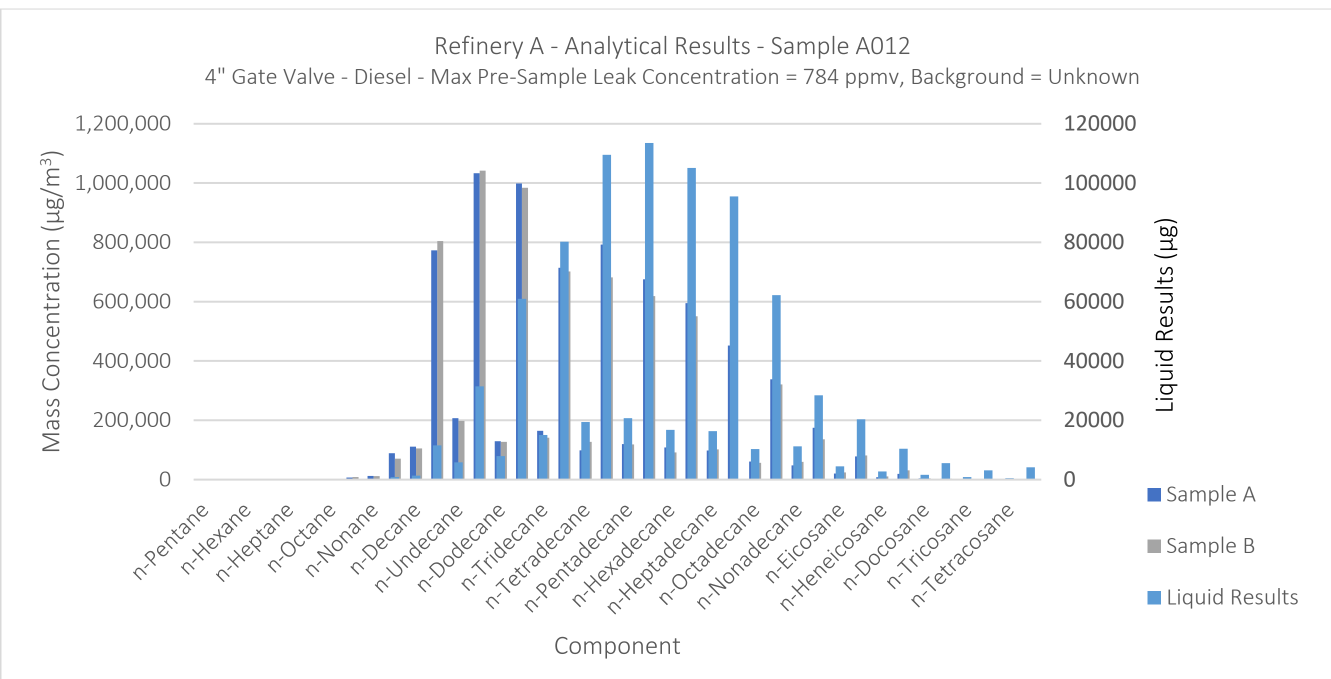


Figure B-3.18. *Plot of Analytical Results for Sample A012 and Associated Background Sample*

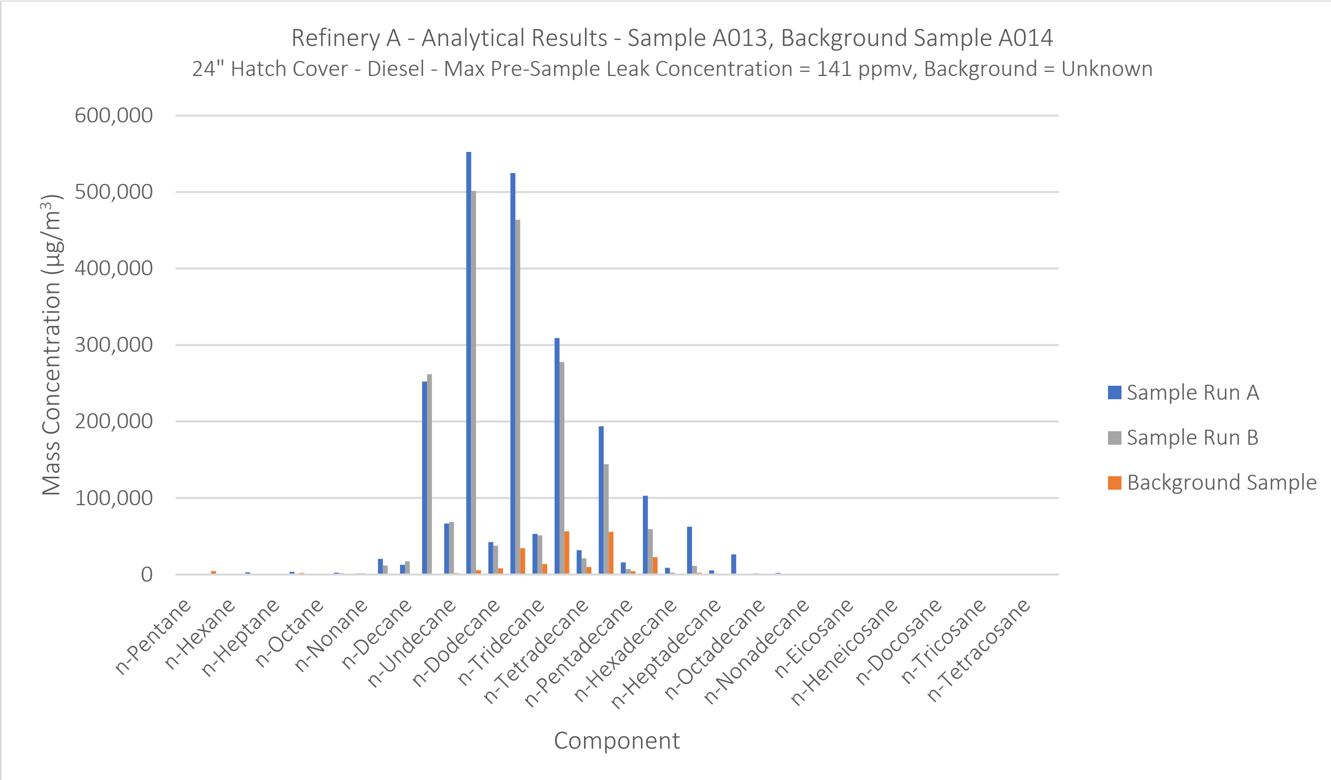


Figure B-3.19. *Plot of Analytical Results for Sample A013 and Associated Background Sample*

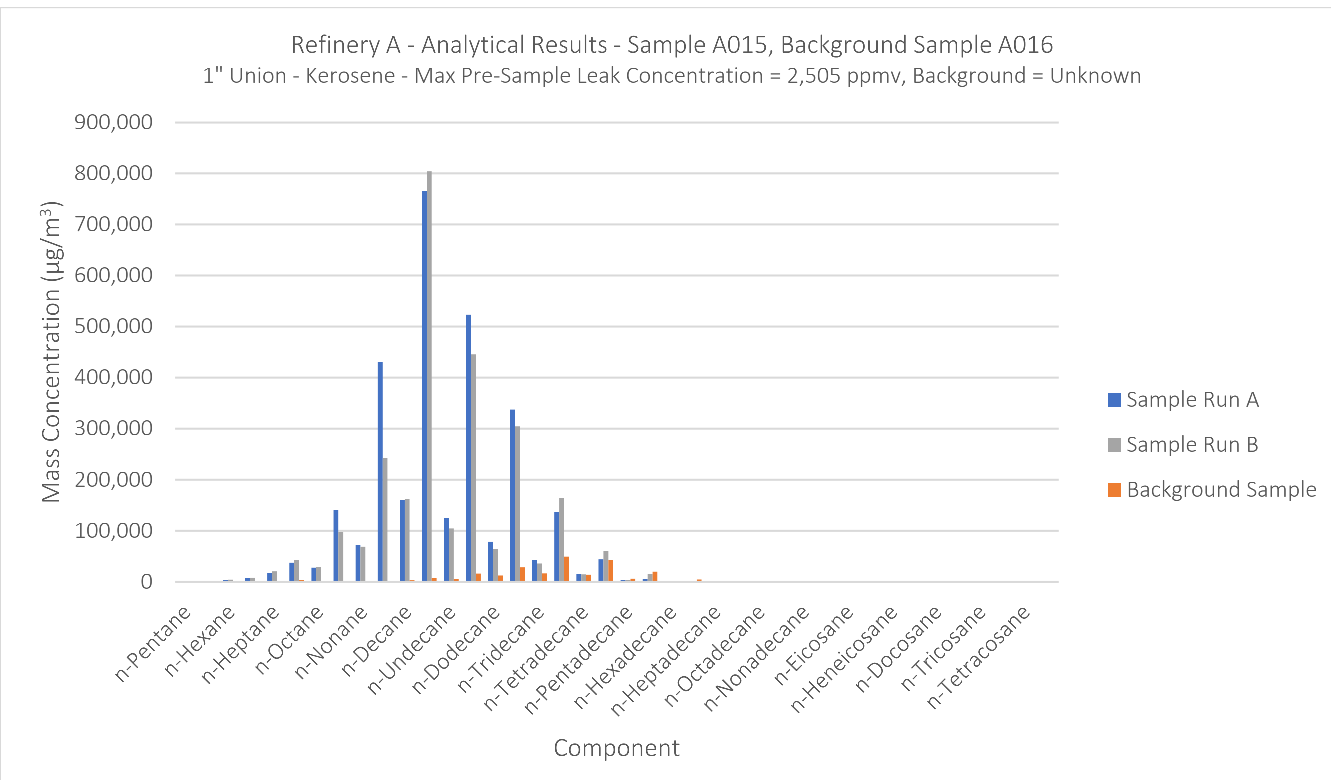


Figure B-3.20. *Plot of Analytical Results for Sample A015 and Associated Background Sample*

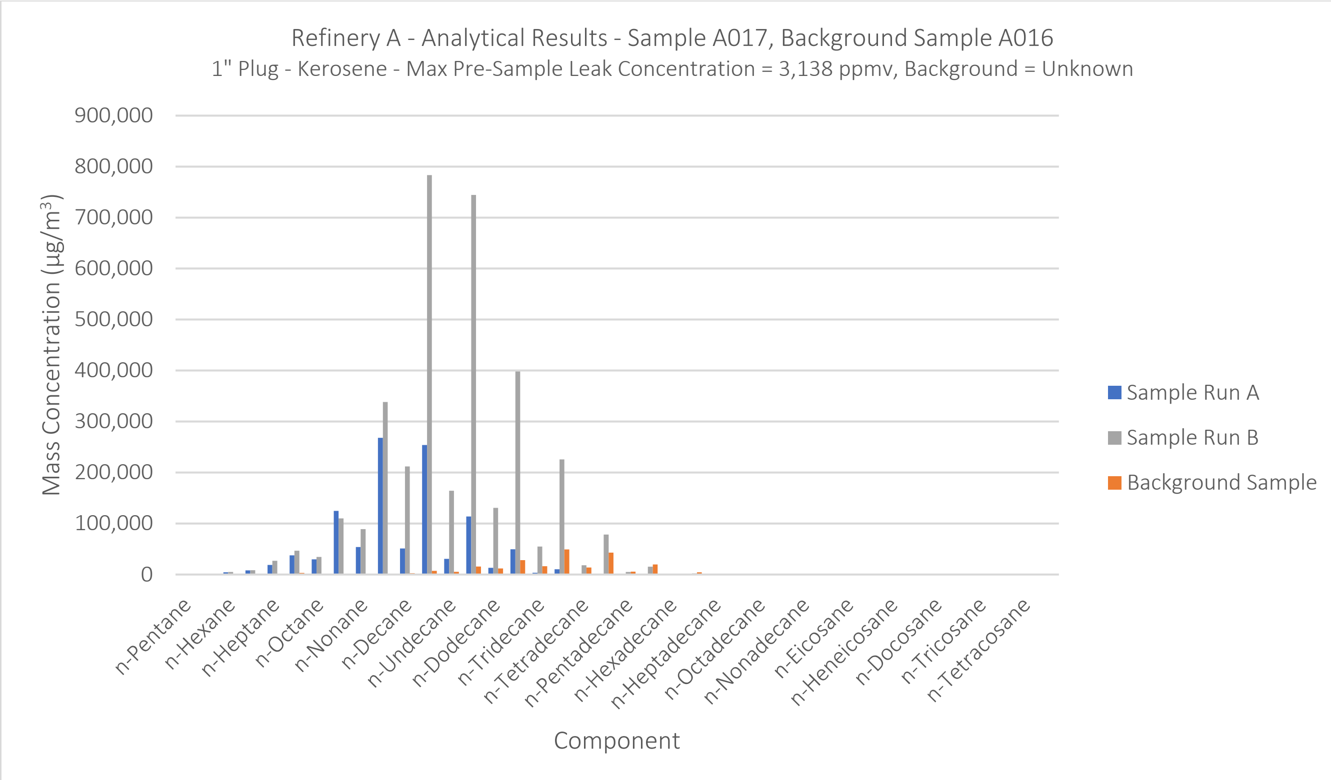


Figure B-3.21. Plot of Analytical Results for Sample A017 and Associated Background Sample

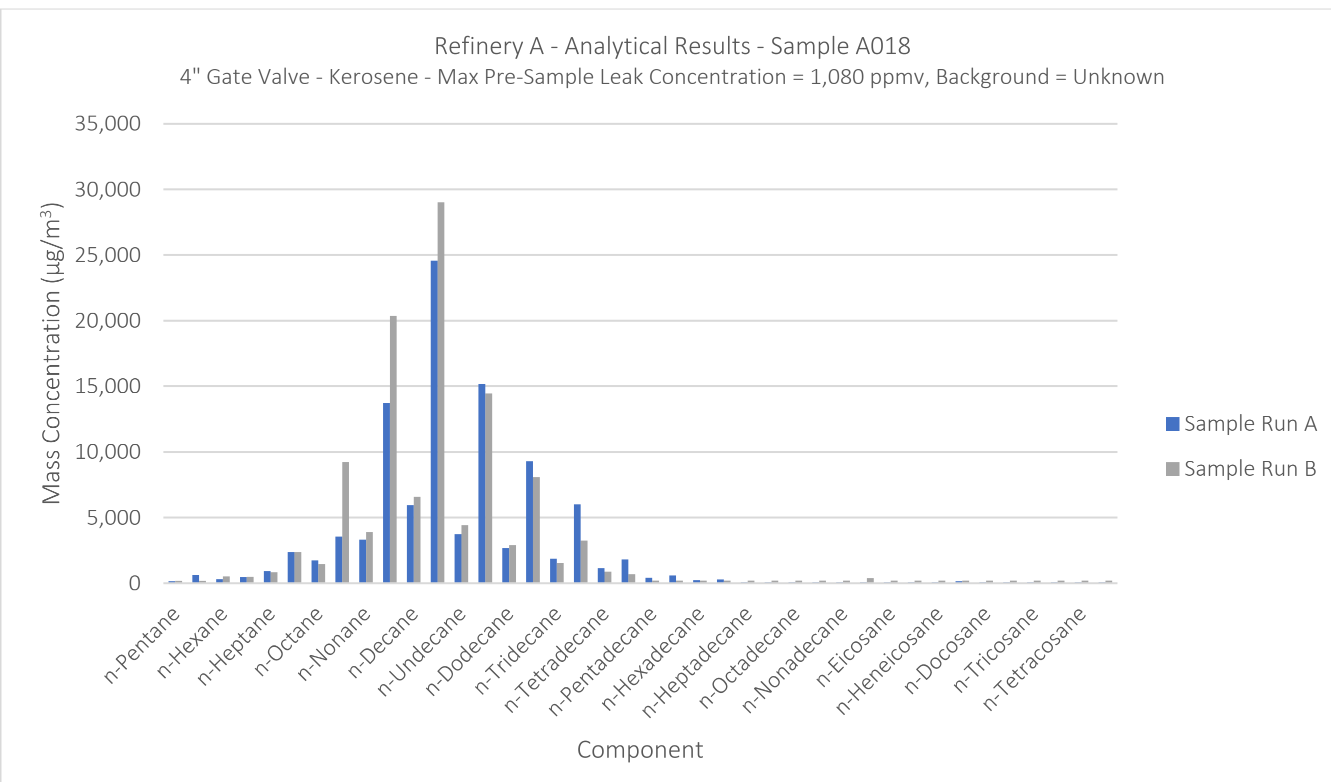


Figure B-3.22. Plot of Analytical Results for Sample A018 and Associated Background Sample

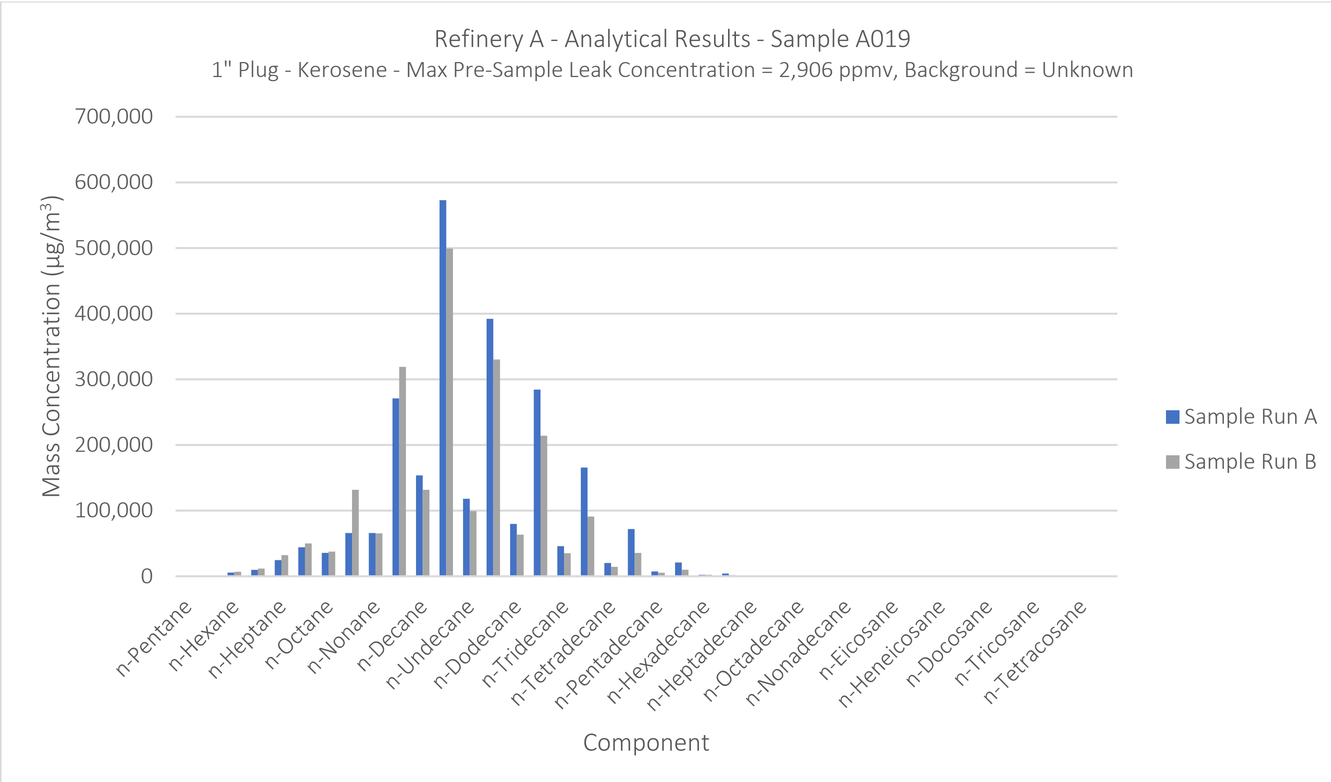


Figure B-3.23. Plot of Analytical Results for Sample A019 and Associated Background Sample

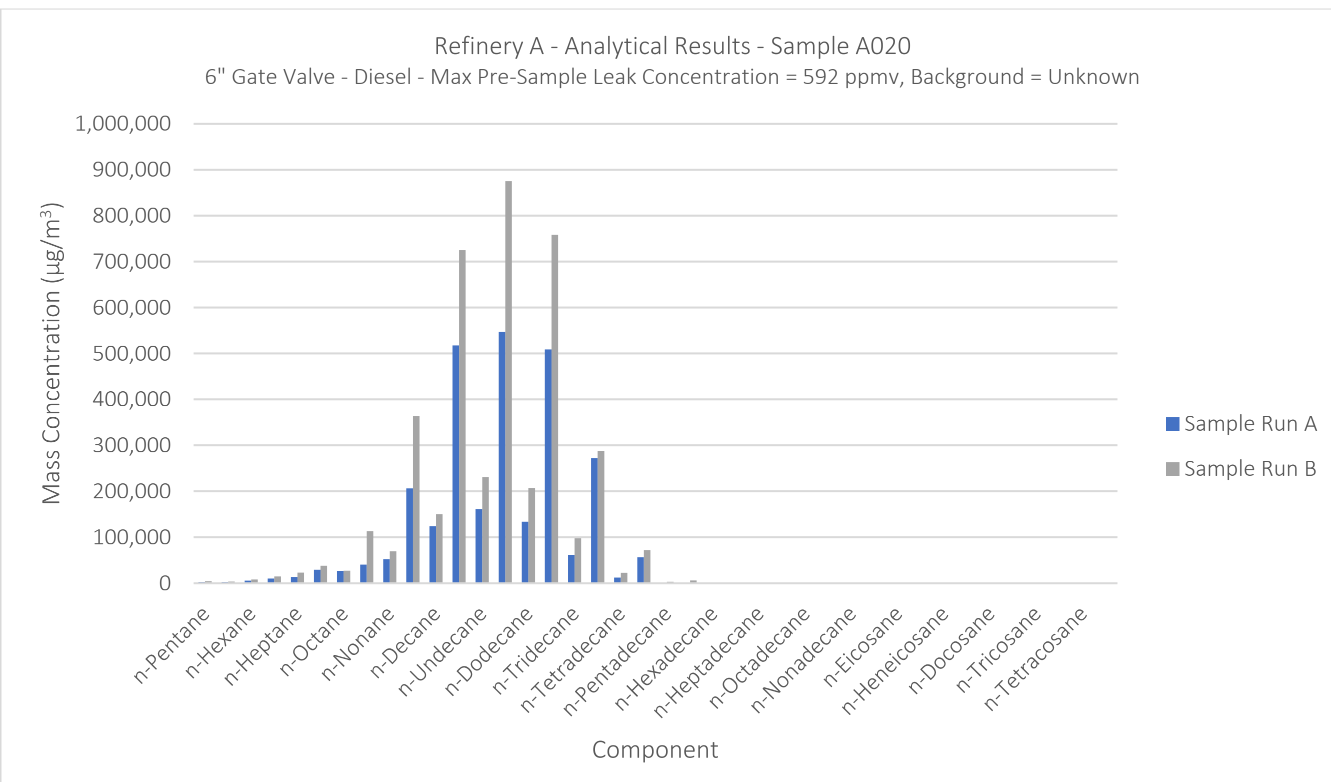


Figure B-3.24. Plot of Analytical Results for Sample A020 and Associated Background Sample

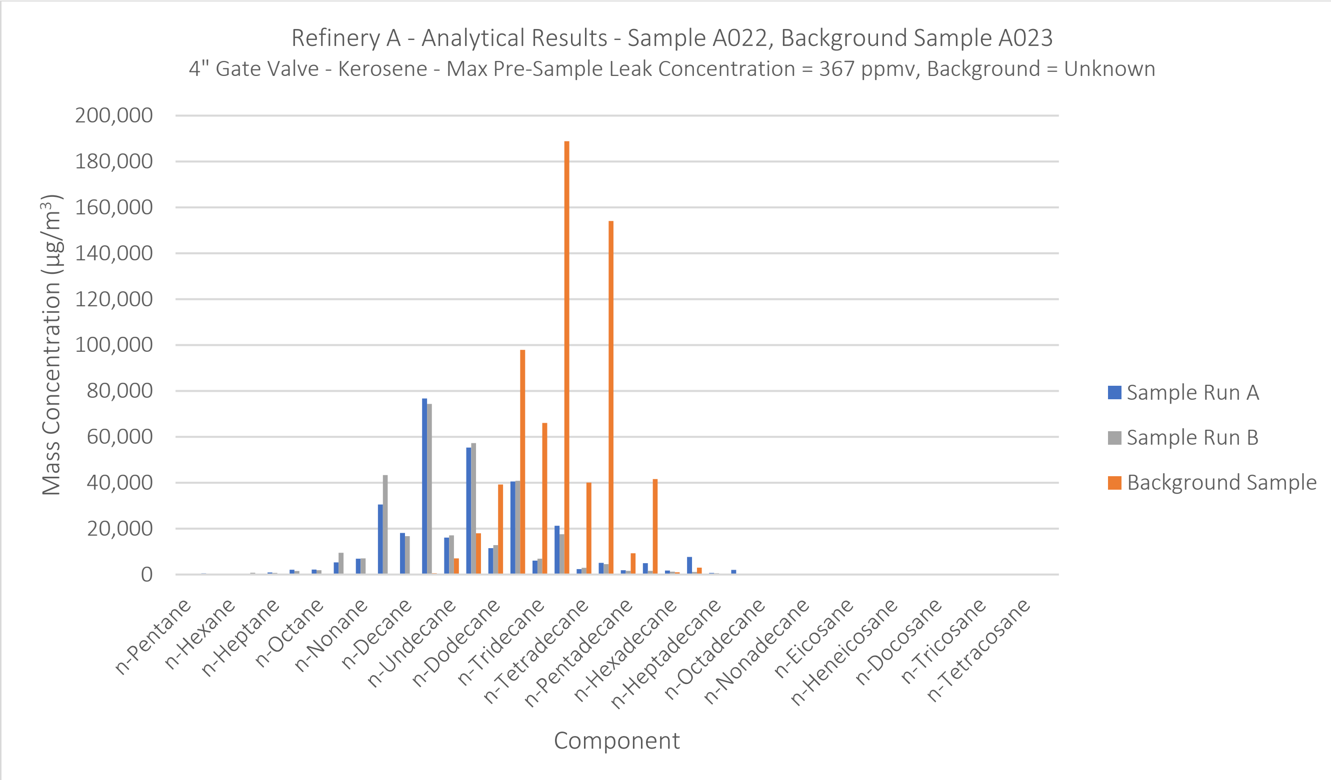


Figure B-3.25. Plot of Analytical Results for Sample A022 and Associated Background Sample

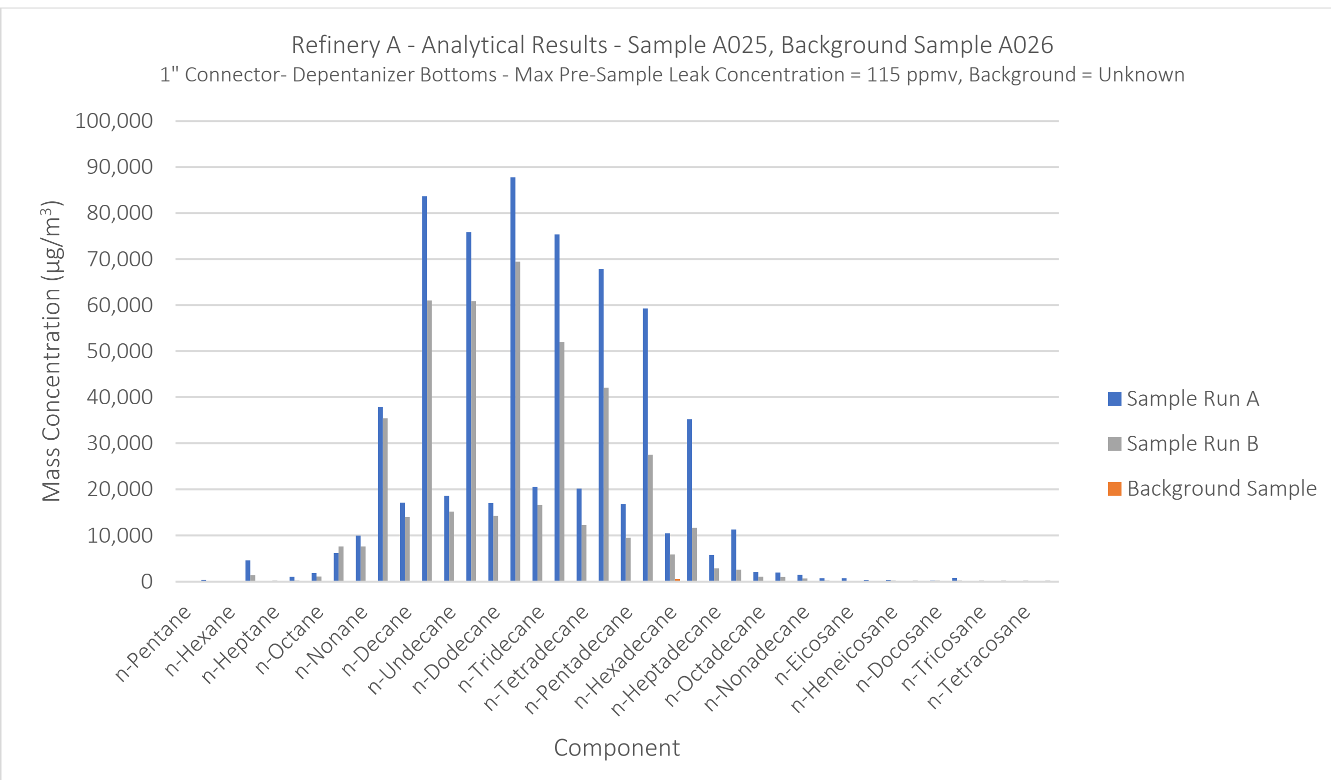


Figure B-3.26. Plot of Analytical Results for Sample A025 and Associated Background Sample

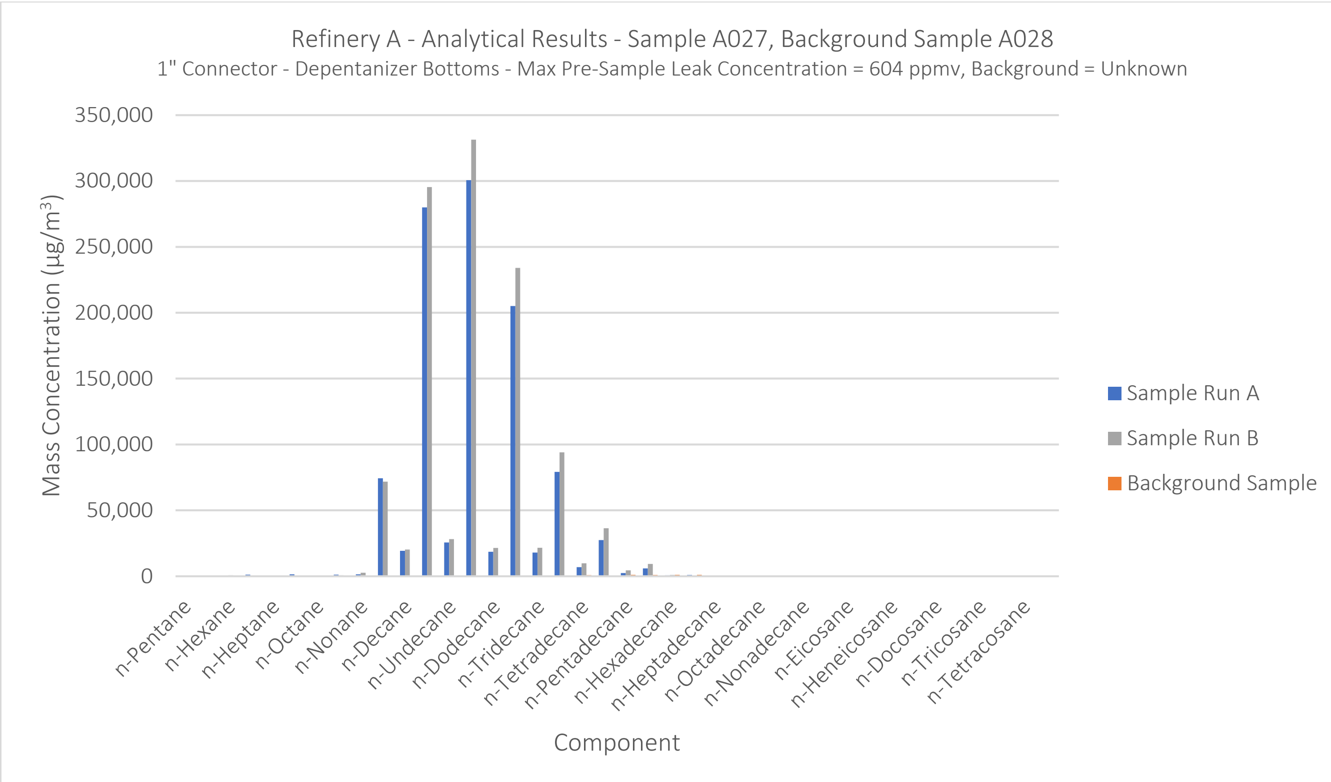


Figure B-3.27. Plot of Analytical Results for Sample A027 and Associated Background Sample

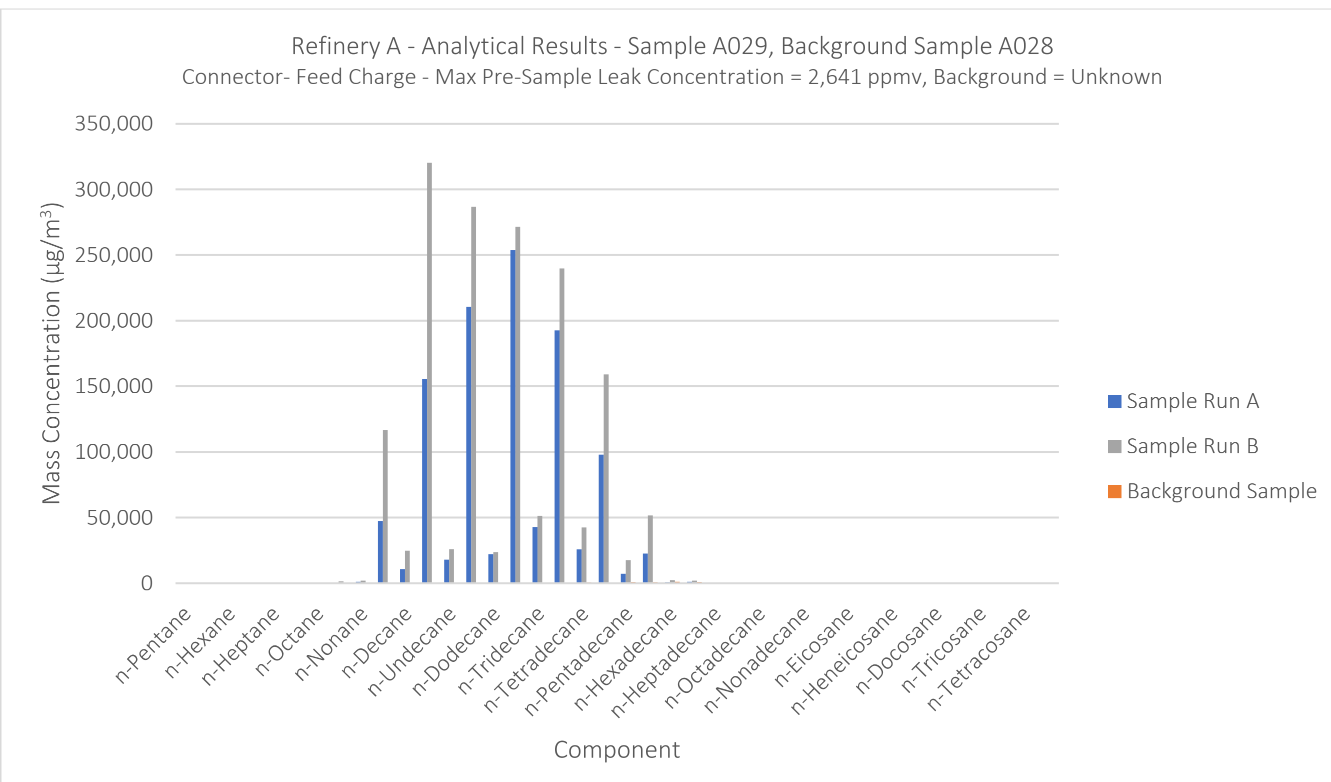


Figure B-3.28. Plot of Analytical Results for Sample A029 and Associated Background Sample

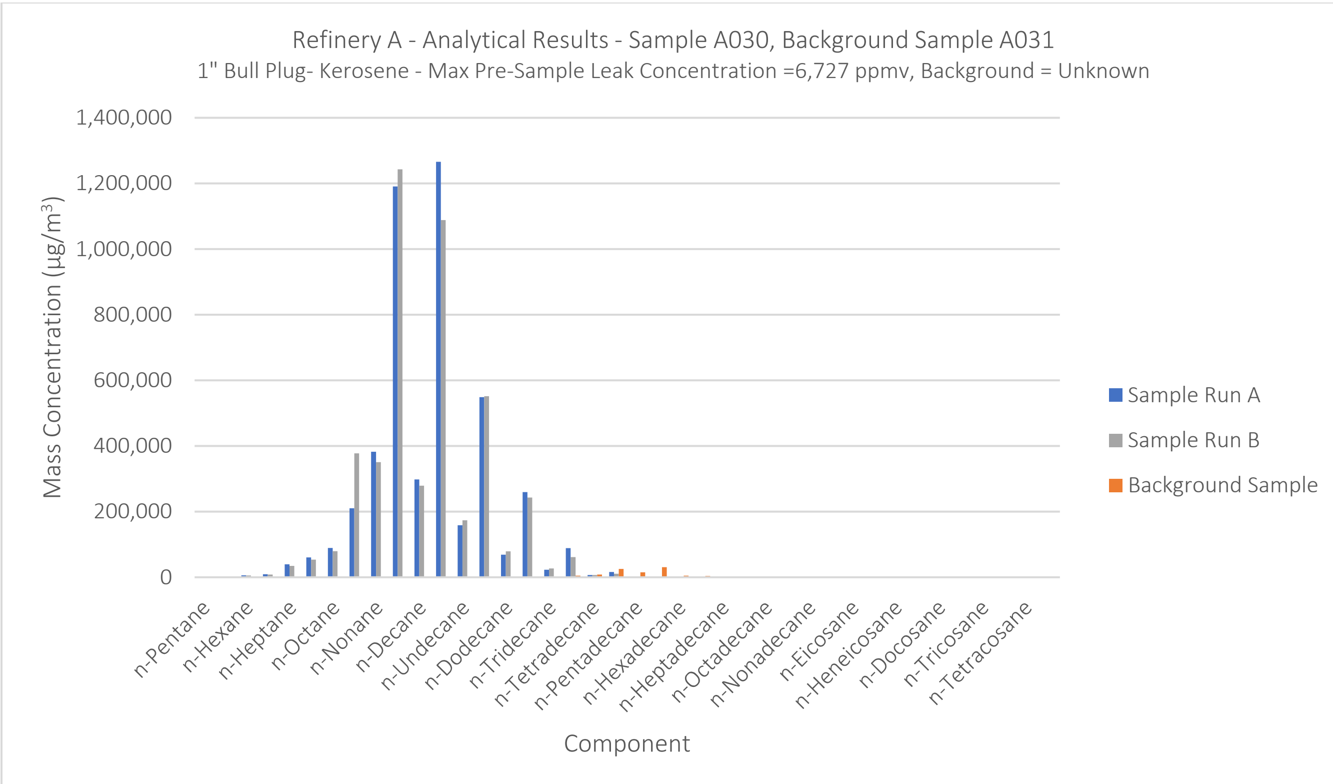


Figure B-3.29. Plot of Analytical Results for Sample A030 and Associated Background Sample

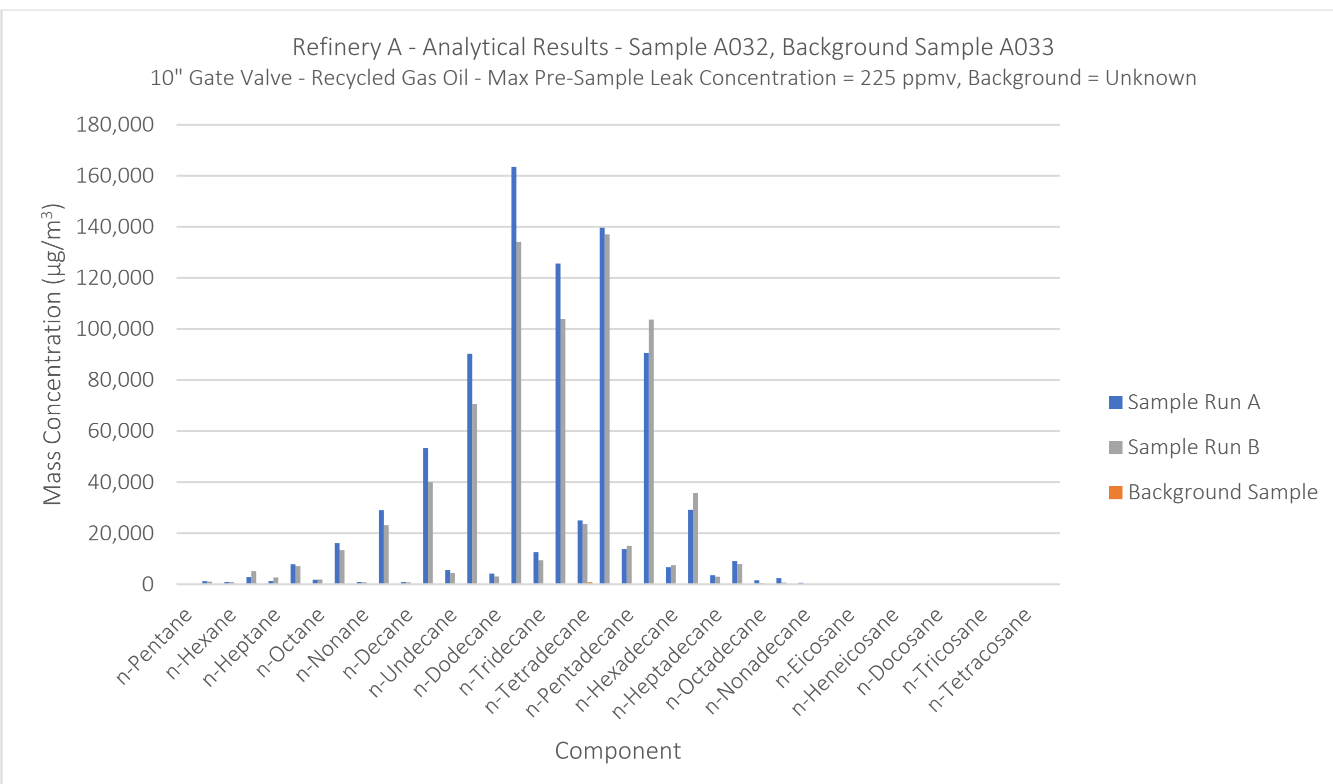


Figure B-3.30. Plot of Analytical Results for Sample A032 and Associated Background Sample

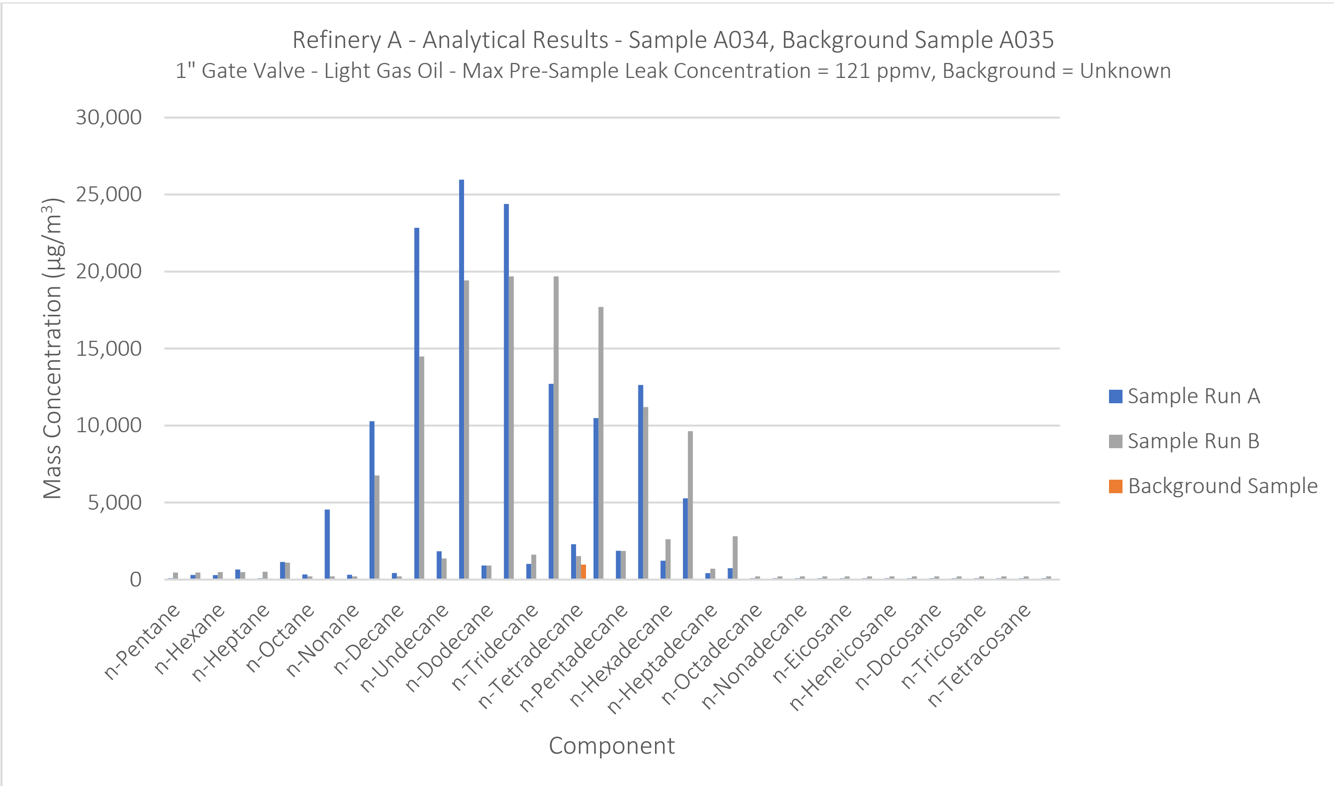


Figure B-3.31. *Plot of Analytical Results for Sample A025 and Associated Background Sample*

Refinery B Sample Results

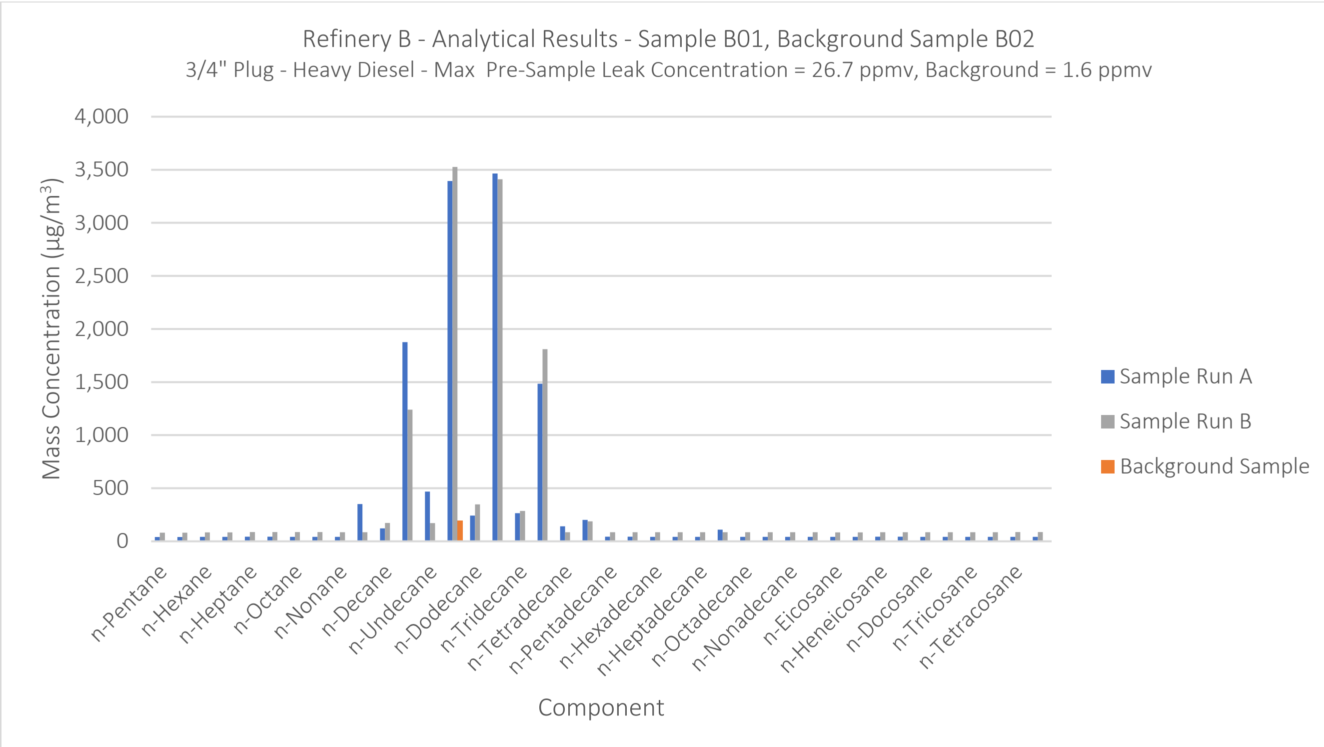


Figure B-3.32. Plot of Analytical Results for Sample B01 and Associated Background Sample

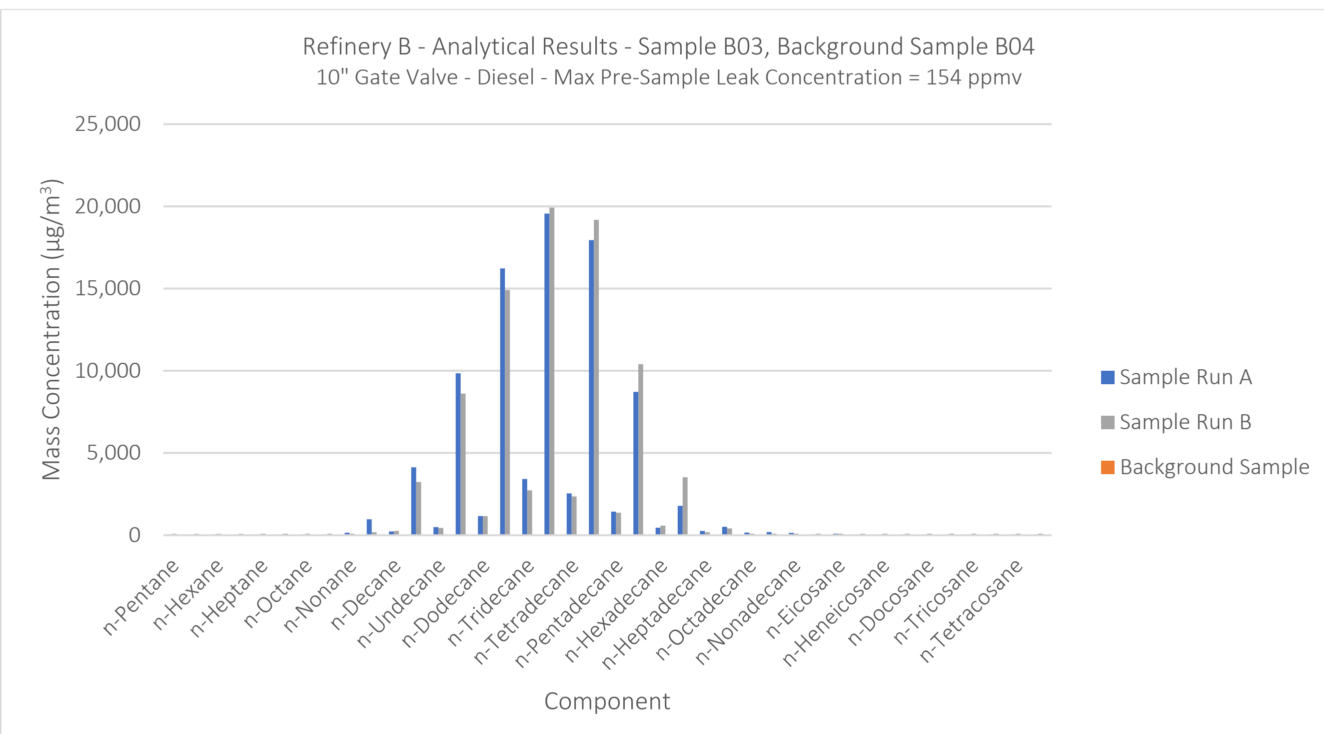


Figure B-3.33. Plot of Analytical Results for Sample B03 and Associated Background Sample

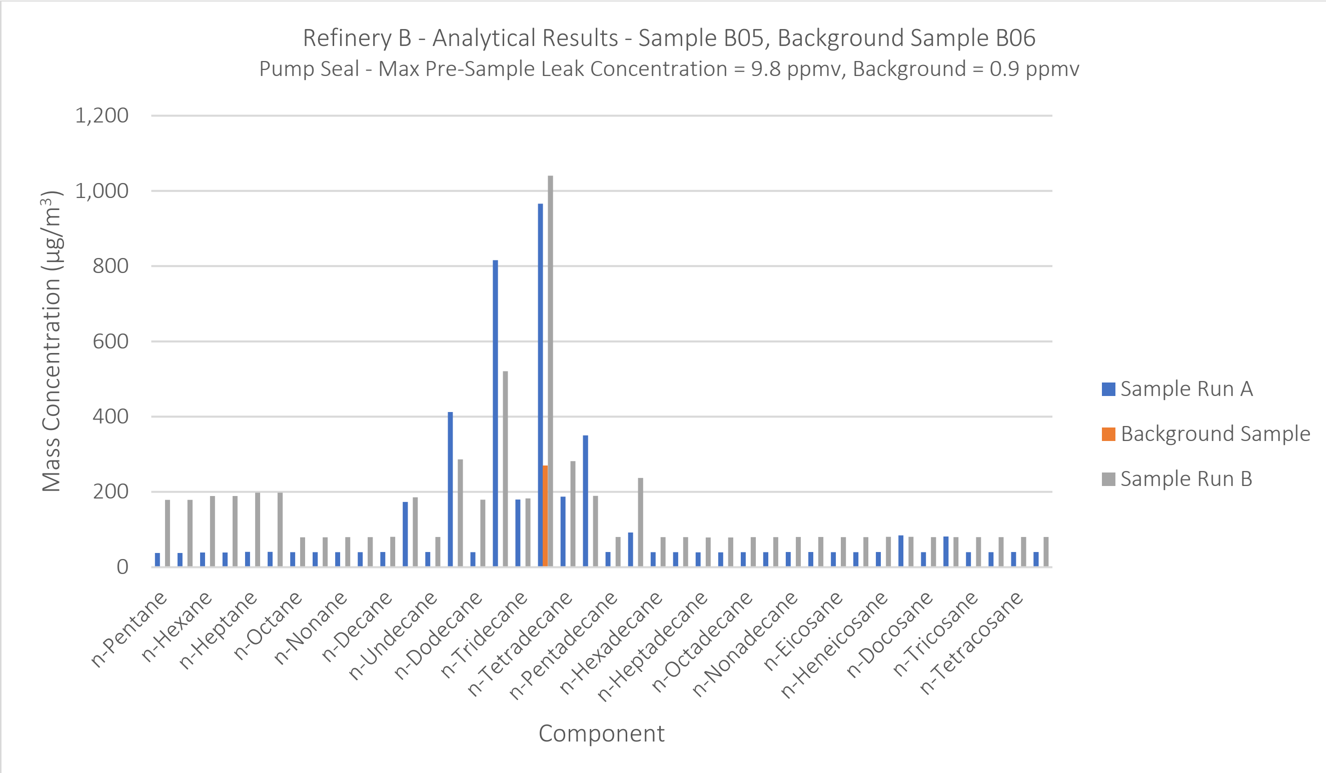


Figure B-3.34. Plot of Analytical Results for Sample B05 and Associated Background Sample

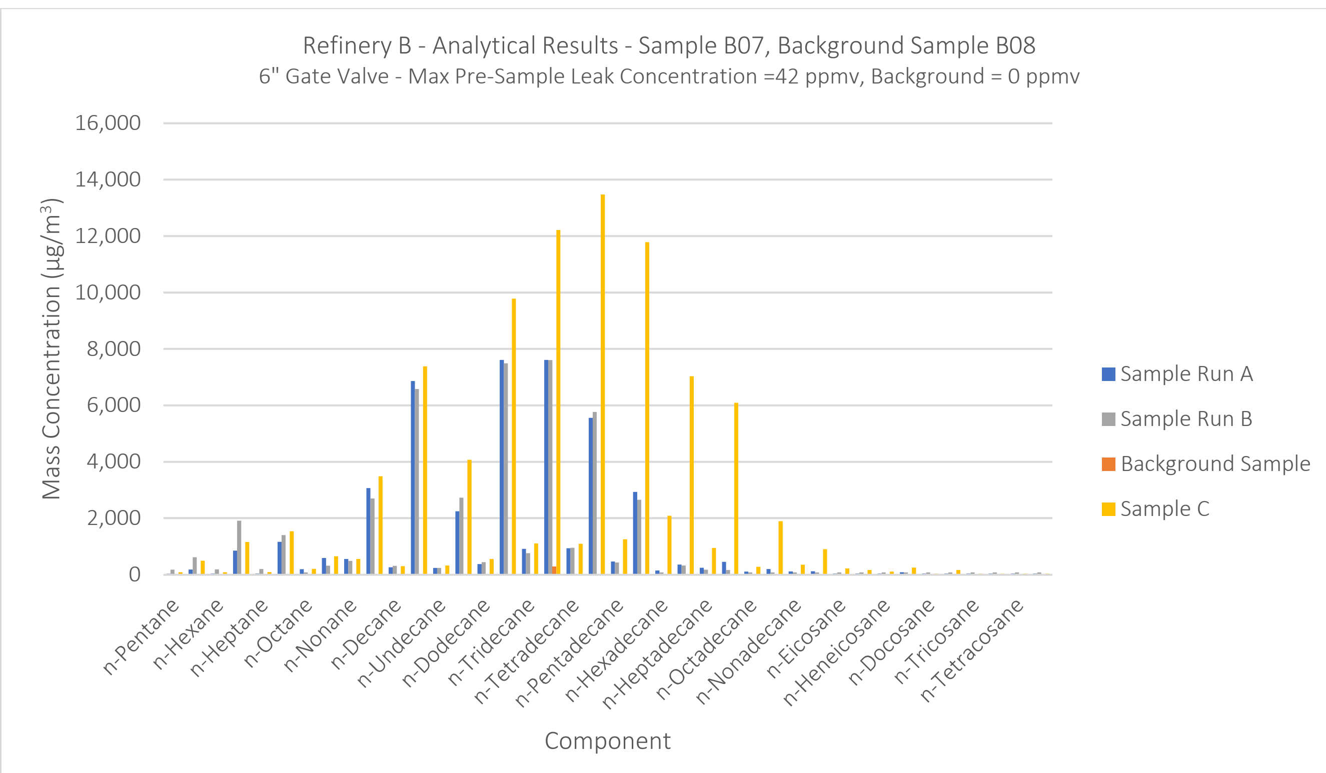


Figure B-3.35. Plot of Analytical Results for Sample B07 and Associated Background Sample

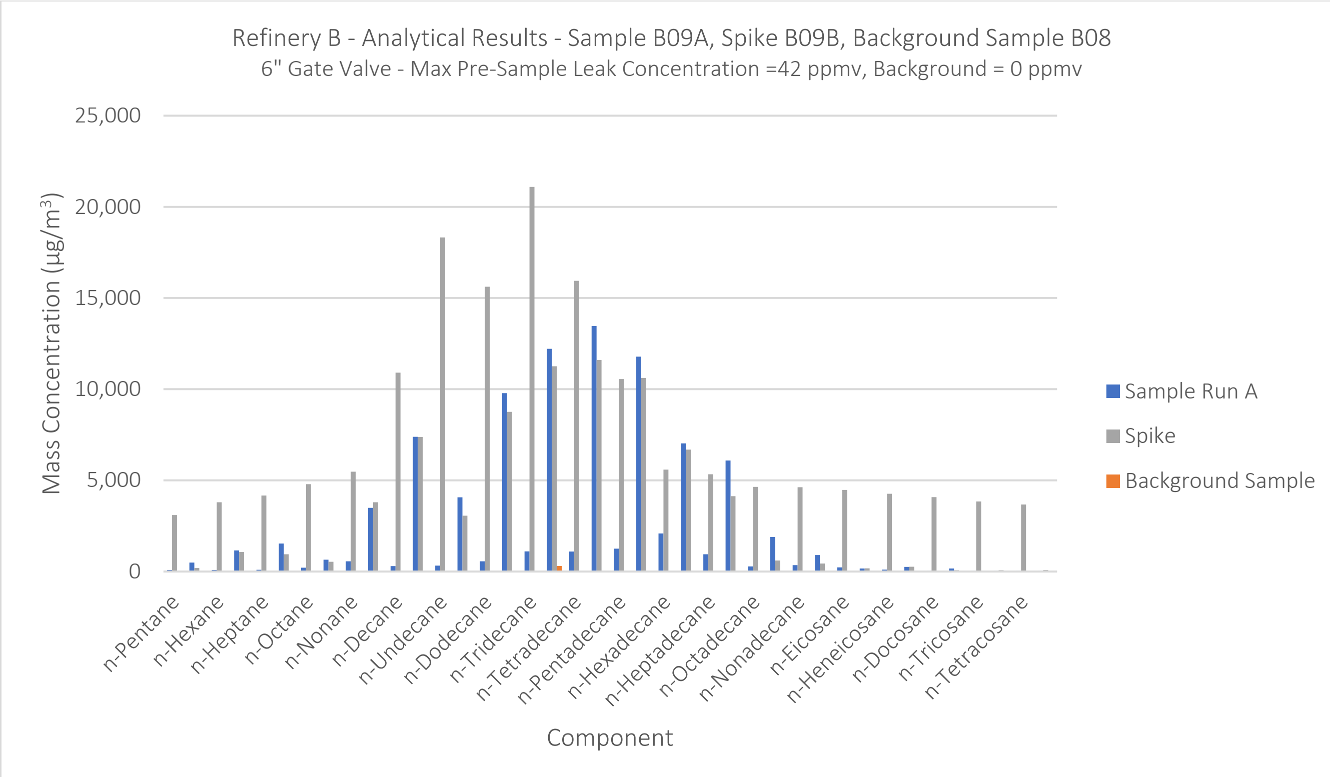


Figure B-3.36. Plot of Analytical Results for Sample B09 and Associated Background Sample

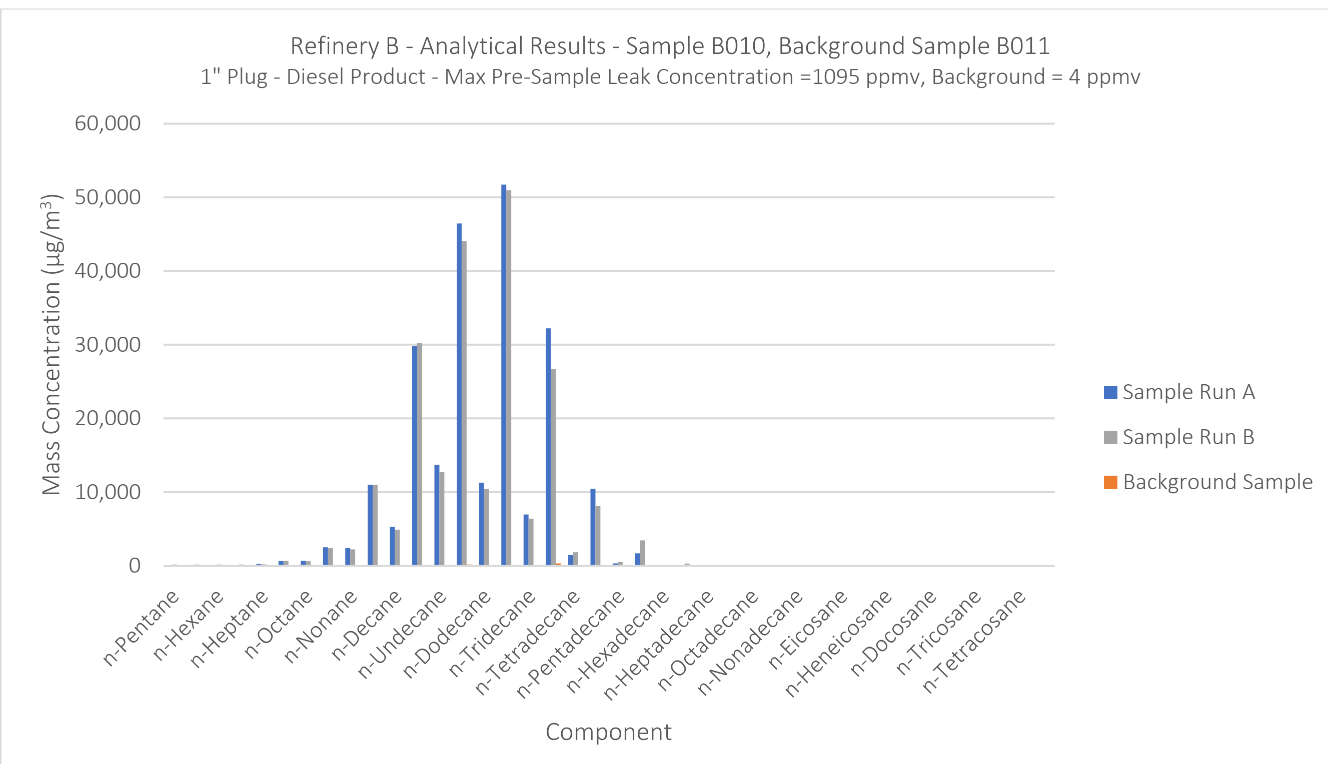


Figure B-3.37. Plot of Analytical Results for Sample B010 and Associated Background Sample

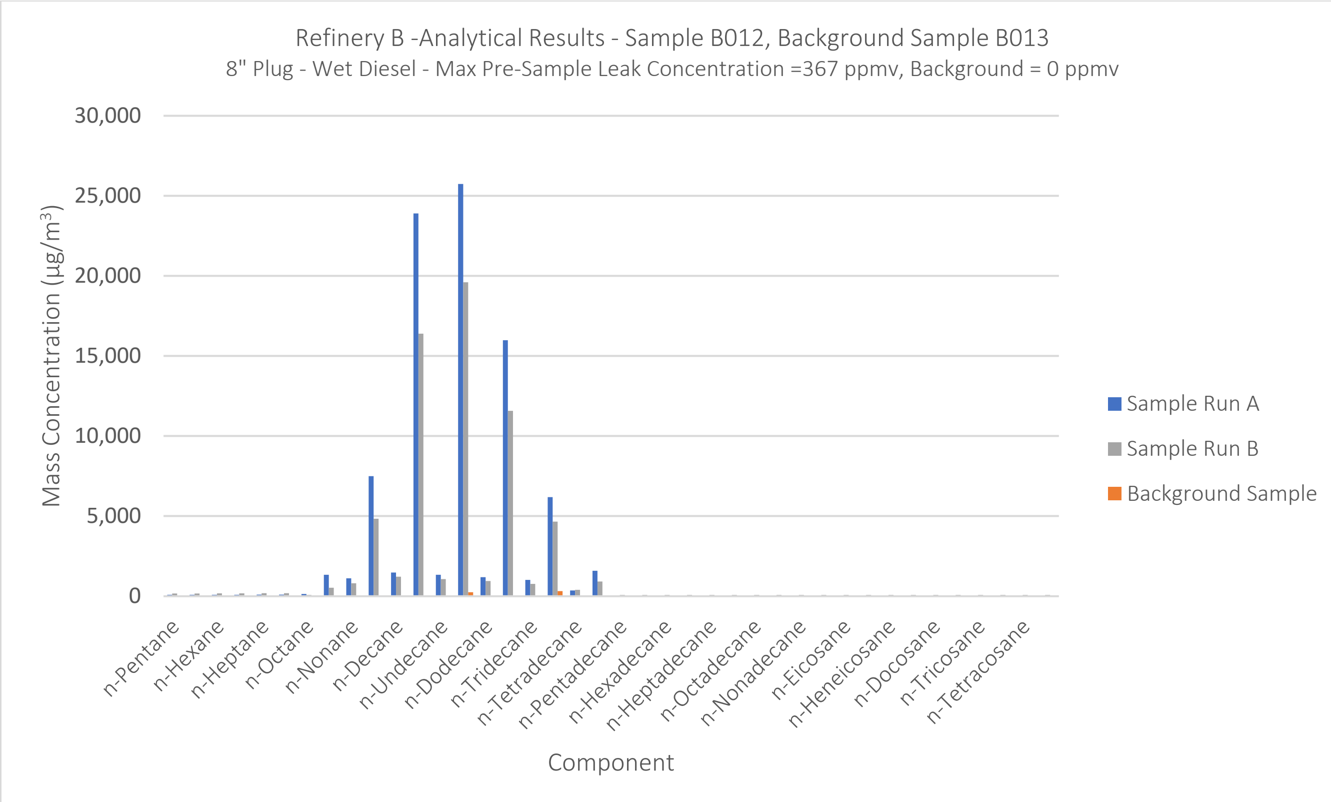


Figure B-3.38. Plot of Analytical Results for Sample B012 and Associated Background Sample

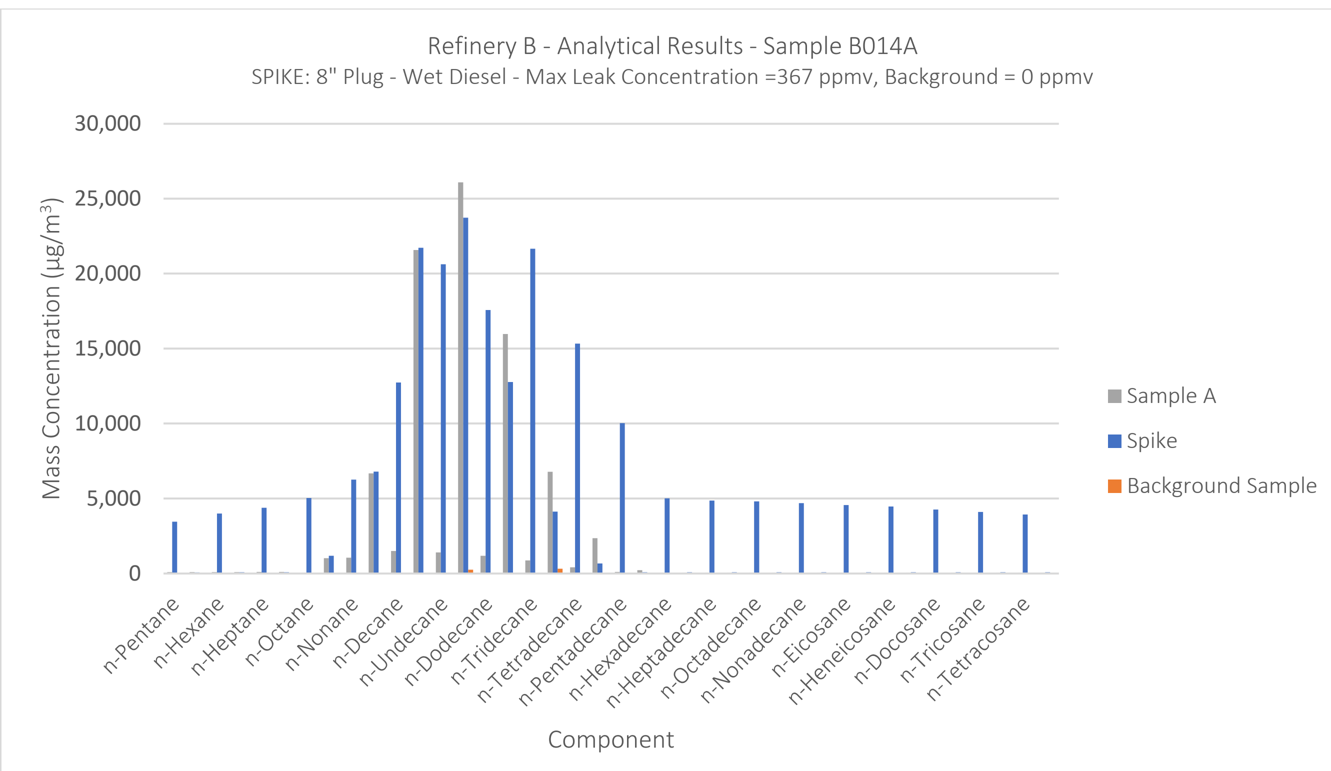


Figure B-3.39. Plot of Analytical Results for Sample B014 and Associated Background Sample

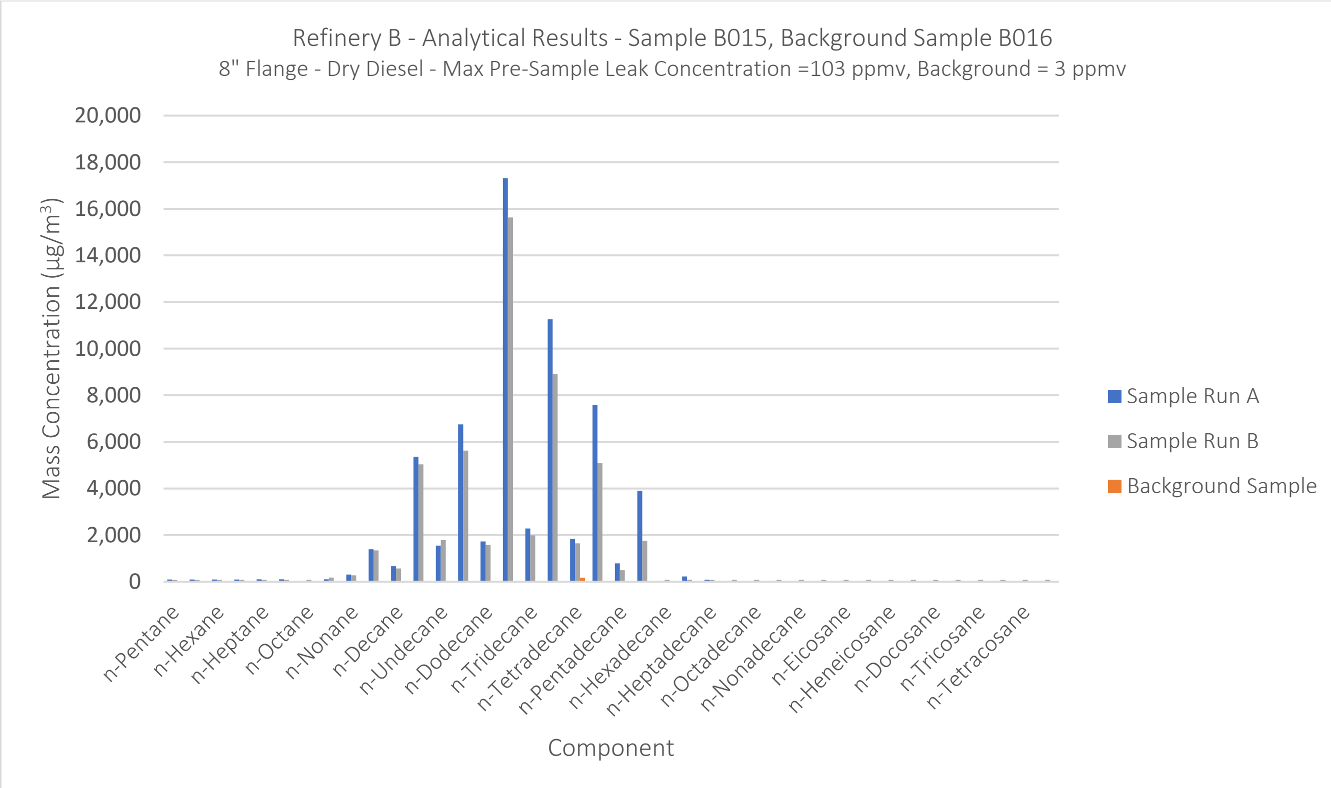


Figure B-3.40. Plot of Analytical Results for Sample B015 and Associated Background Sample

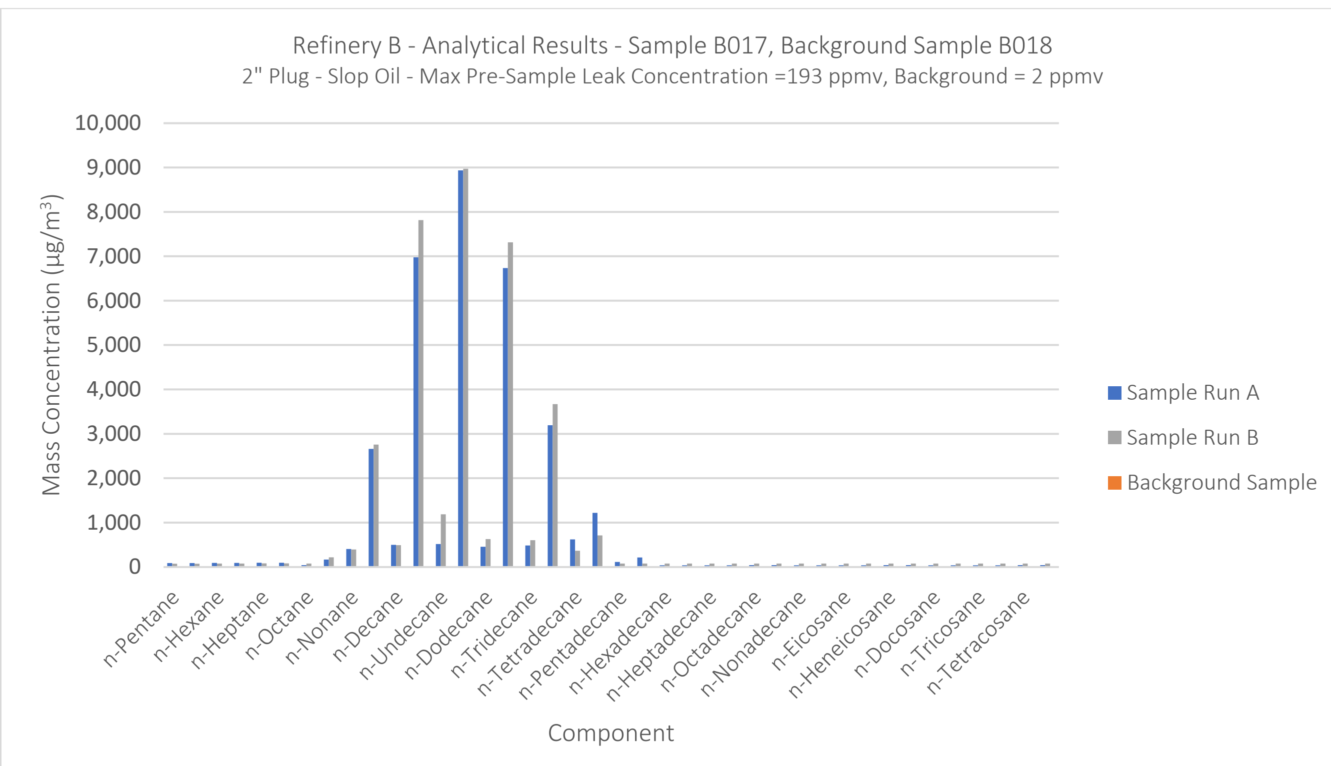


Figure B-3.41. Plot of Analytical Results for Sample B017 and Associated Background Sample

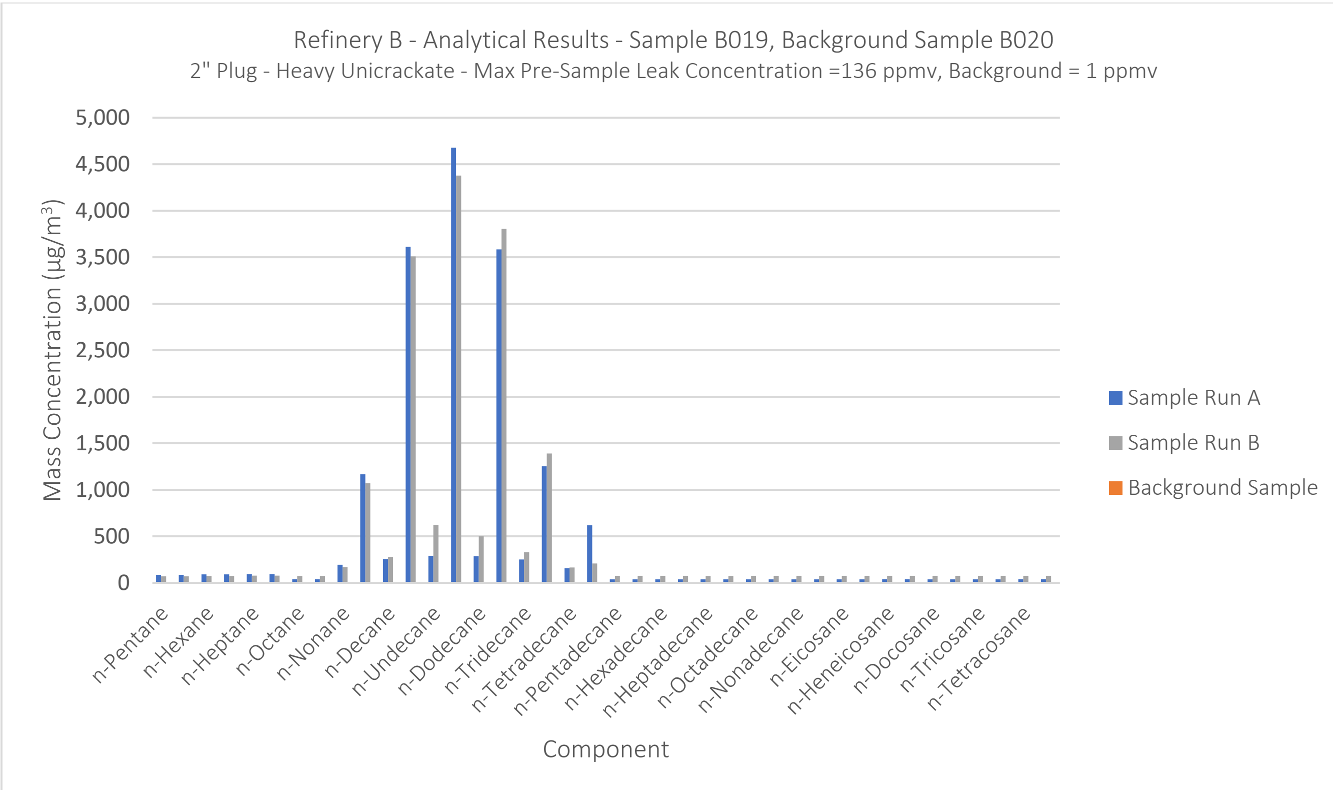


Figure B-3.42. Plot of Analytical Results for Sample B019 and Associated Background Sample

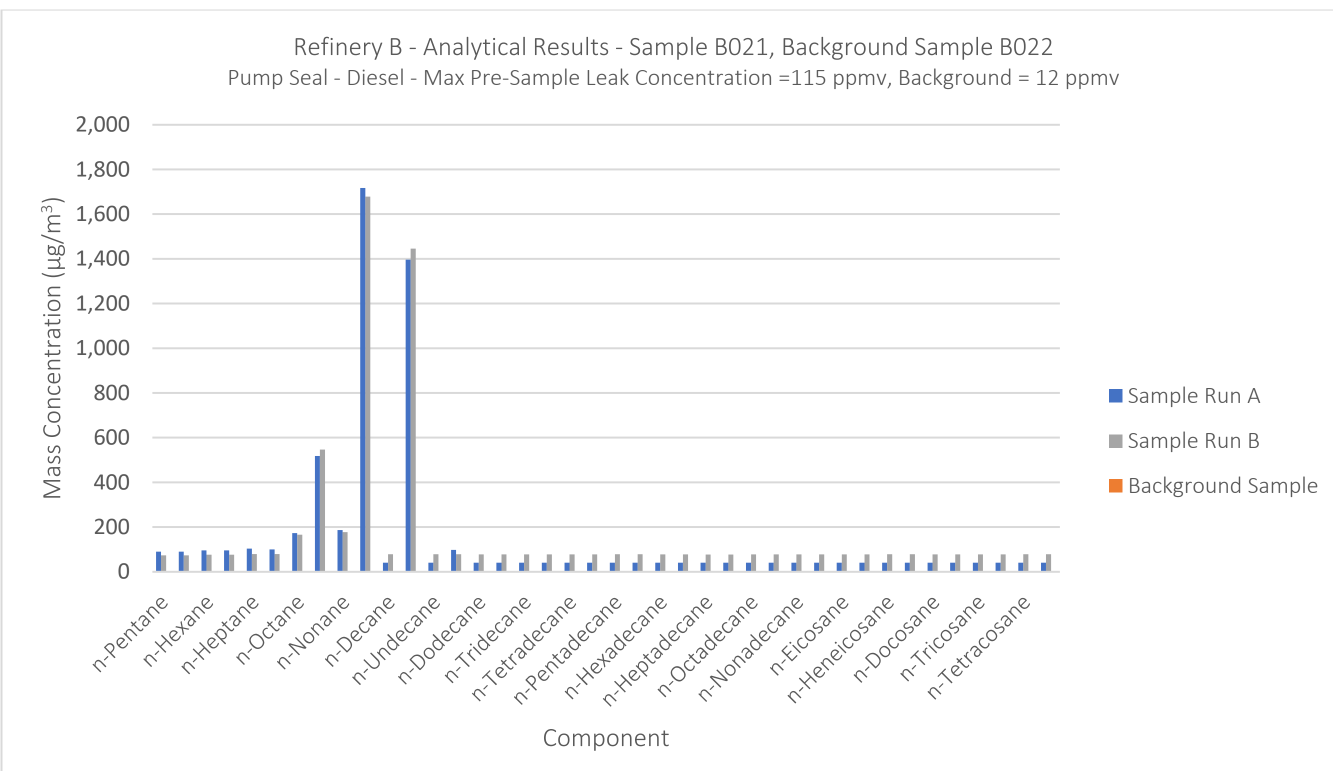


Figure B-3.43. Plot of Analytical Results for Sample B021 and Associated Background Sample

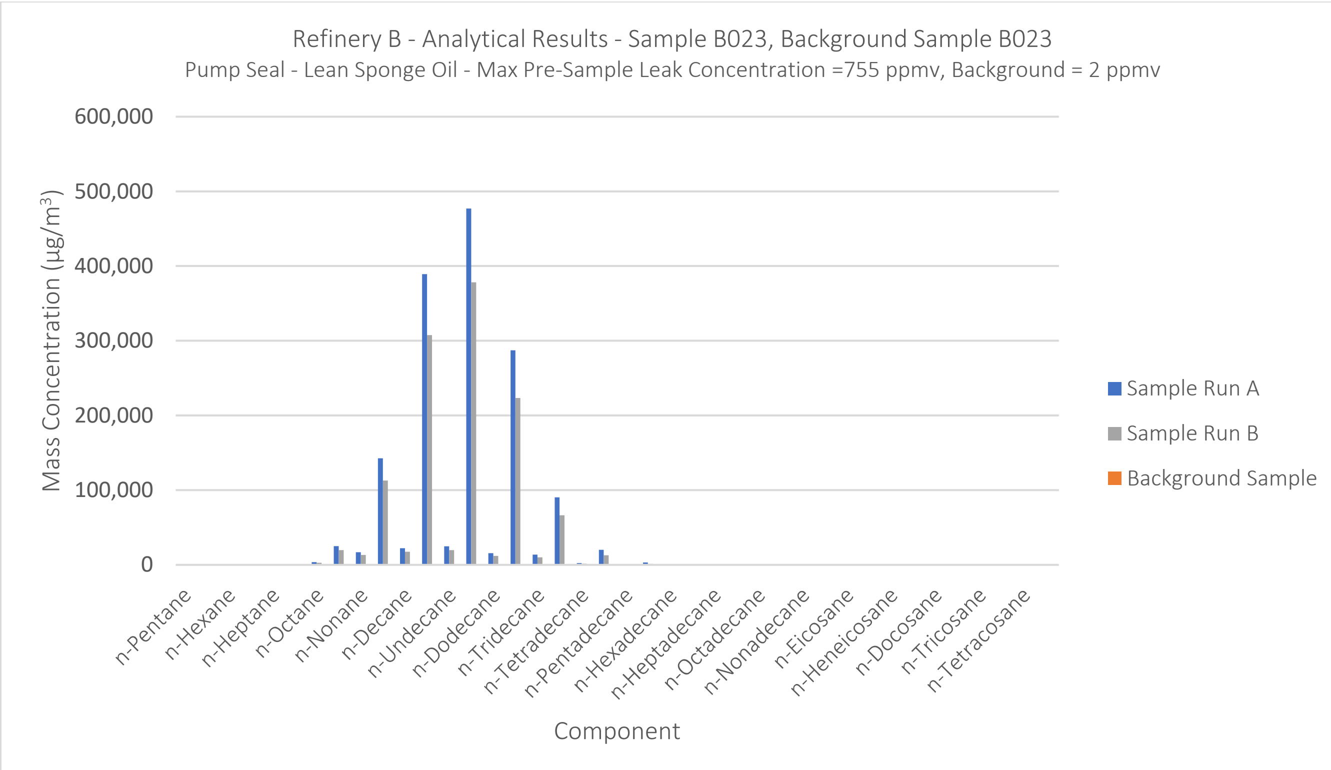


Figure B-3.44. Plot of Analytical Results for Sample B023 and Associated Background Sample

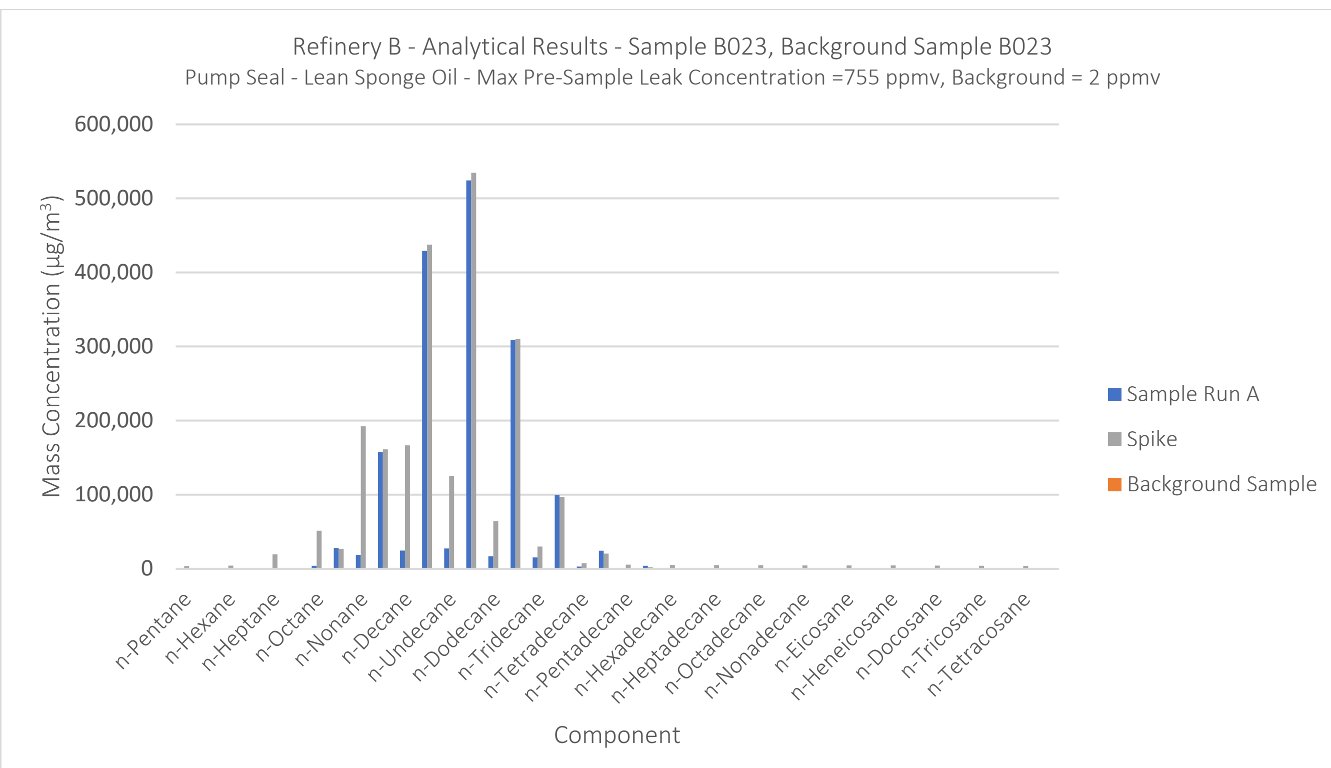


Figure B-3.45. Plot of Analytical Results for Sample B023, Spike, and Associated Background Sample

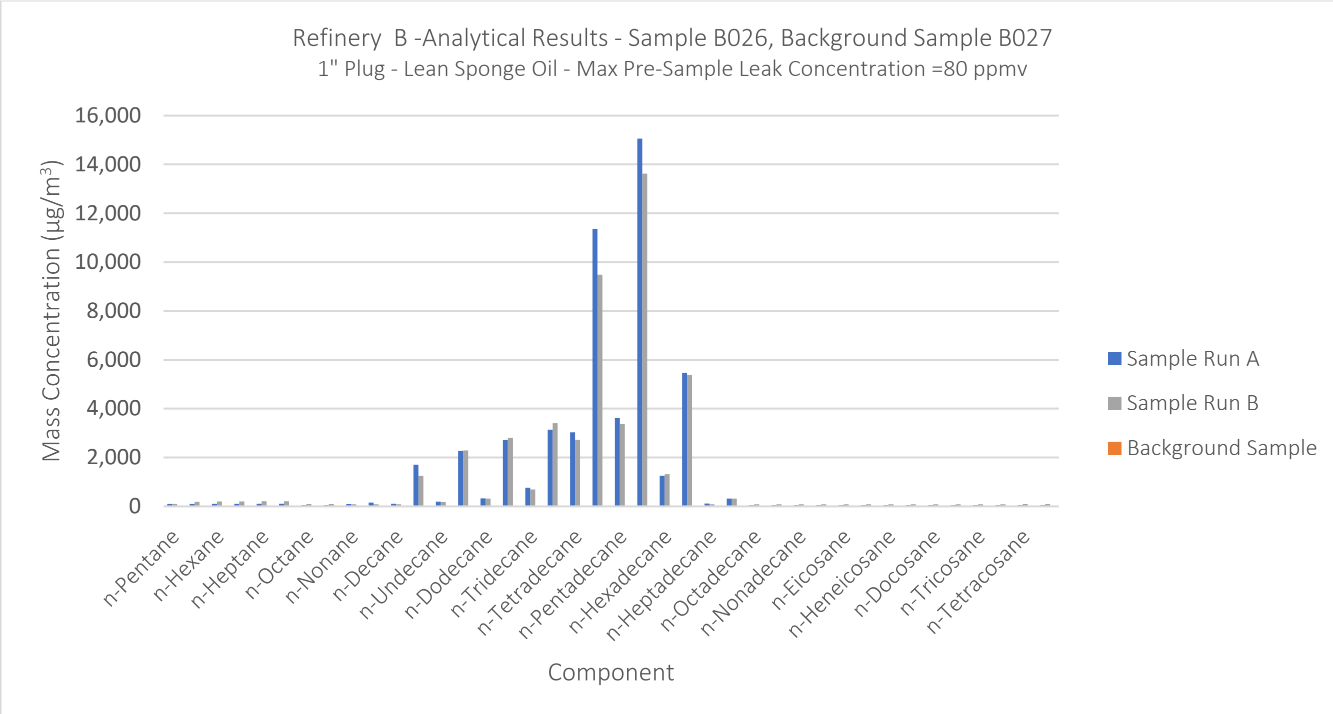


Figure B-3.46. *Plot of Analytical Results for Sample B026 and Associated Background Sample*

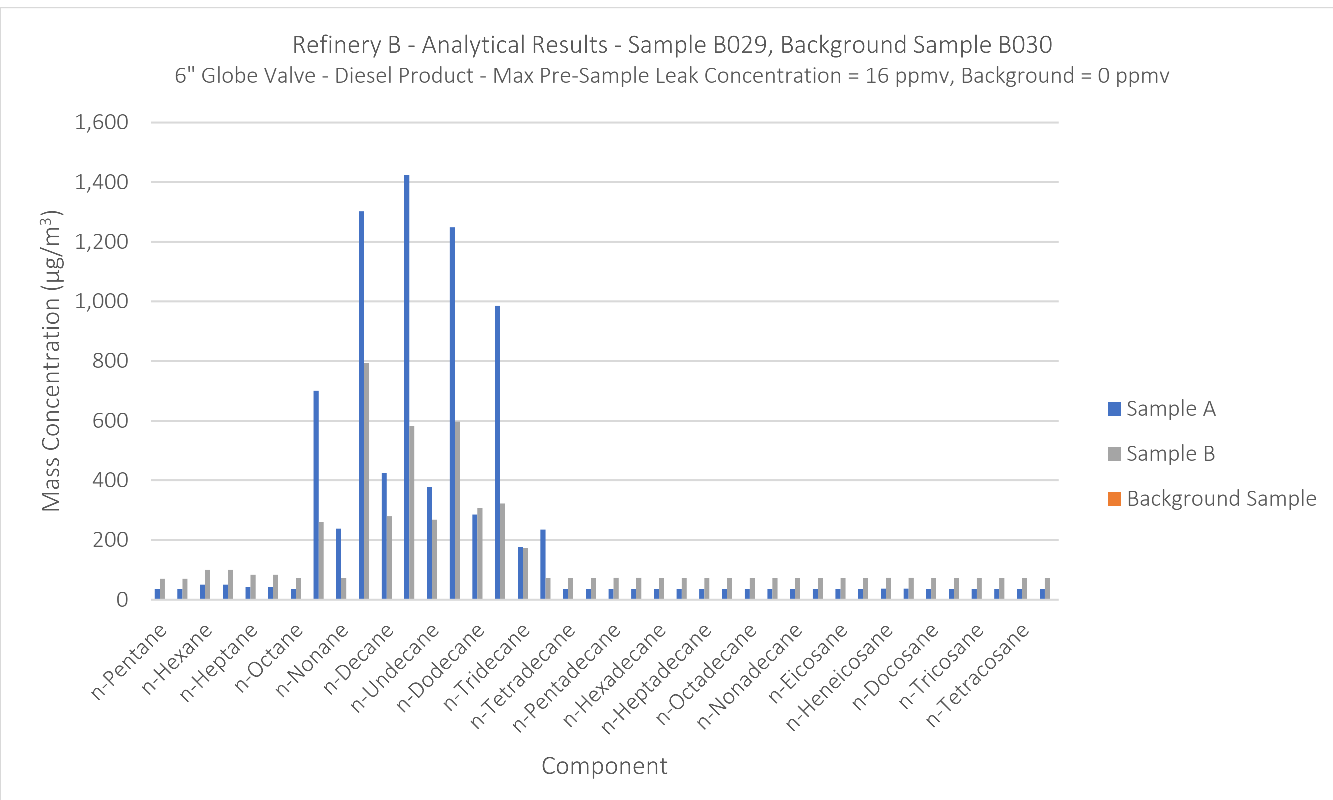


Figure B-3.47. *Plot of Analytical Results for Sample B029 and Associated Background Sample*

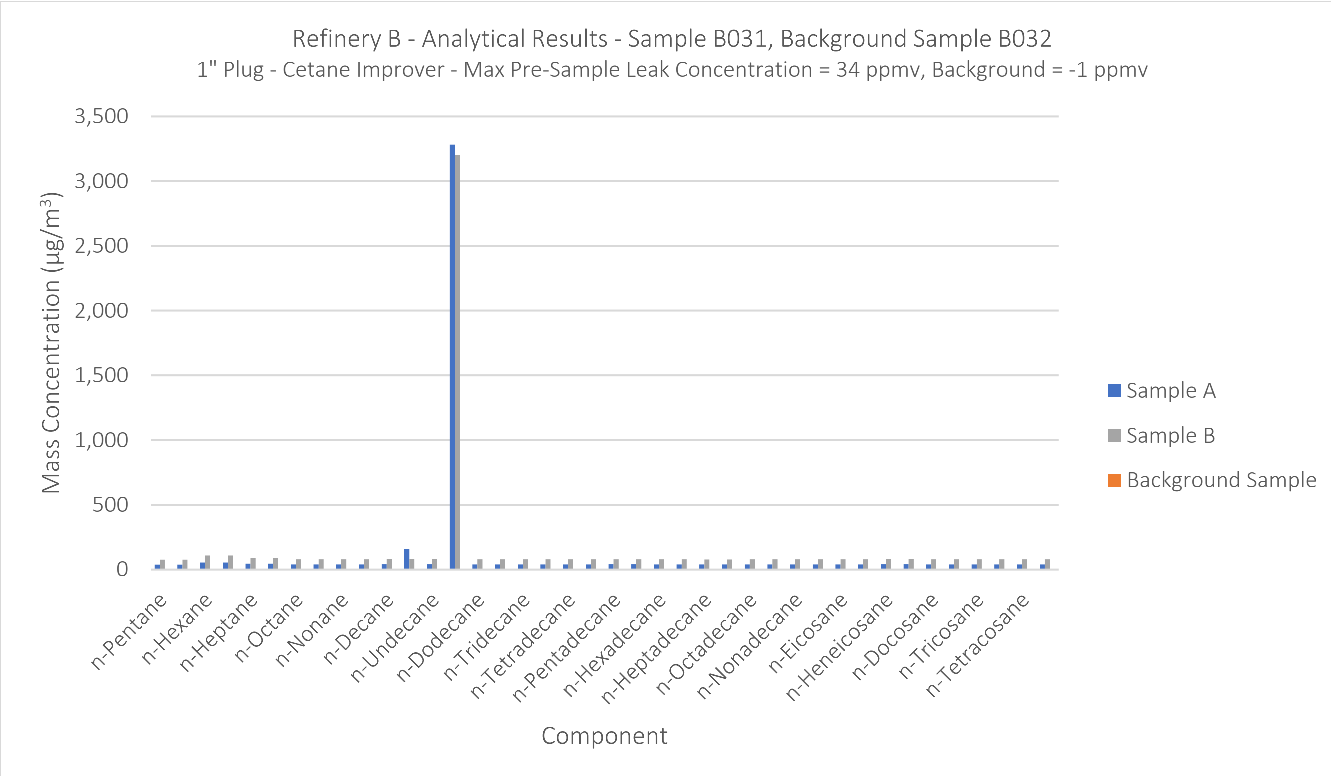


Figure B-3.48. Plot of Analytical Results for Sample B031 and Associated Background Sample

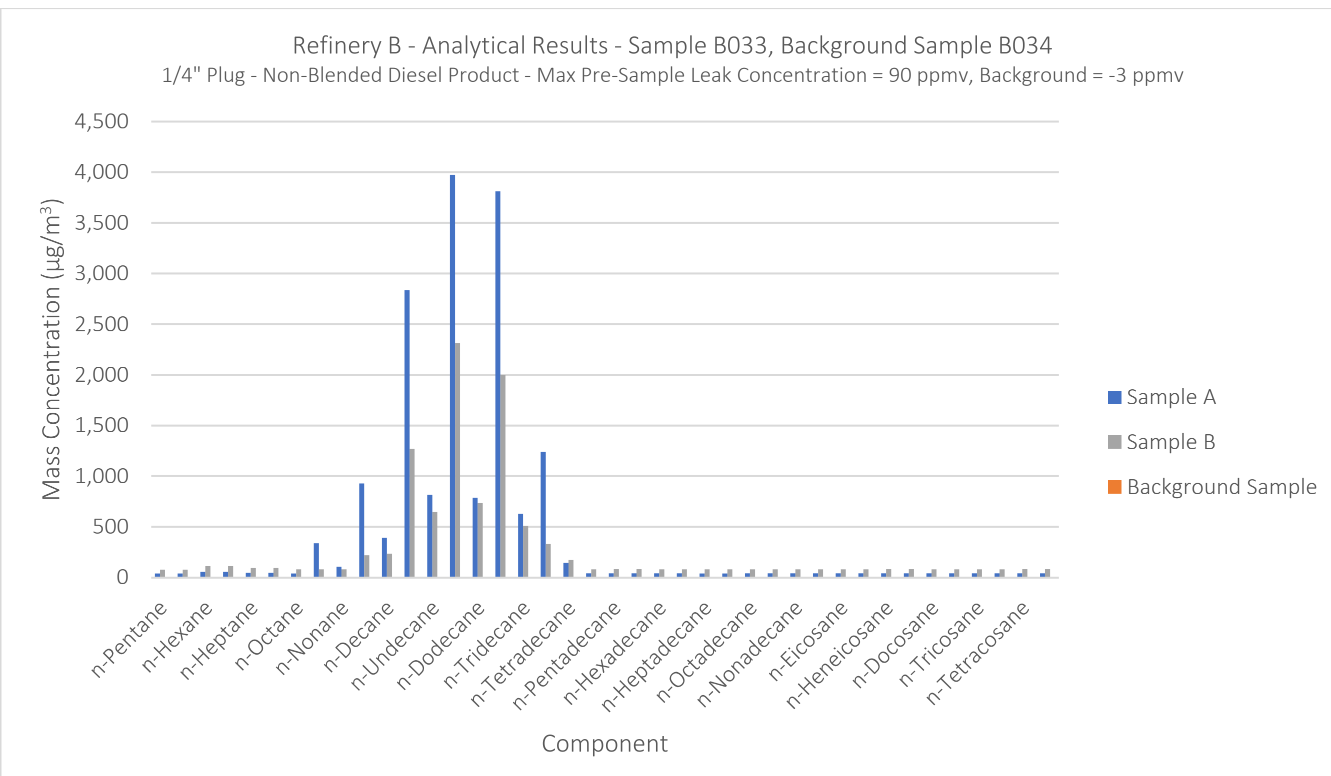


Figure B-3.49. Plot of Analytical Results for Sample B033 and Associated Background Sample

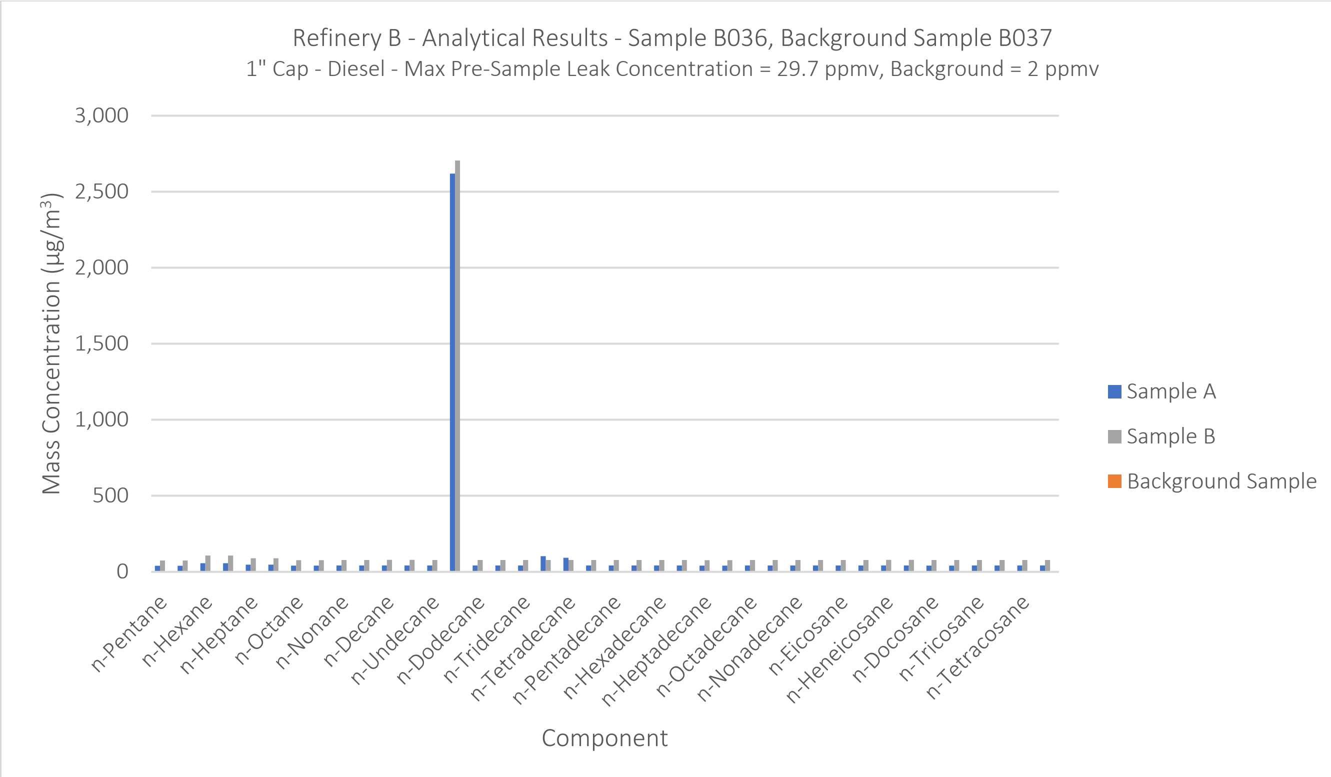


Figure B-3.50. Plot of Analytical Results for Sample B036 and Associated Background Sample

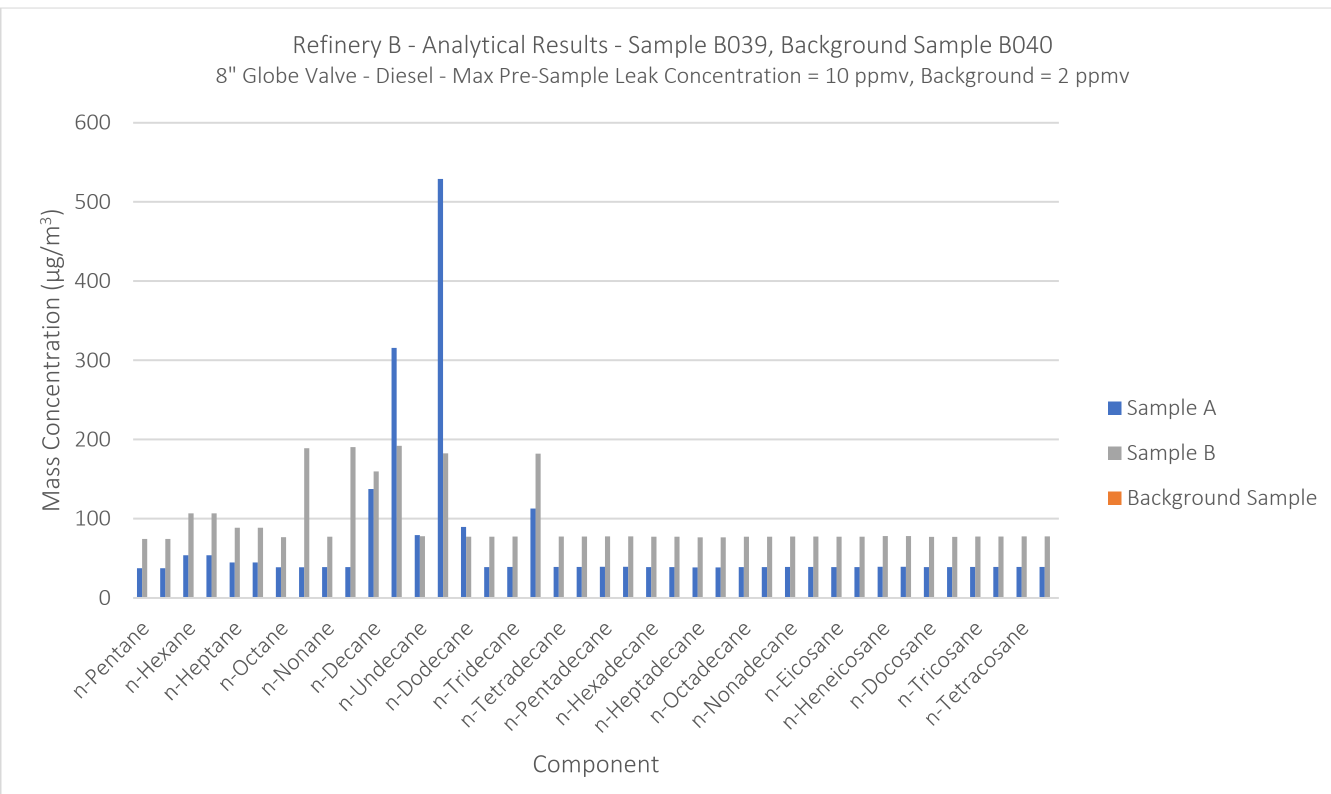


Figure B-3.51. Plot of Analytical Results for Sample B039 and Associated Background Sample

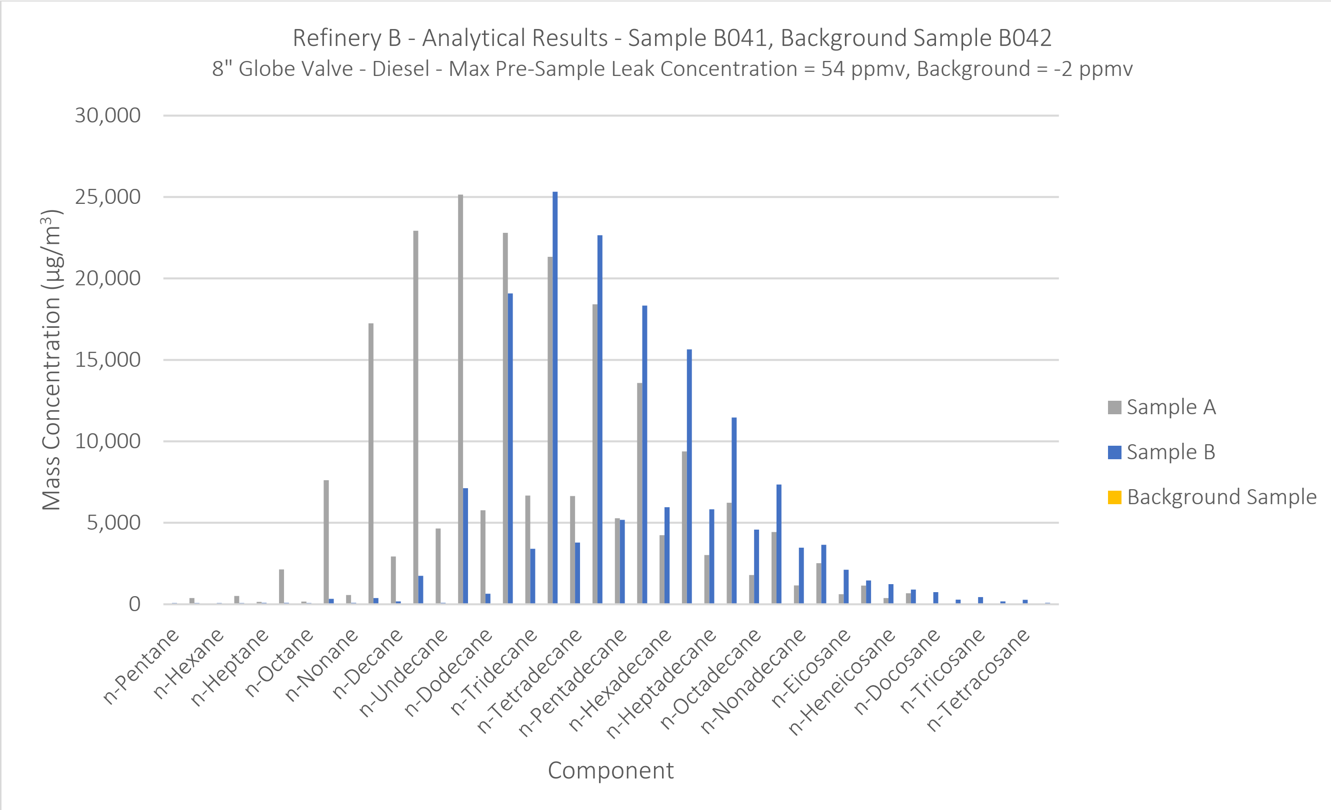


Figure B-3.52. *Plot of Analytical Results for Sample B041 and Associated Background Sample*

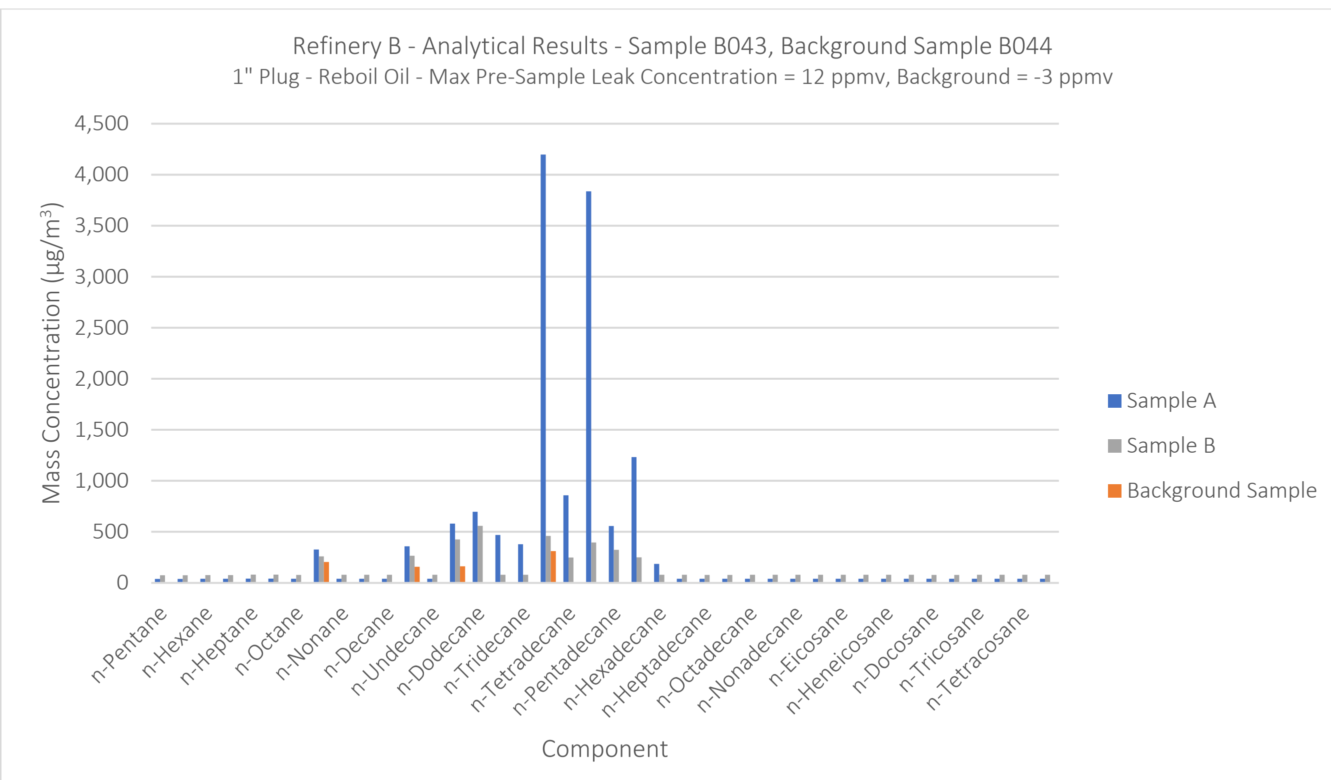


Figure B-3.53. *Plot of Analytical Results for Sample B043 and Associated Background Sample*

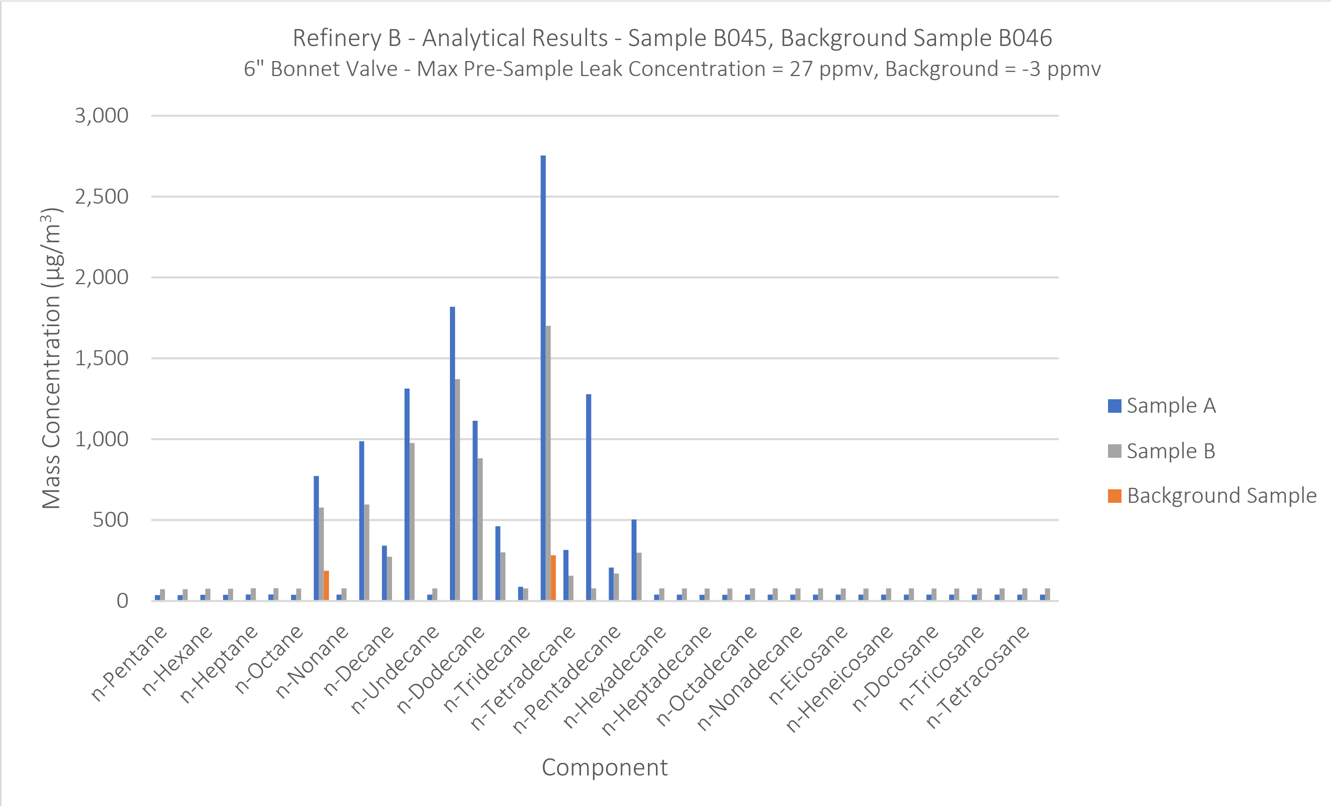


Figure B-3.54. Plot of Analytical Results for Sample B45 and Associated Background Sample

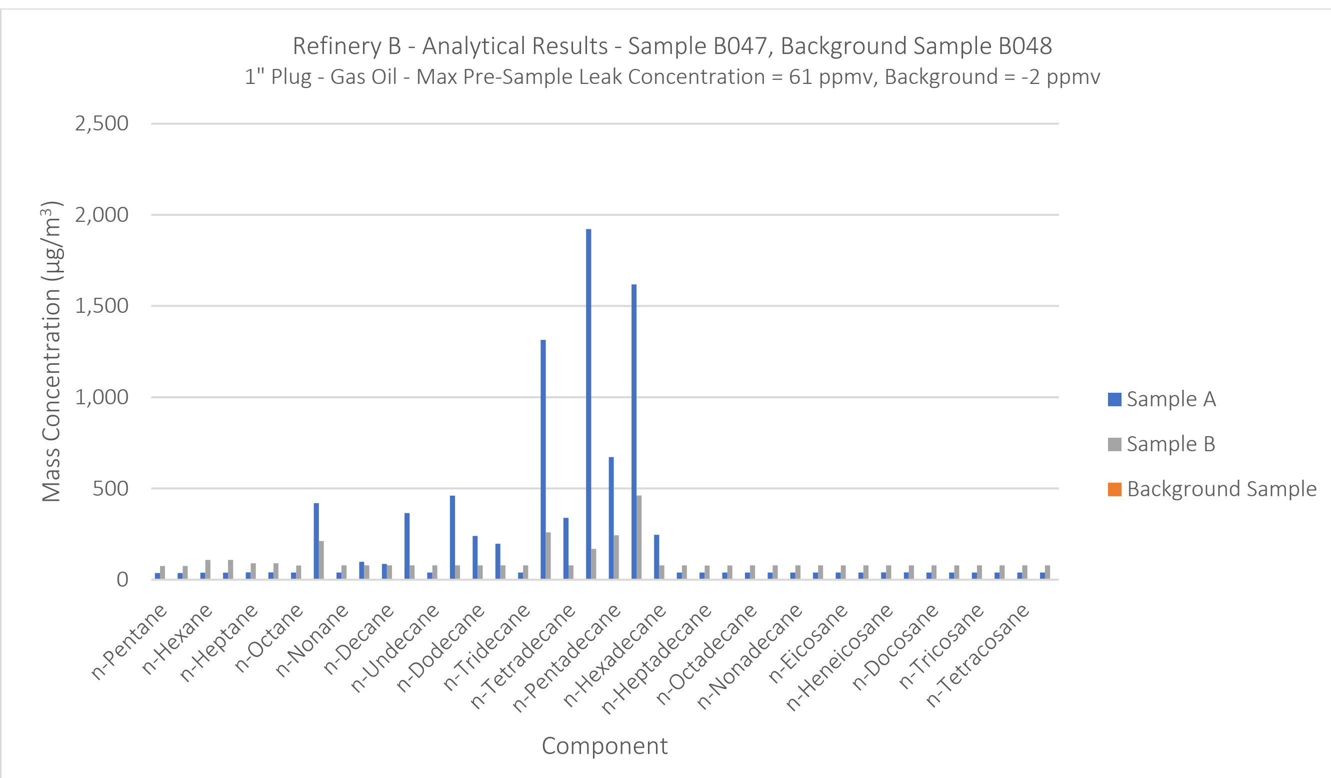


Figure B-3.55. Plot of Analytical Results for Sample B047 and Associated Background Sample

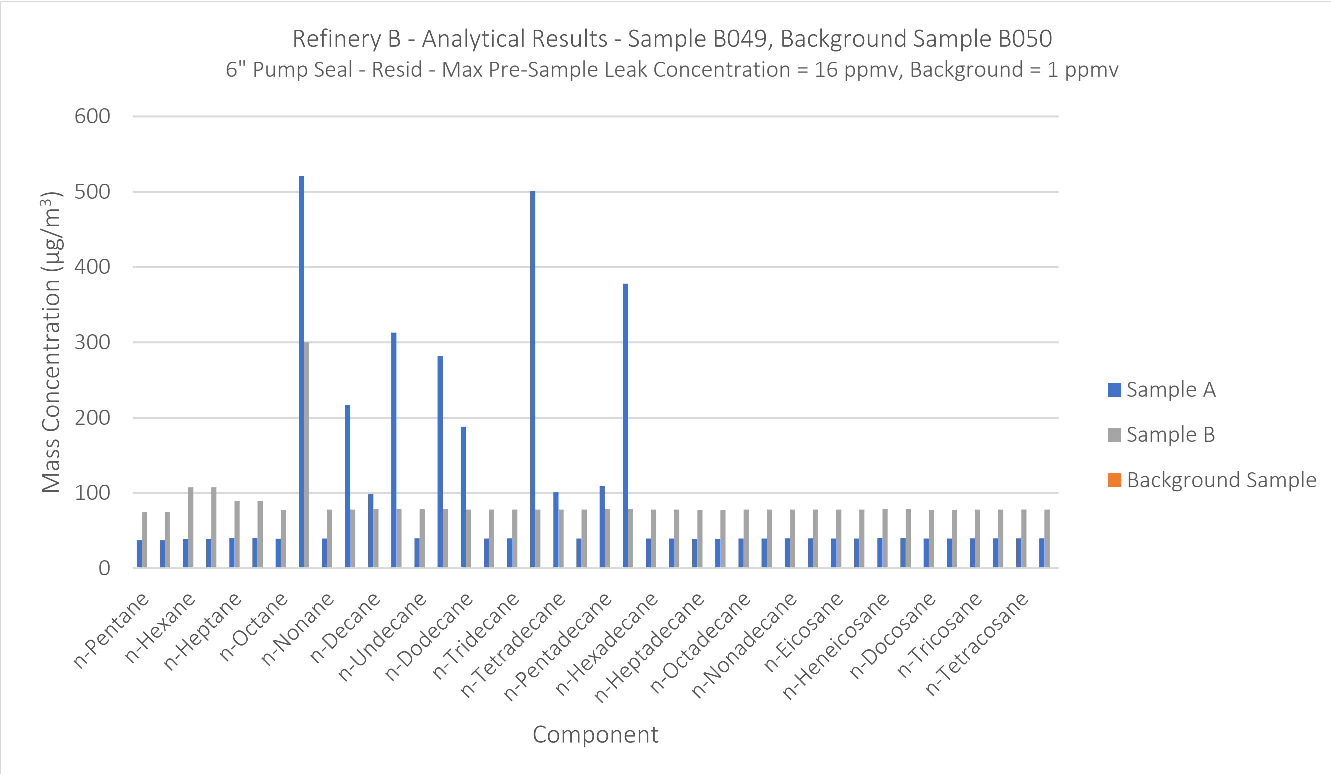


Figure B-3.56. Plot of Analytical Results for Sample B049 and Associated Background Sample

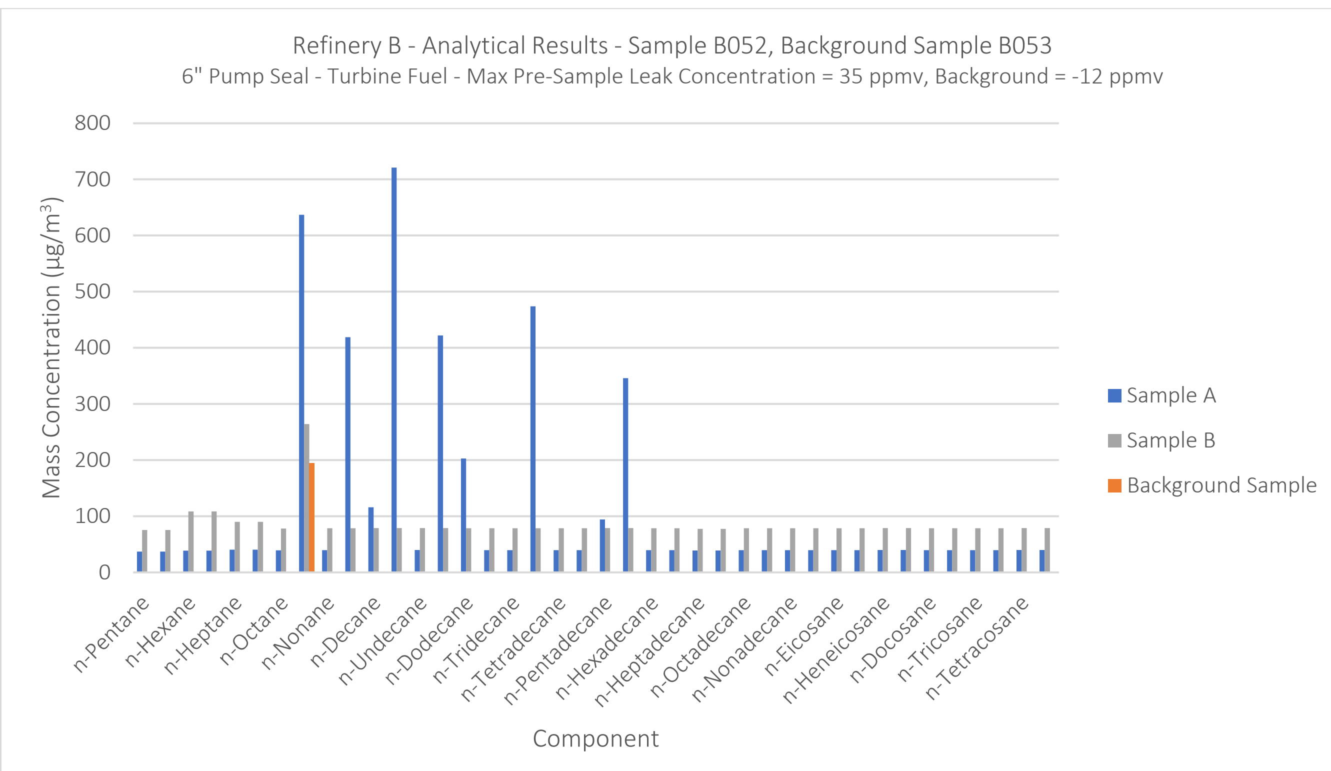


Figure B-3.57. Plot of Analytical Results for Sample B052 and Associated Background Sample

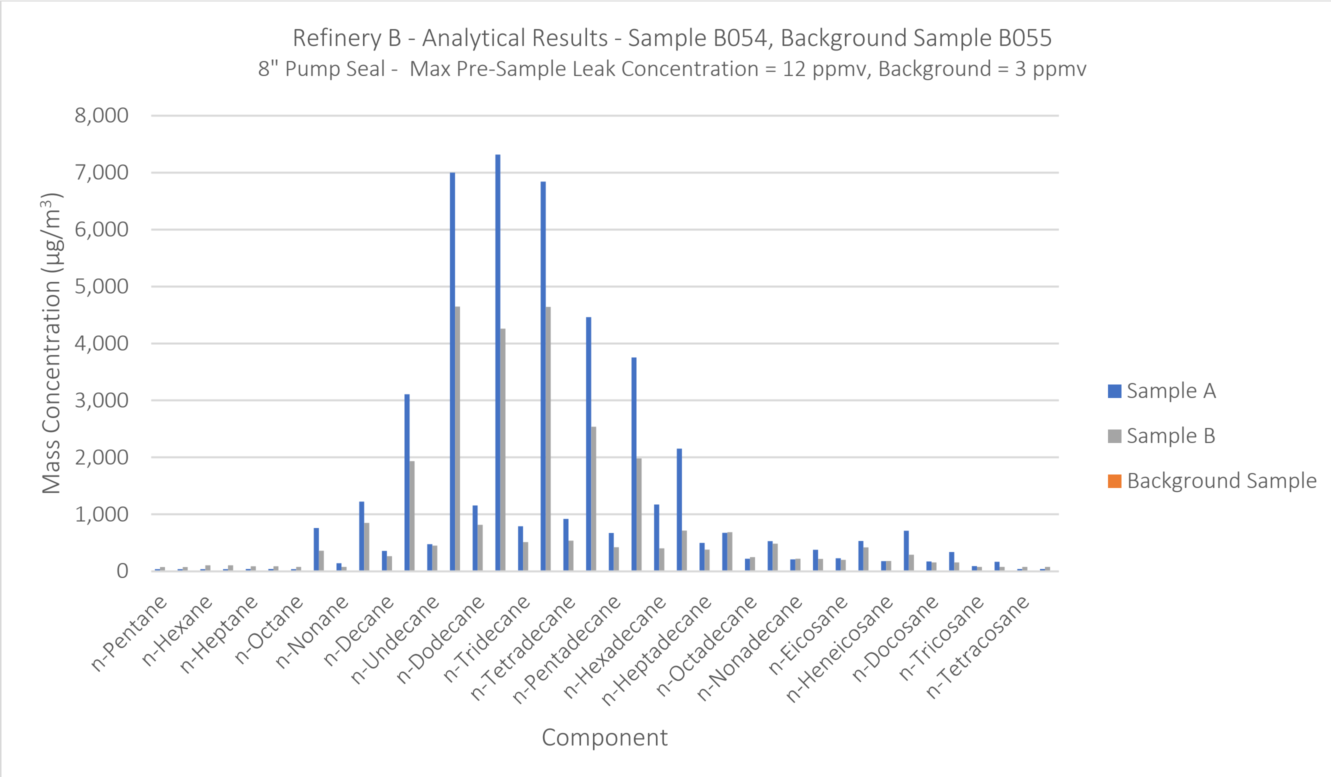


Figure B-3.58. Plot of Analytical Results for Sample B054 and Associated Background Sample

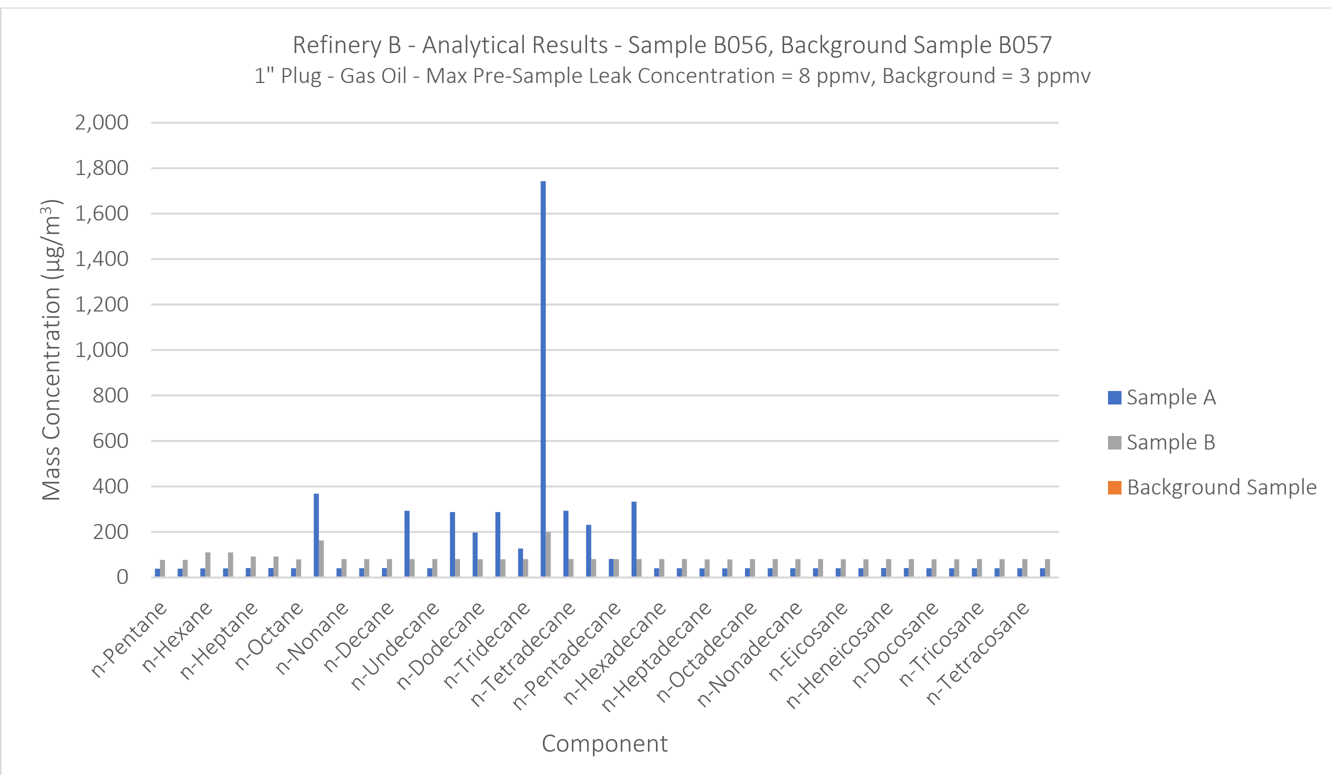


Figure B-3.59. Plot of Analytical Results for Sample B056 and Associated Background Sample

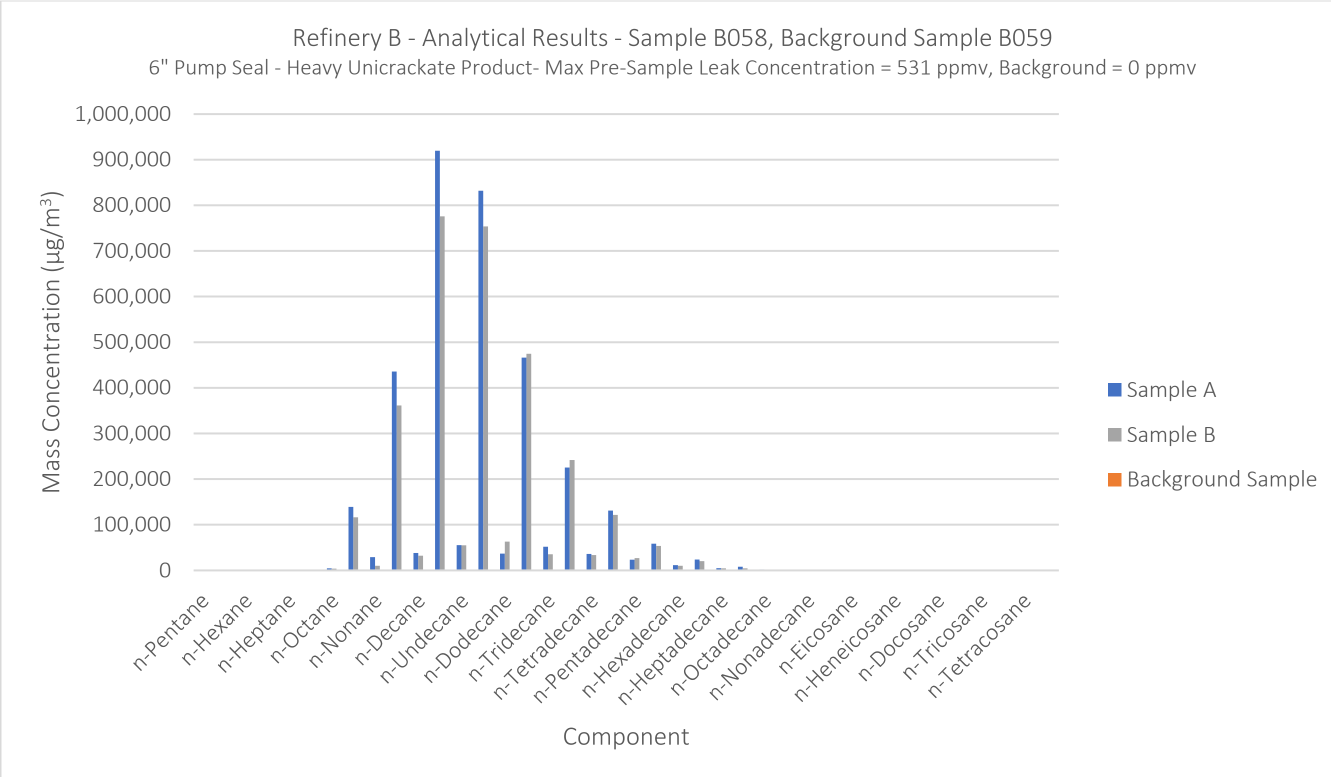


Figure B-3.60. Plot of Analytical Results for Sample B058 and Associated Background Sample

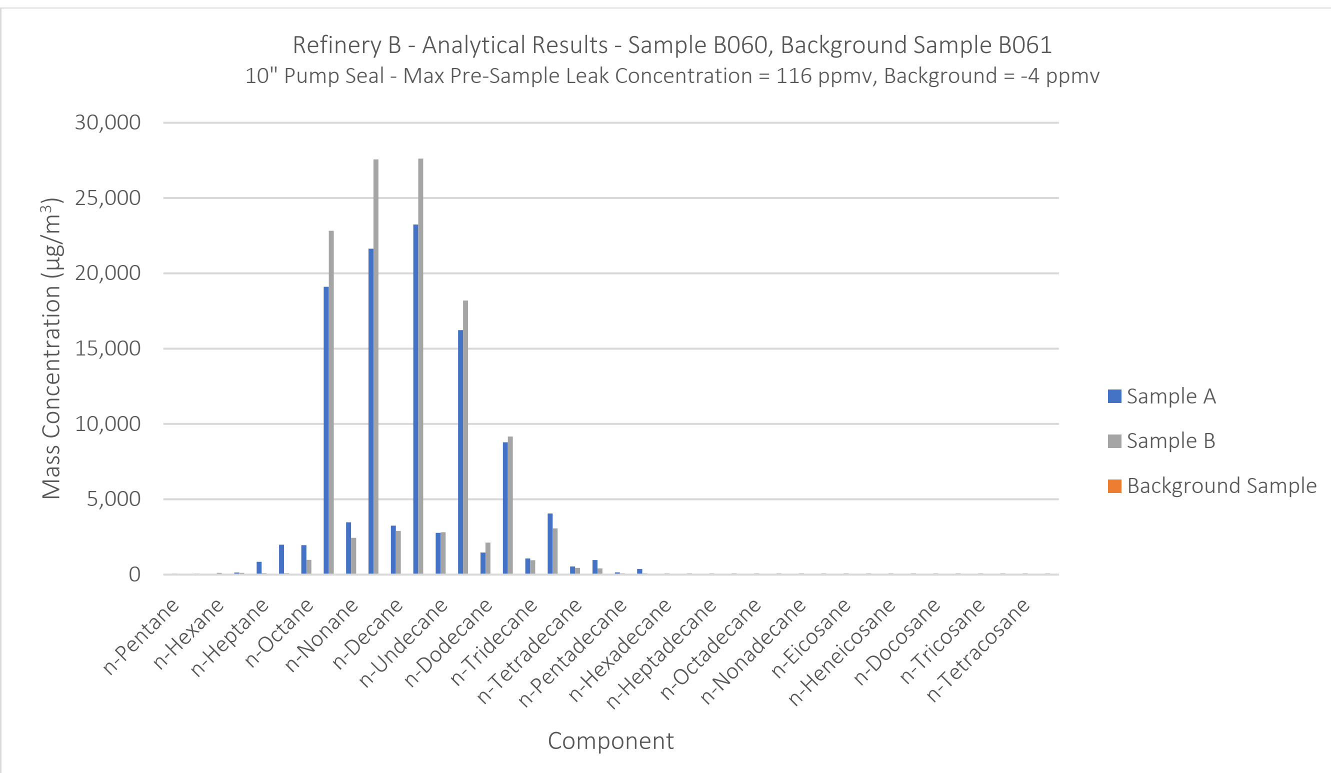


Figure B-3.61. Plot of Analytical Results for Sample B060 and Associated Background Sample

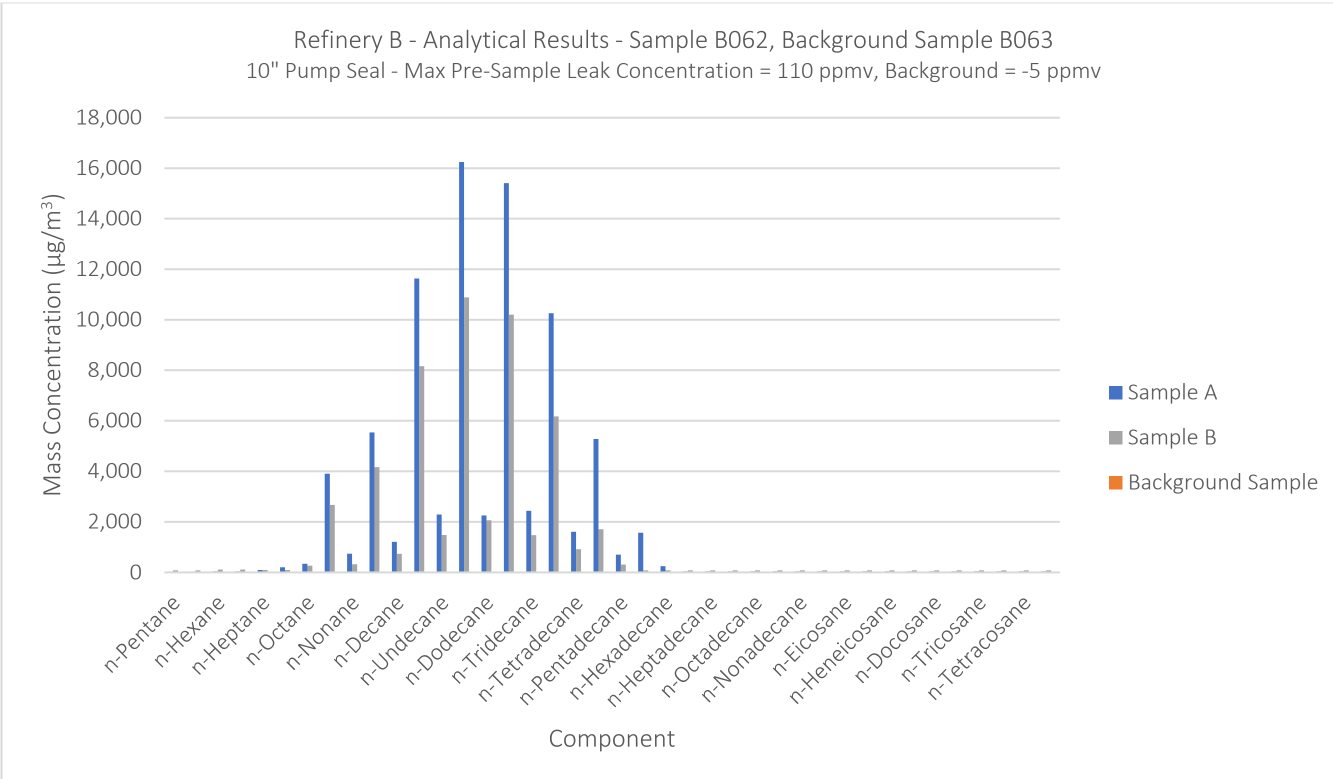


Figure B-3.62. Plot of Analytical Results for Sample B062 and Associated Background Sample

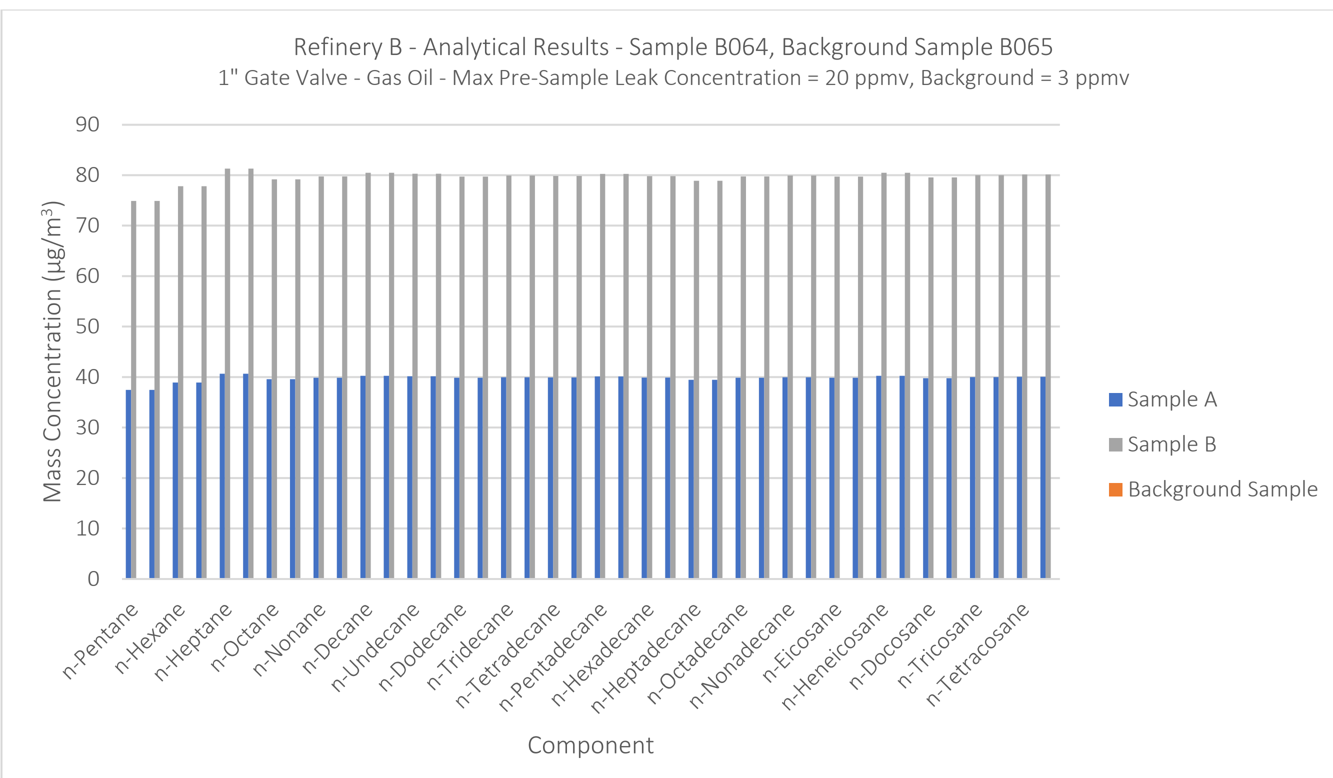


Figure B-3.63. Plot of Analytical Results for Sample B064 and Associated Background Sample

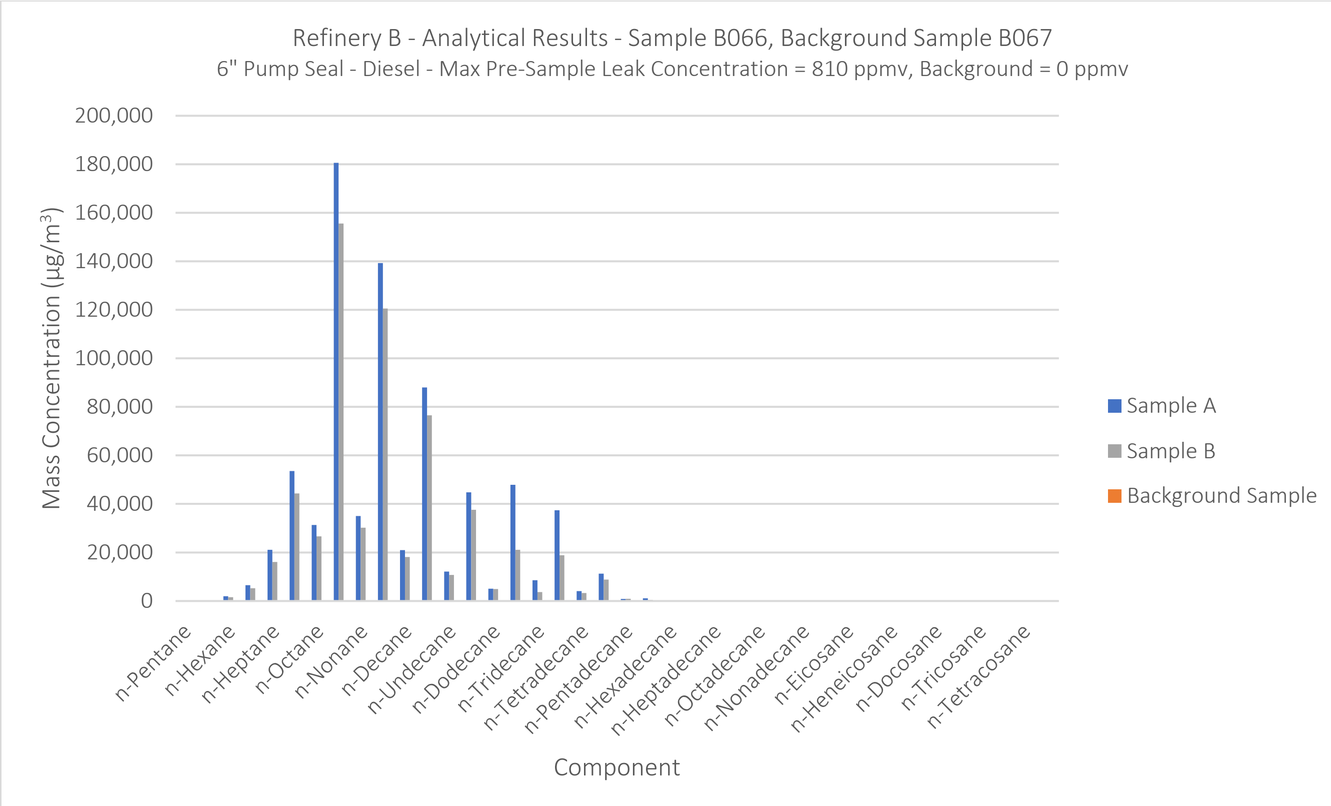


Figure B-3.64. Plot of Analytical Results for Sample B066 and Associated Background Sample

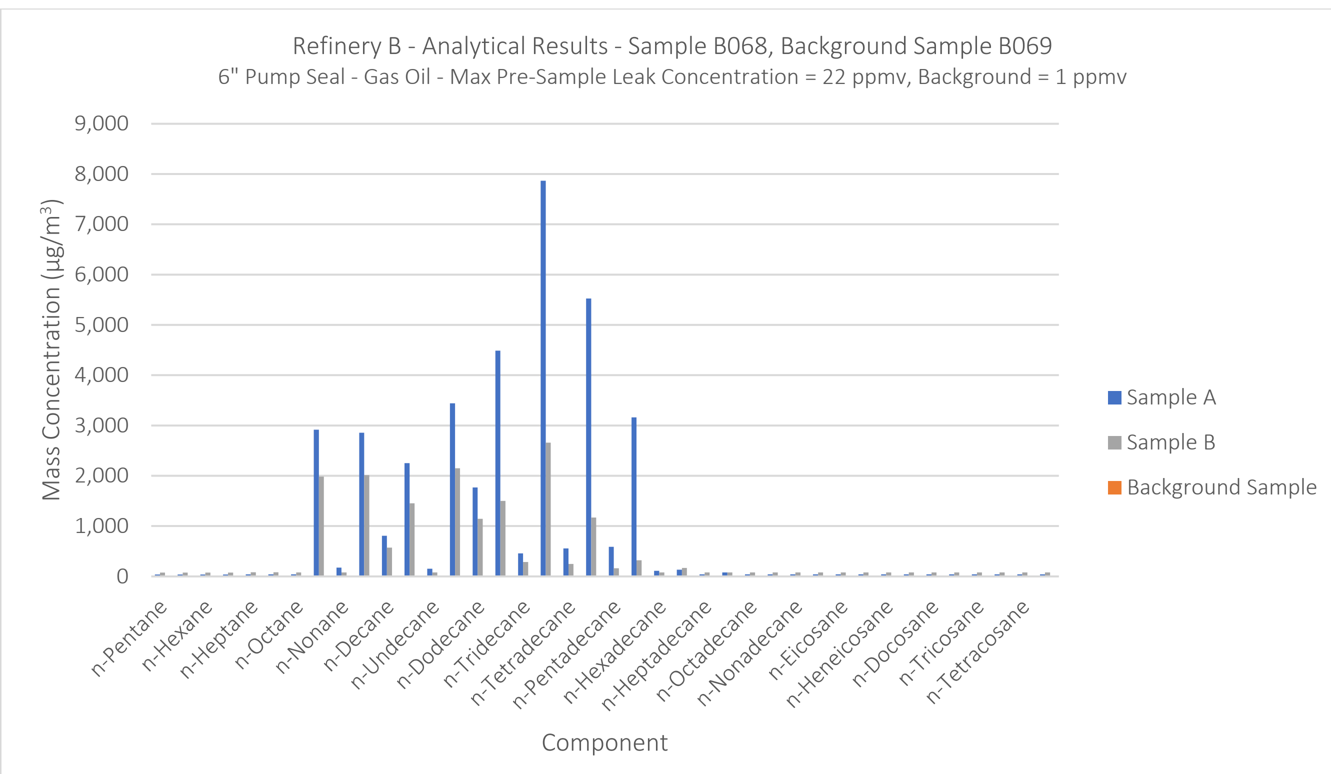


Figure B-3.65. Plot of Analytical Results for Sample B068 and Associated Background Sample

Refinery C Sample Results

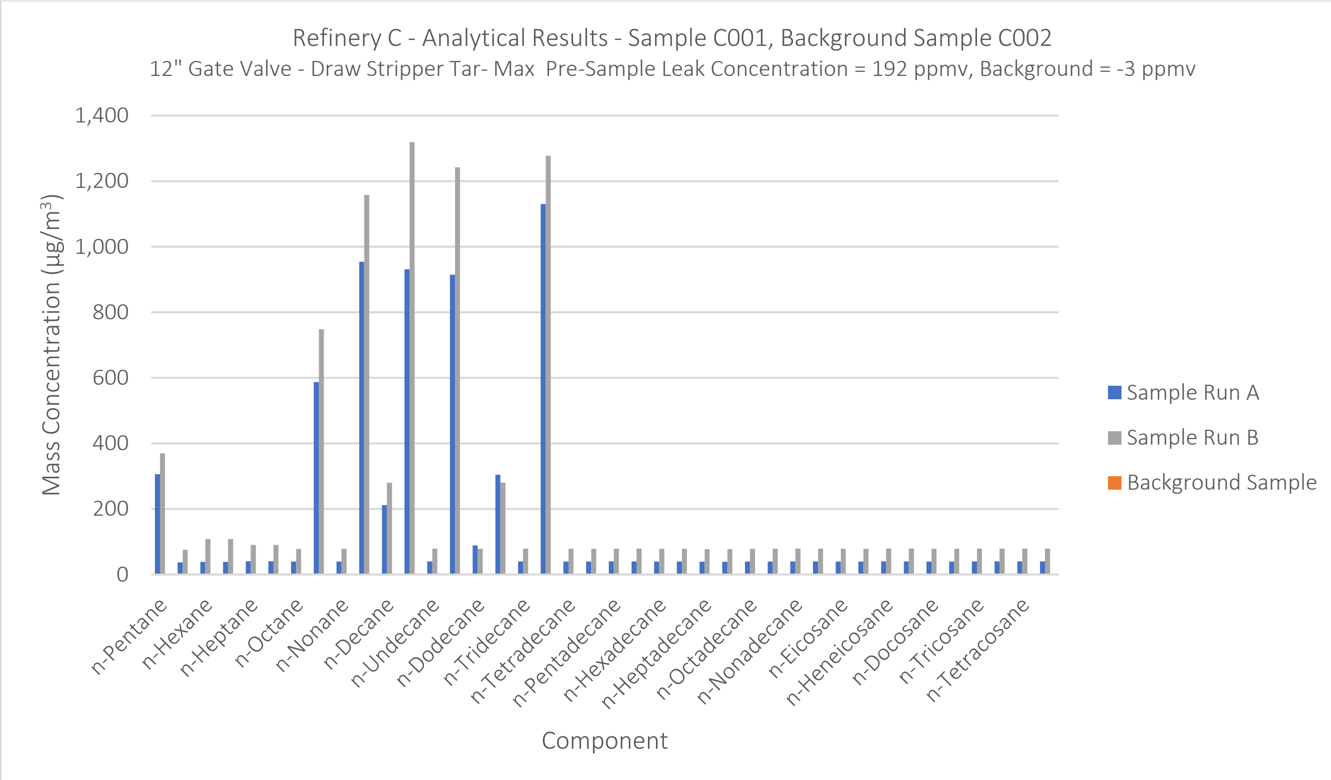


Figure B-3.66. Plot of Analytical Results for Sample C001 and Associated Background Sample

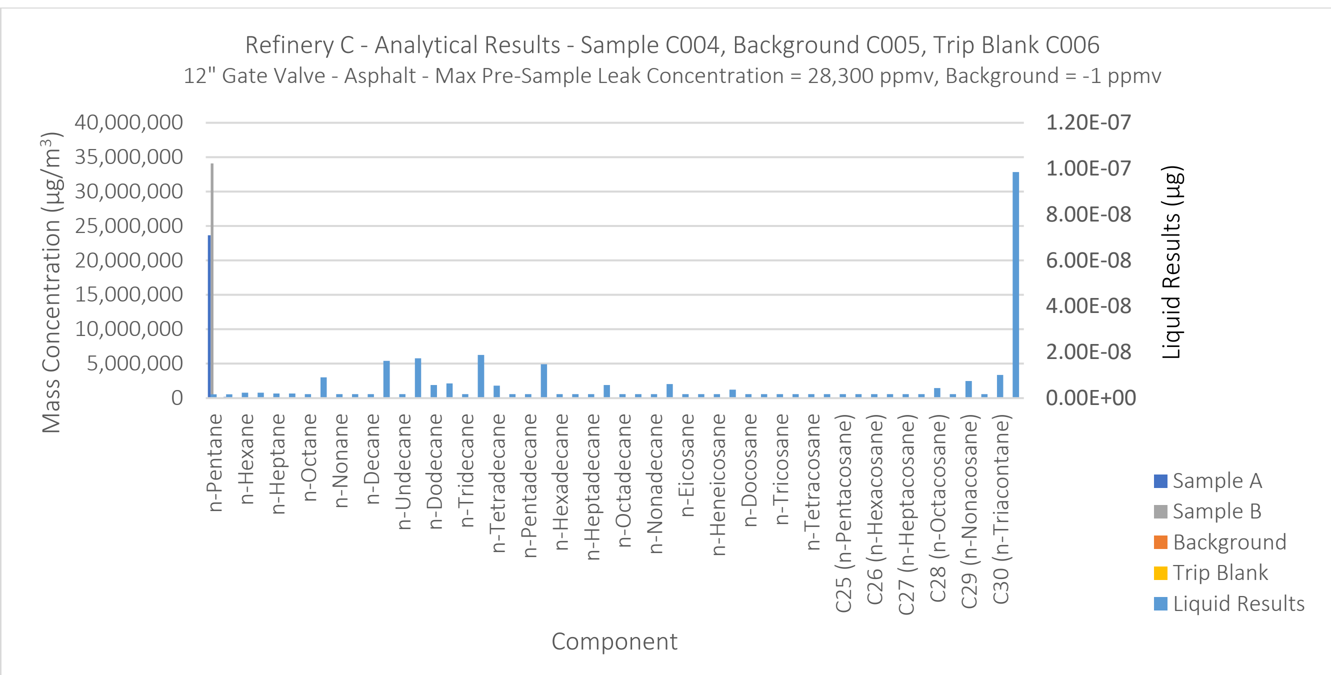


Figure B-3.67. Plot of Analytical Results for Sample C004 and Associated Background Sample

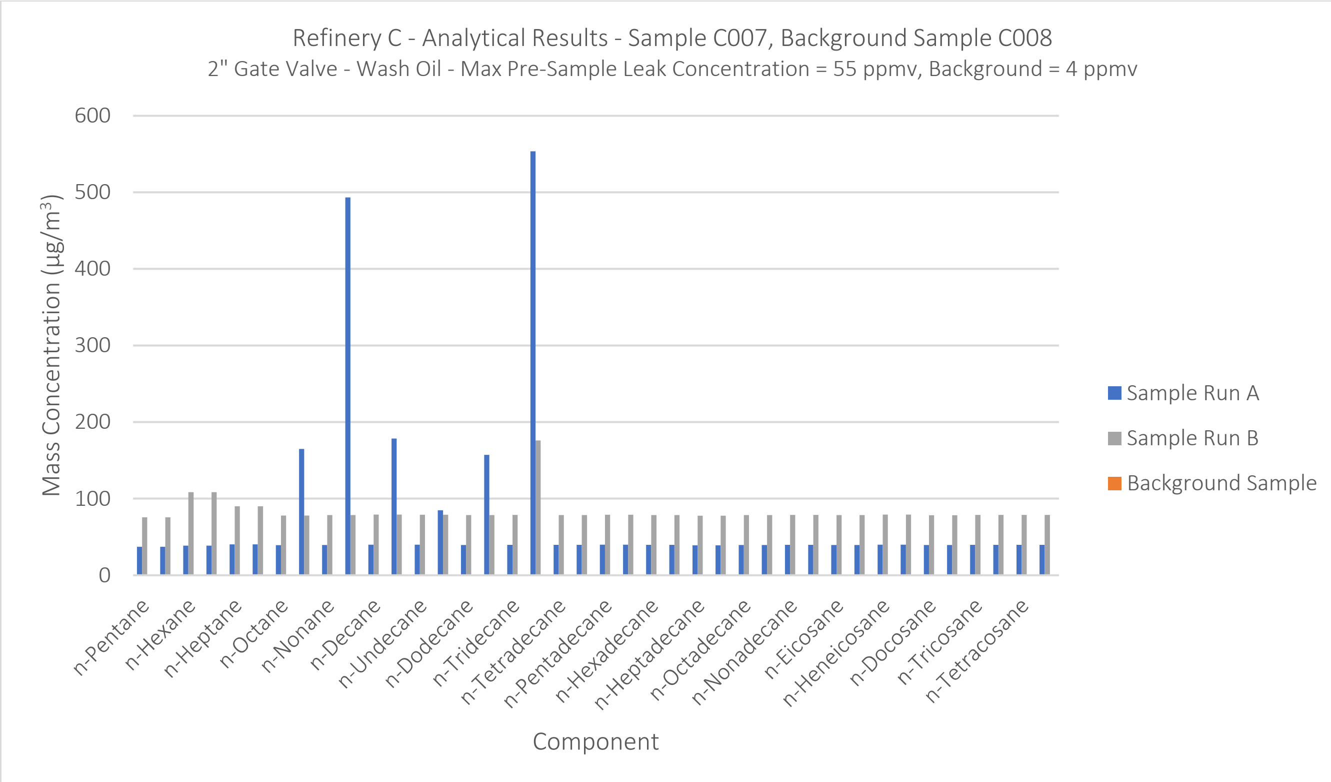


Figure B-3.68. *Plot of Analytical Results for Sample C007 and Associated Background Sample*

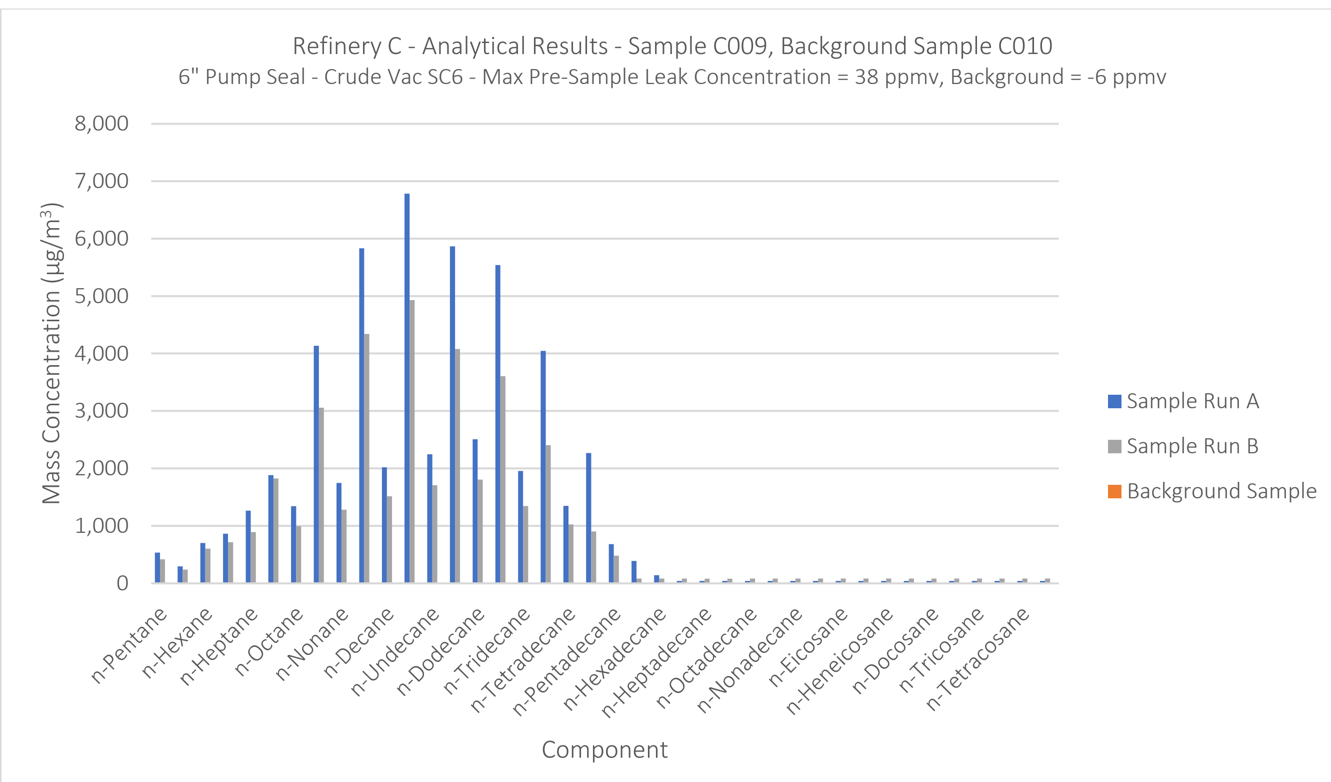


Figure B-3.69. *Plot of Analytical Results for Sample C009 and Associated Background Sample*

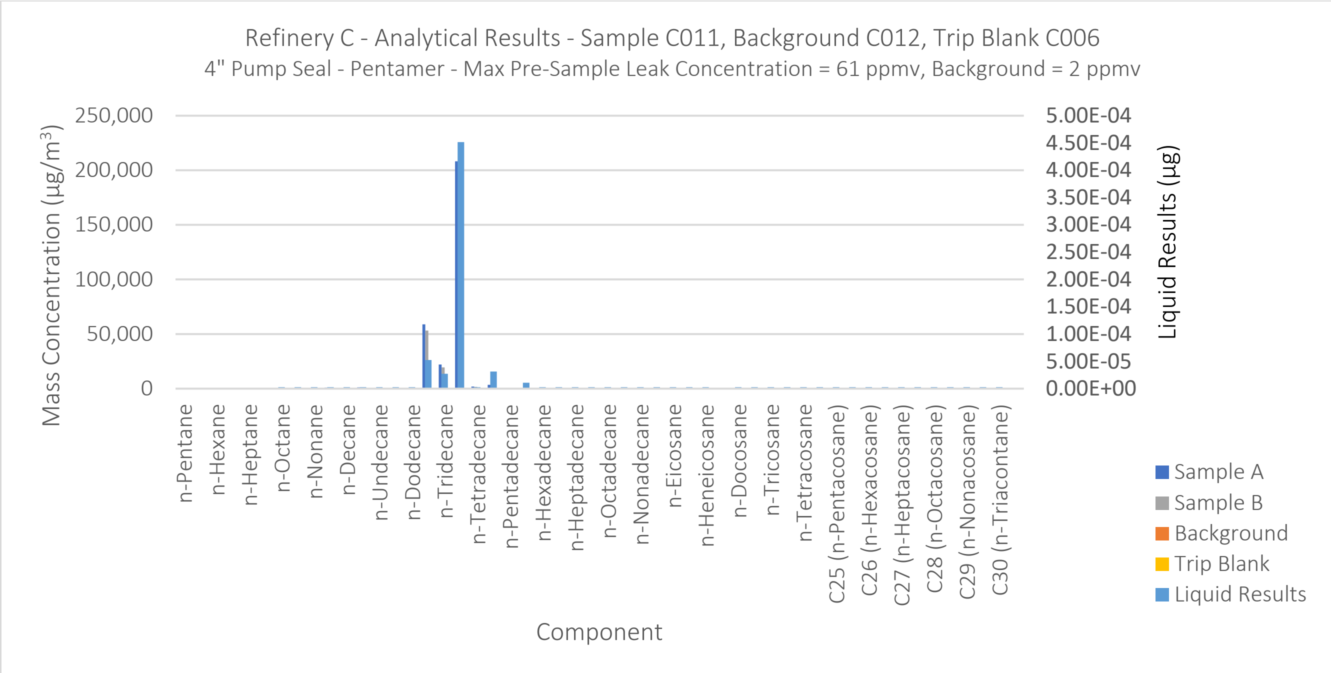


Figure B-3.70. Plot of Analytical Results for Sample C011 and Associated Background Sample

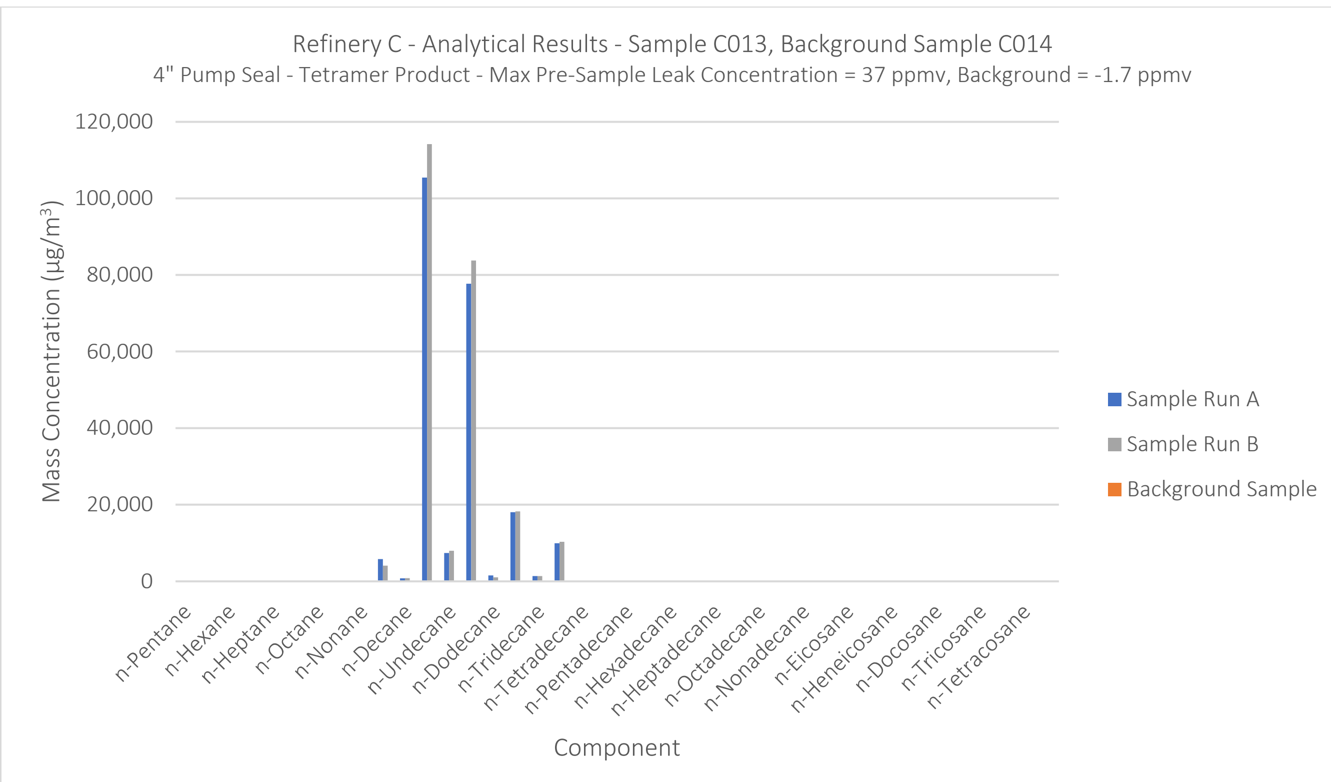


Figure B-3.71. Plot of Analytical Results for Sample C013 and Associated Background Sample

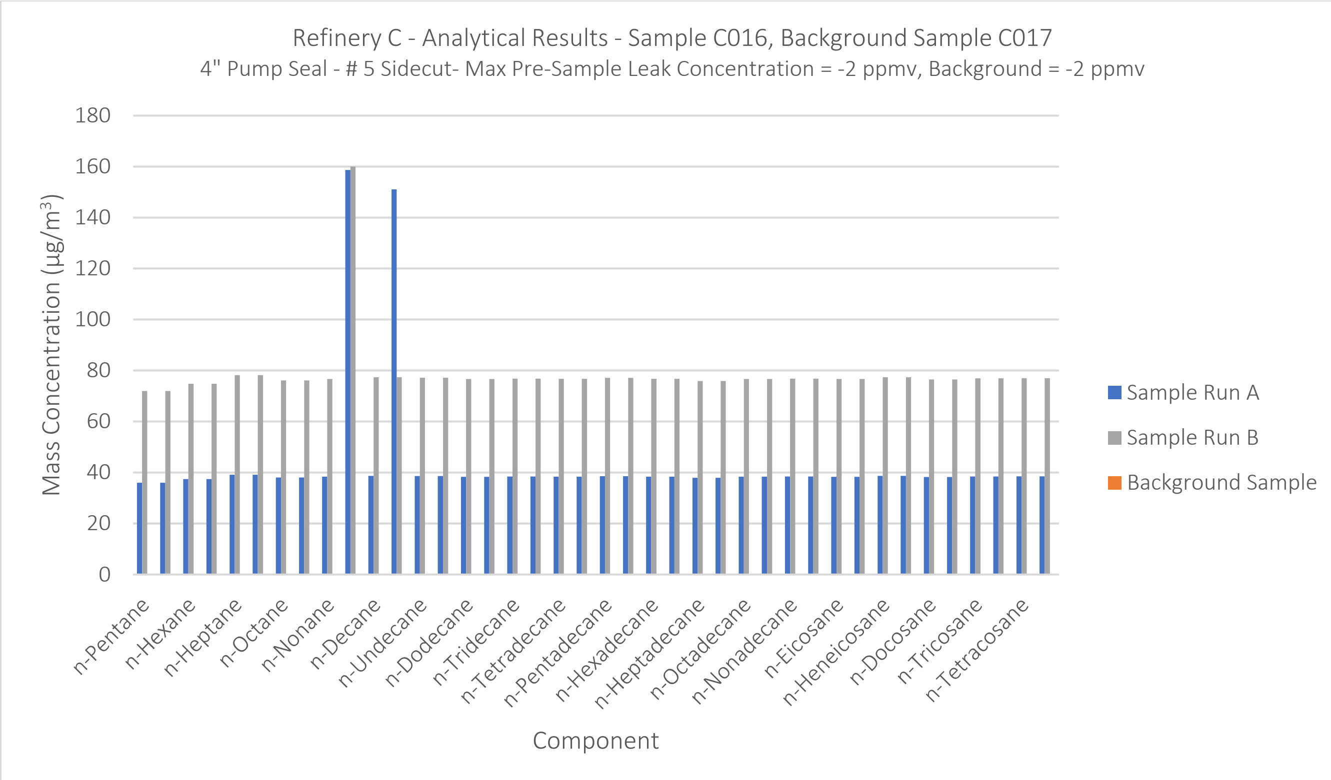


Figure B-3.72. Plot of Analytical Results for Sample C016 and Associated Background Sample

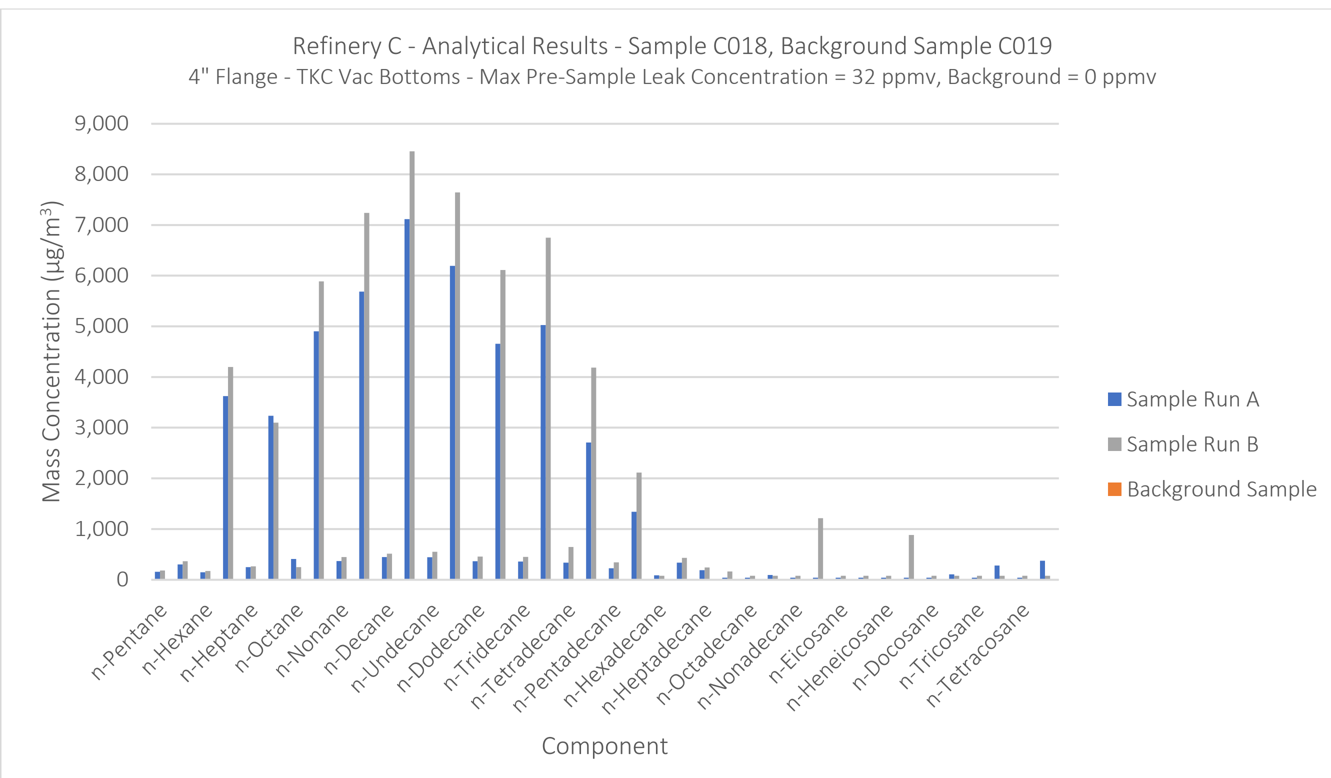


Figure B-3.73. Plot of Analytical Results for Sample C018 and Associated Background Sample

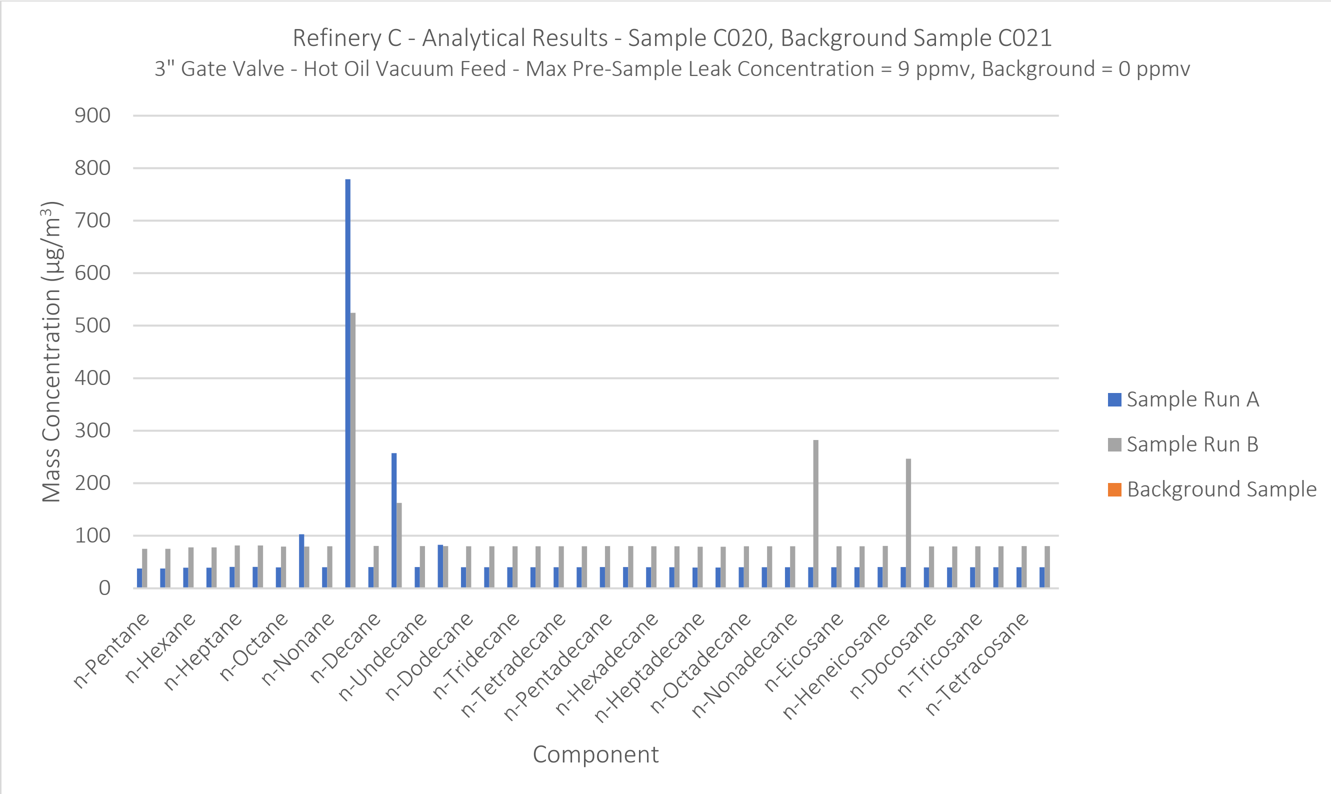


Figure B-3.74. Plot of Analytical Results for Sample C020 and Associated Background Sample

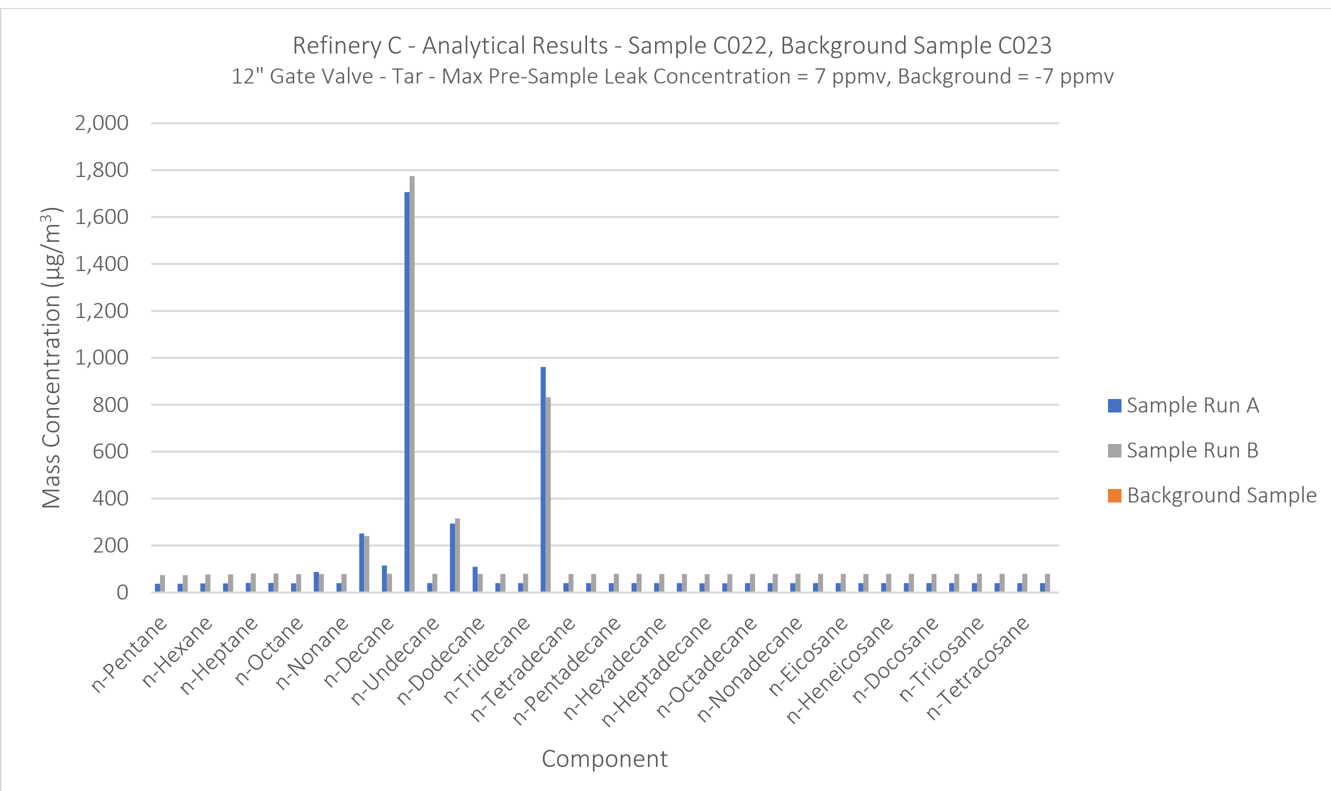


Figure B-3.75. Plot of Analytical Results for Sample C011 and Associated Background Sample

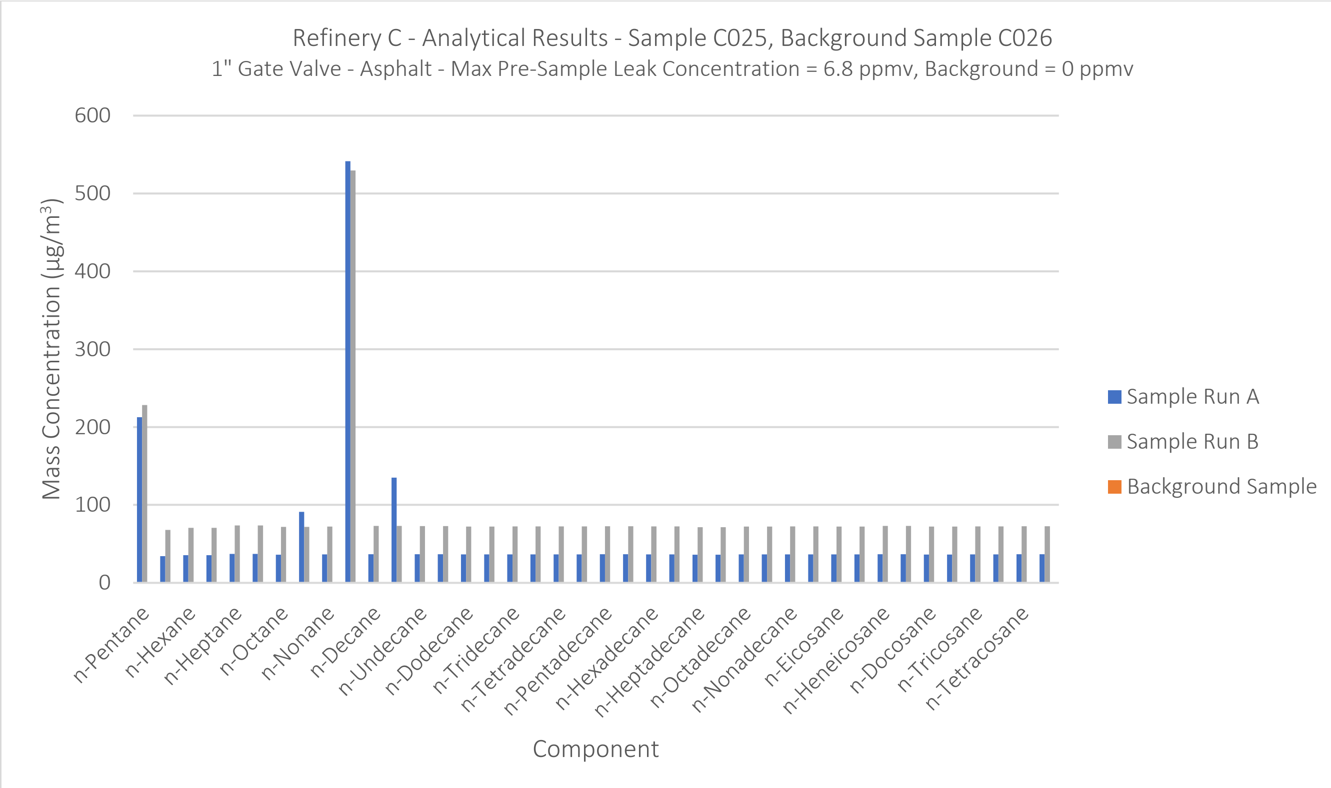


Figure B-3.76. *Plot of Analytical Results for Sample C025 and Associated Background Sample*

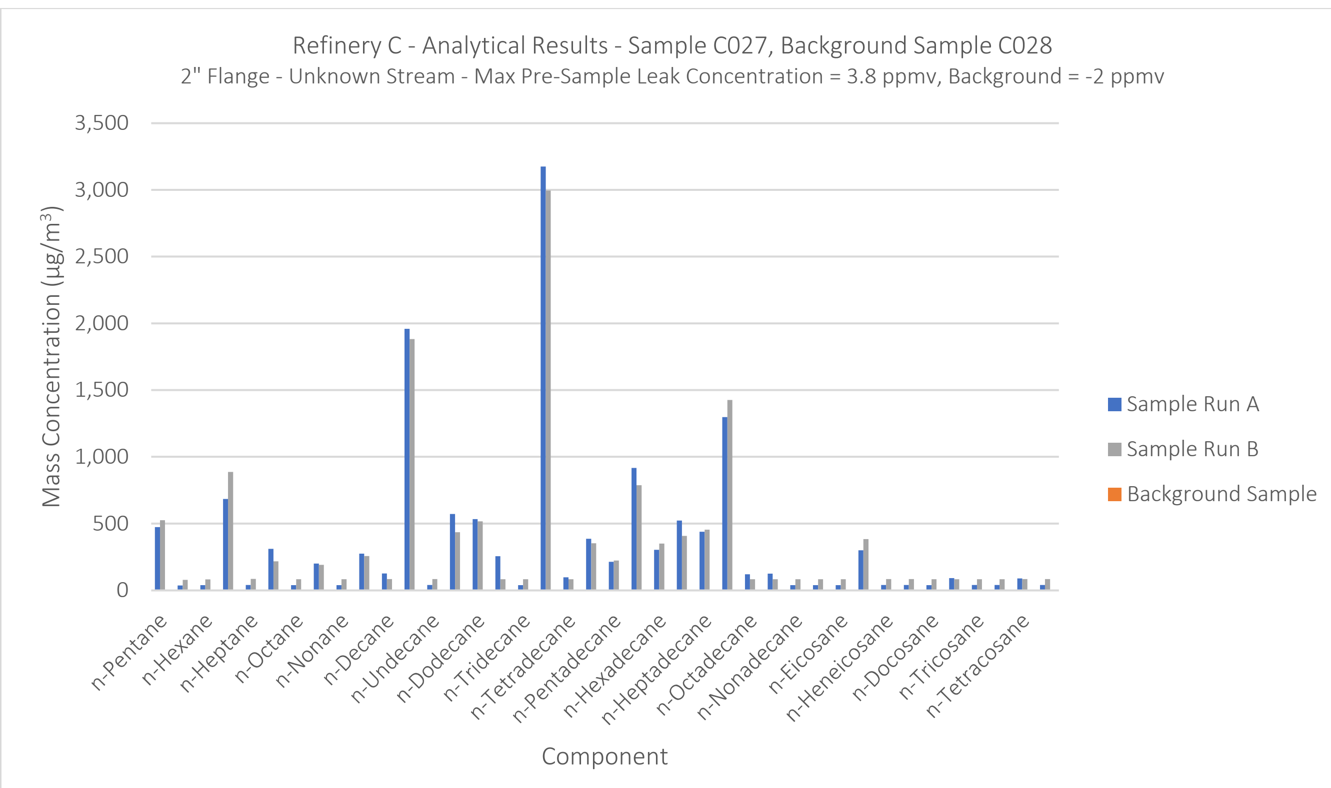


Figure B-3.77. *Plot of Analytical Results for Sample C027 and Associated Background Sample*

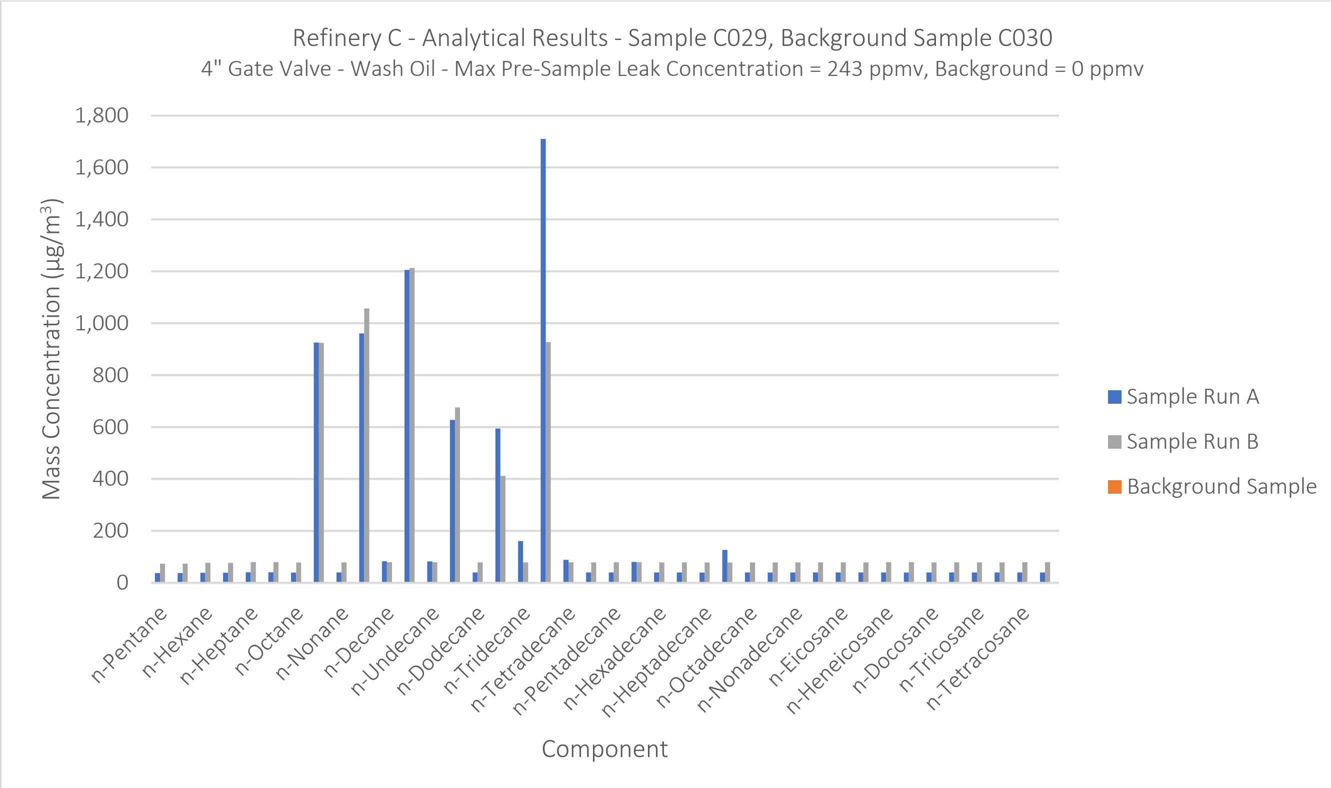


Figure B-3.78. Plot of Analytical Results for Sample C029 and Associated Background Sample

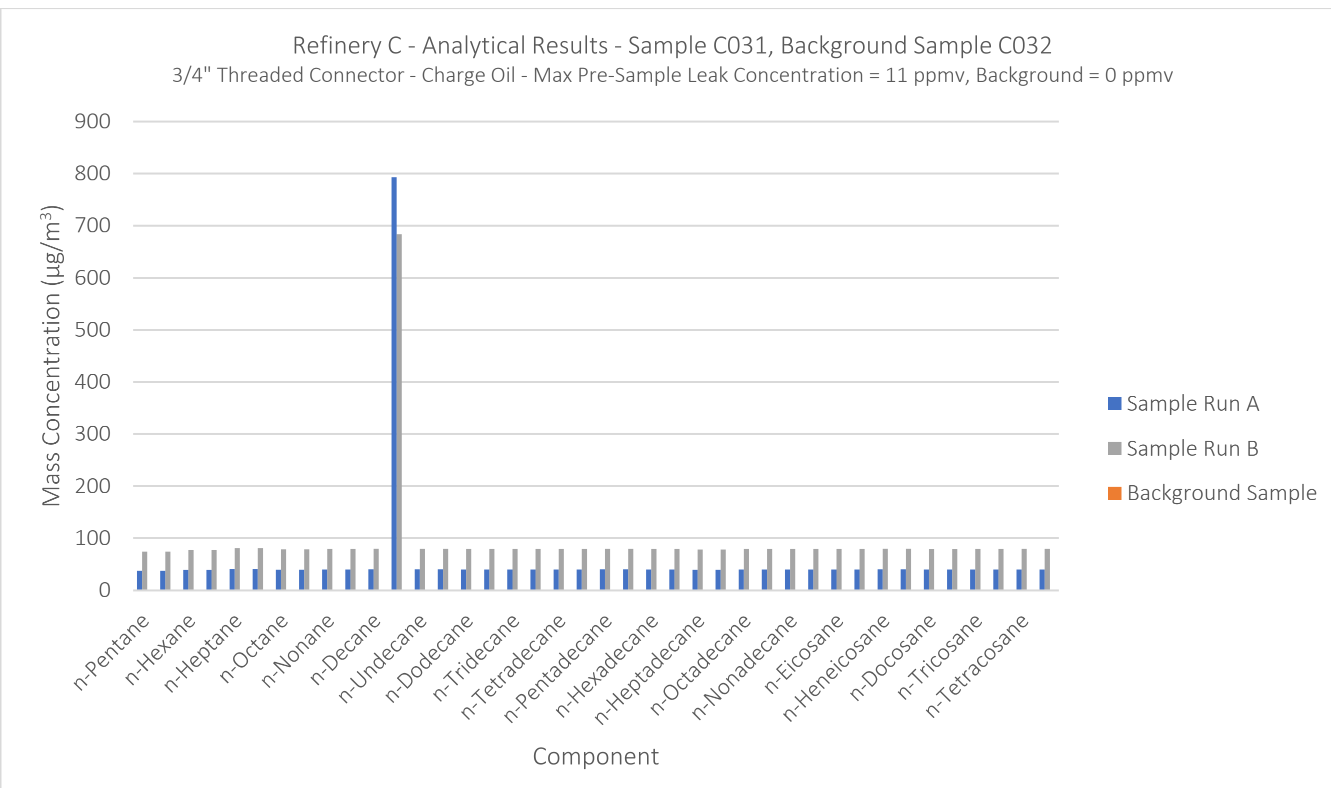


Figure B-3.79. Plot of Analytical Results for Sample C031 and Associated Background Sample

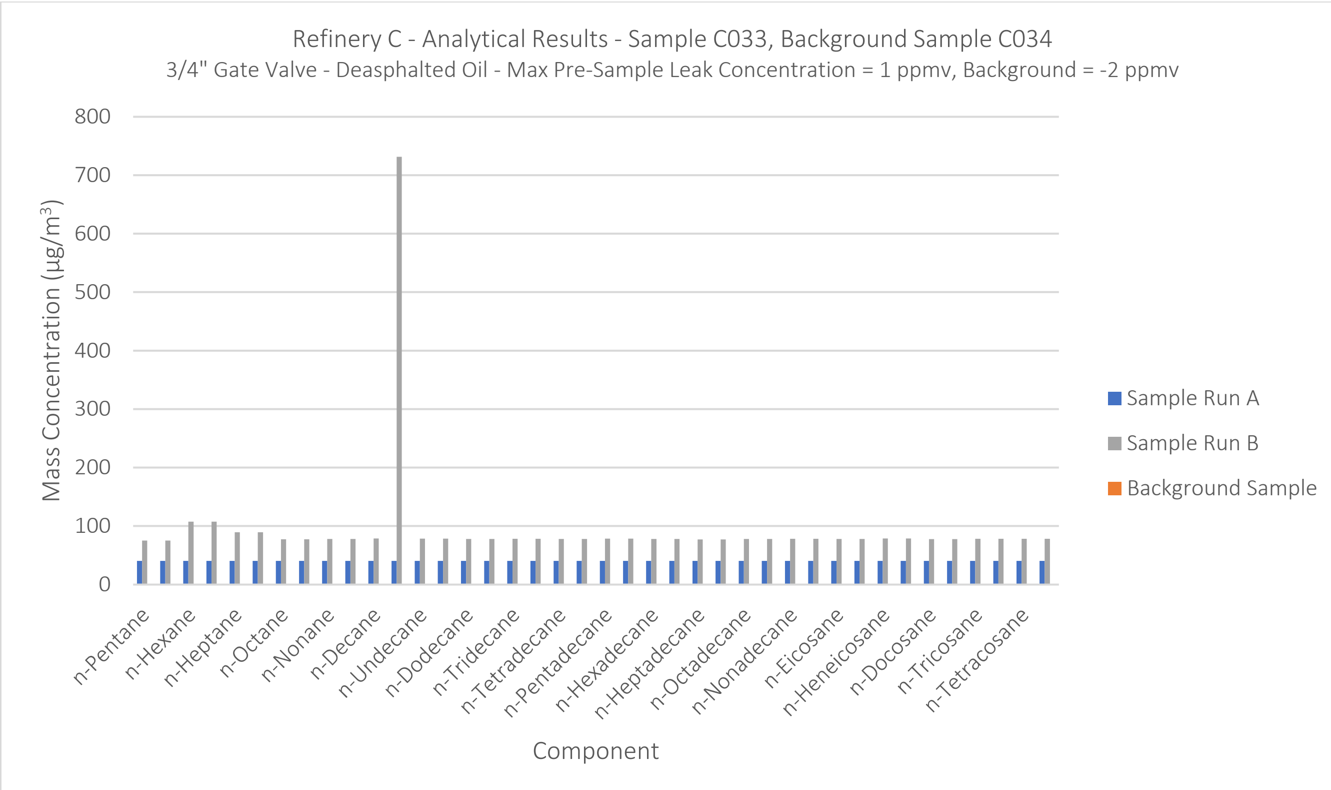


Figure B-3.80. Plot of Analytical Results for Sample C033 and Associated Background Sample

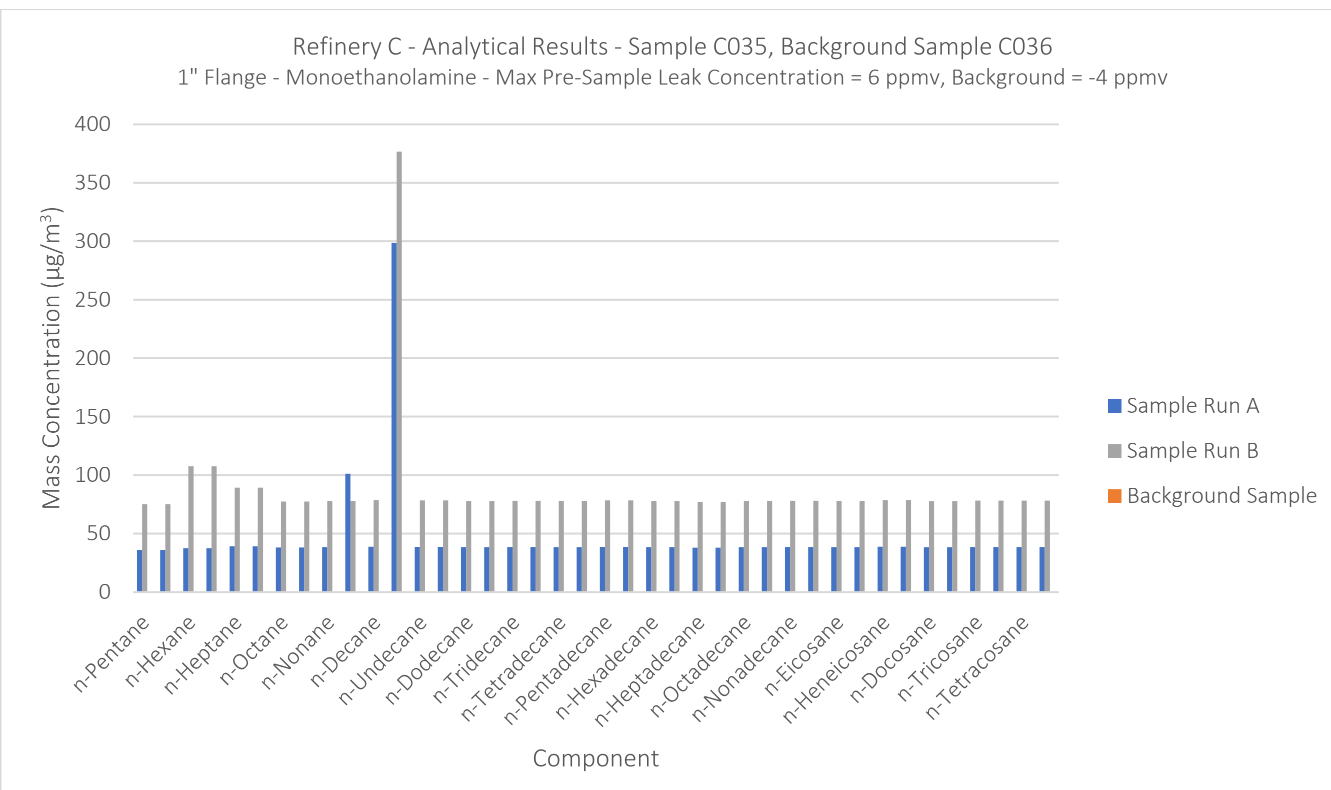


Figure B-3.81. Plot of Analytical Results for Sample C035 and Associated Background Sample

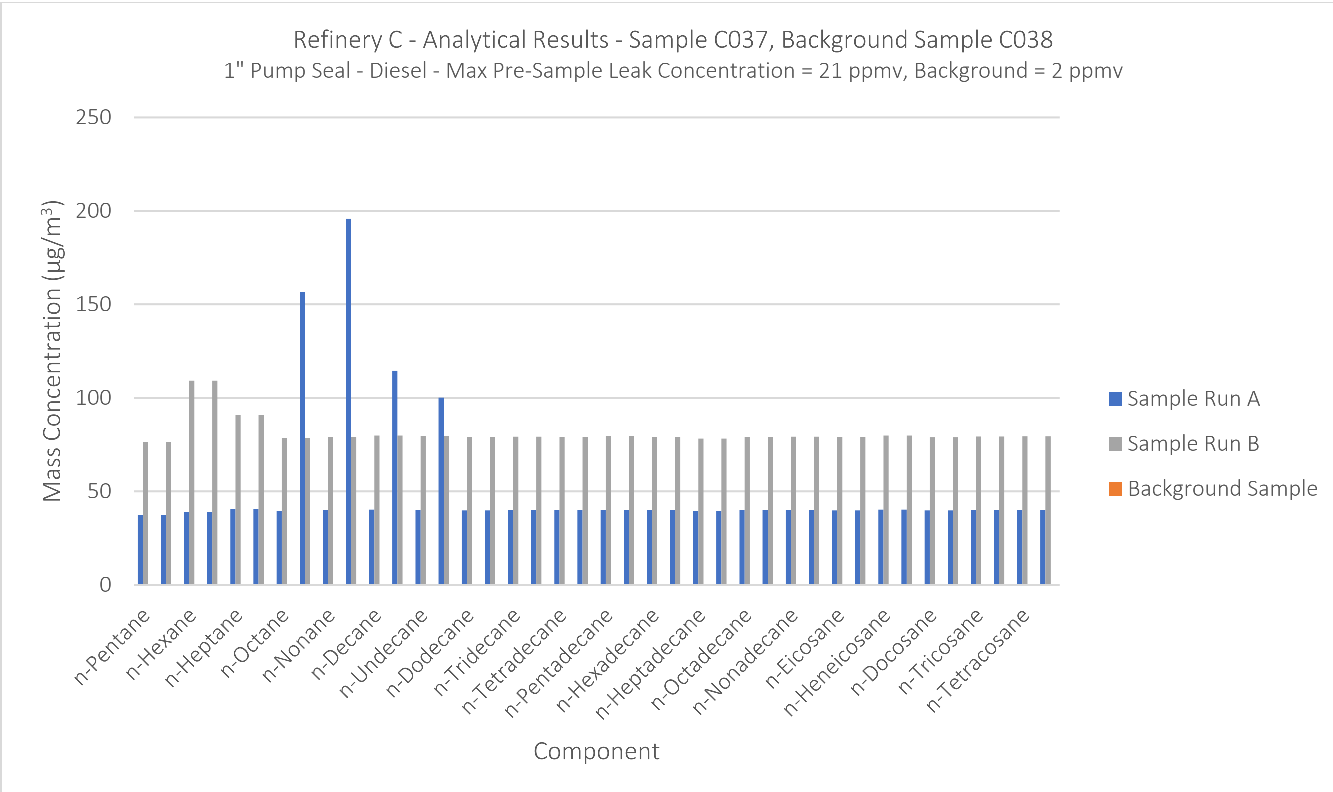


Figure B-3.82. Plot of Analytical Results for Sample C037 and Associated Background Sample

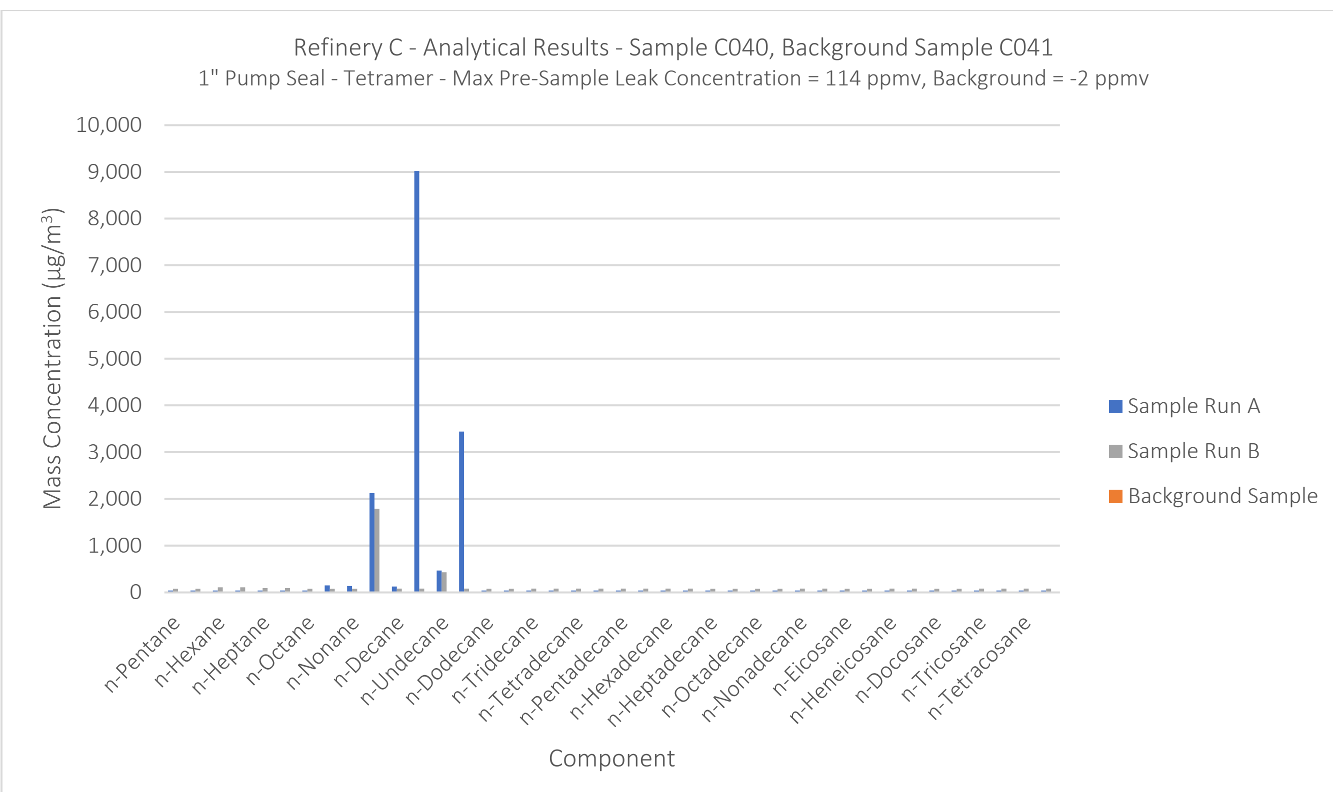


Figure B-3.83. Plot of Analytical Results for Sample C040 and Associated Background Sample

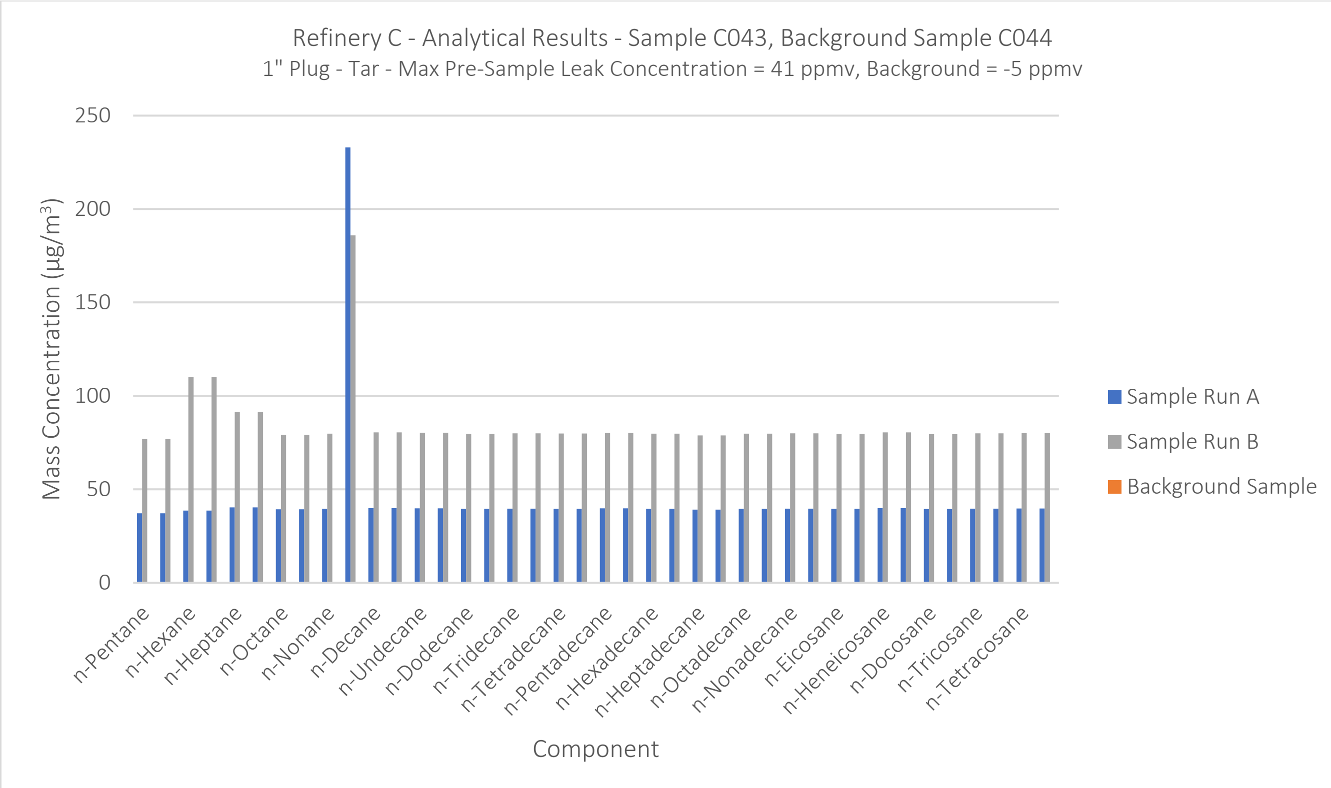


Figure B-3.84. *Plot of Analytical Results for Sample C043 and Associated Background Sample*

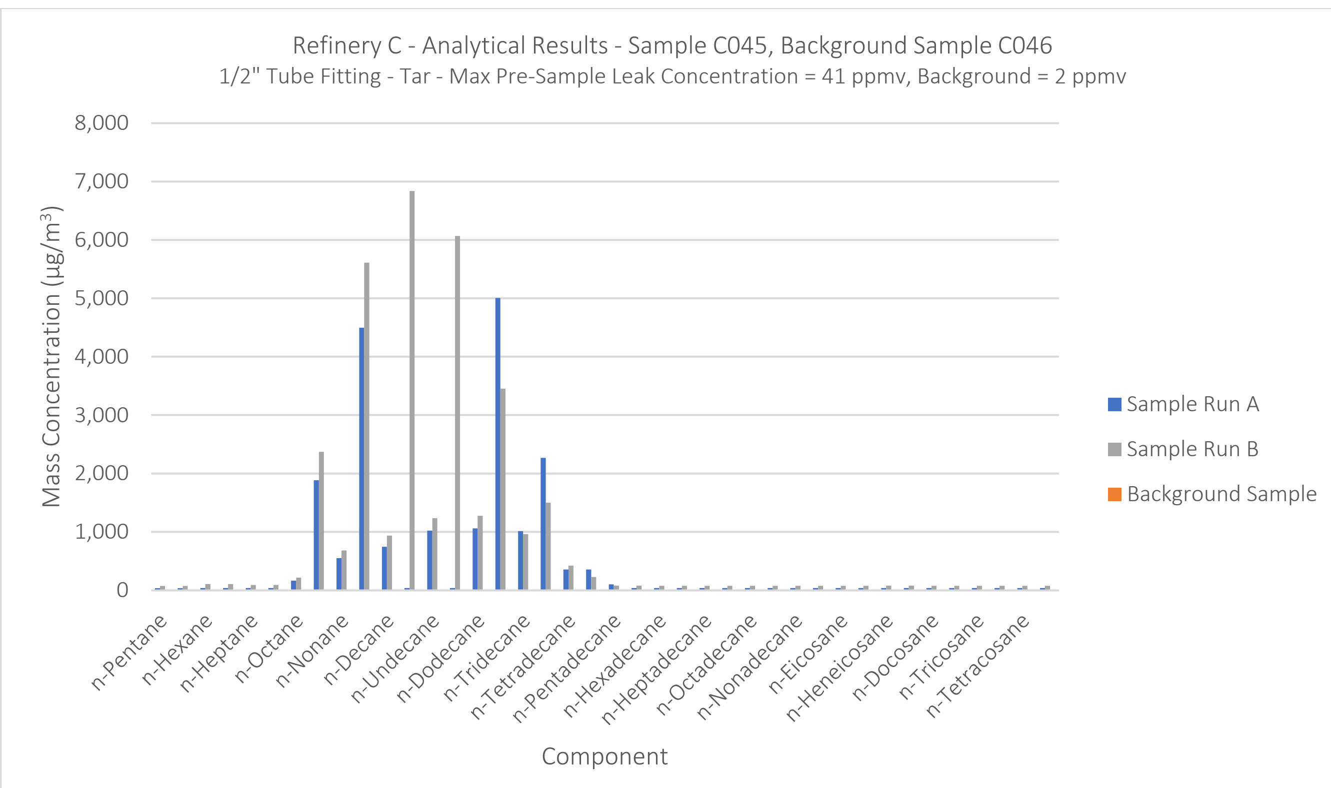


Figure B-3.85. *Plot of Analytical Results for Sample C045 and Associated Background Sample*

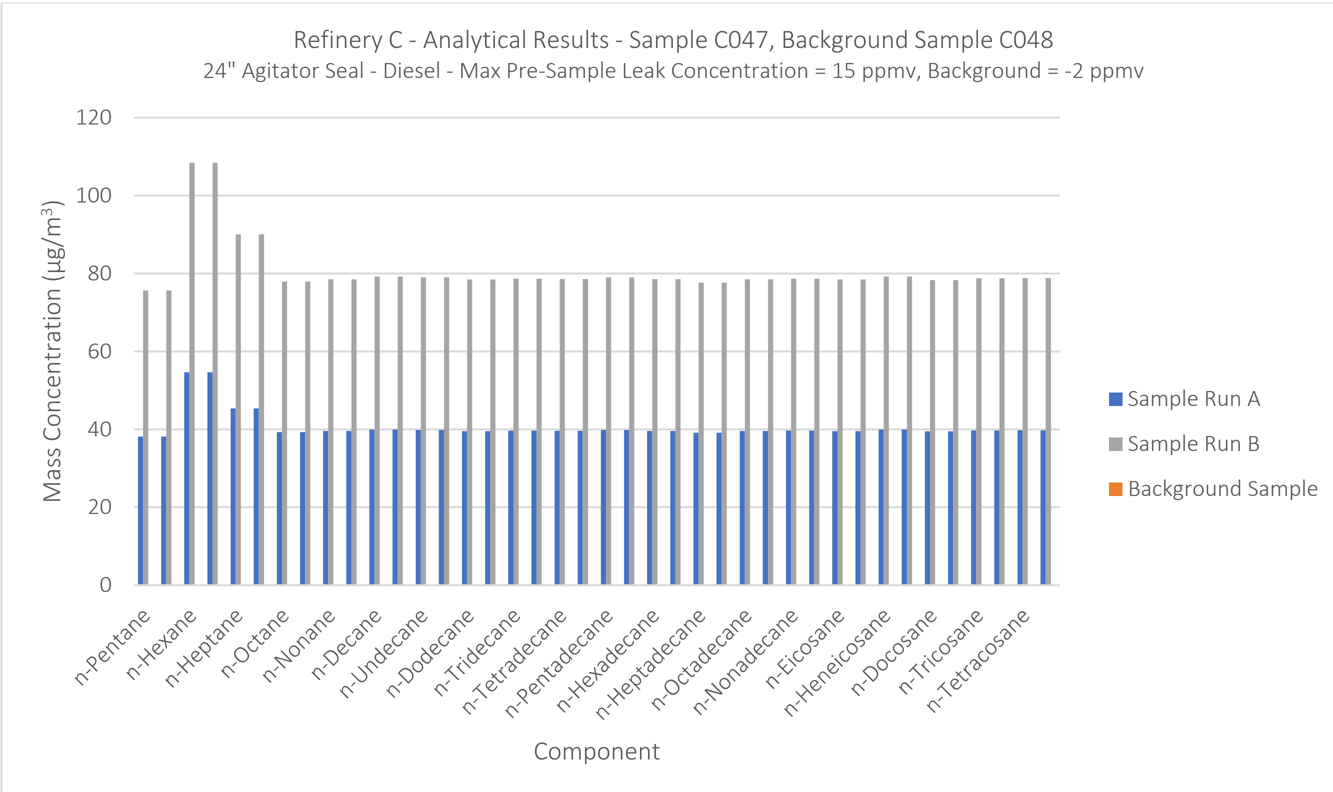


Figure B-3.86. *Plot of Analytical Results for Sample C047 and Associated Background Sample*

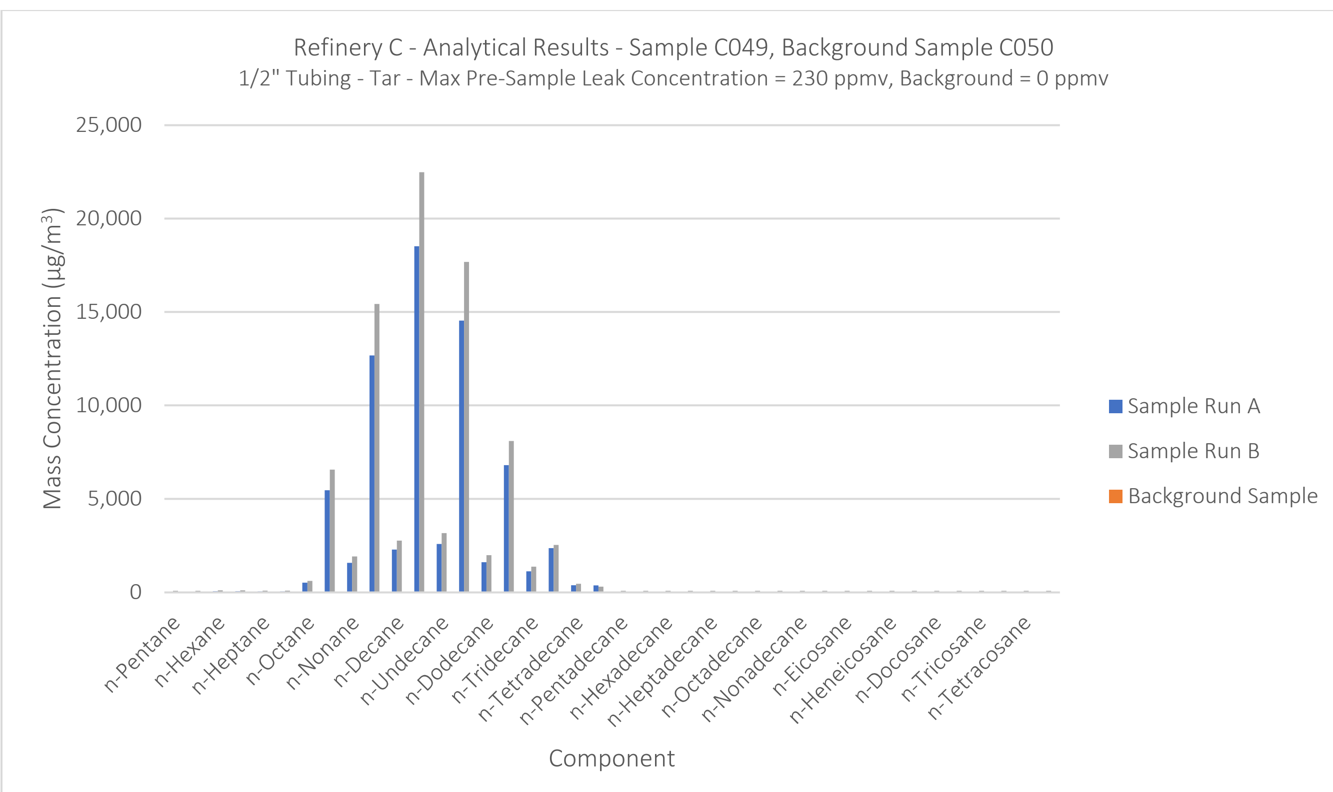


Figure B-3.87. Plot of Analytical Results for Sample C049 and Associated Background Sample

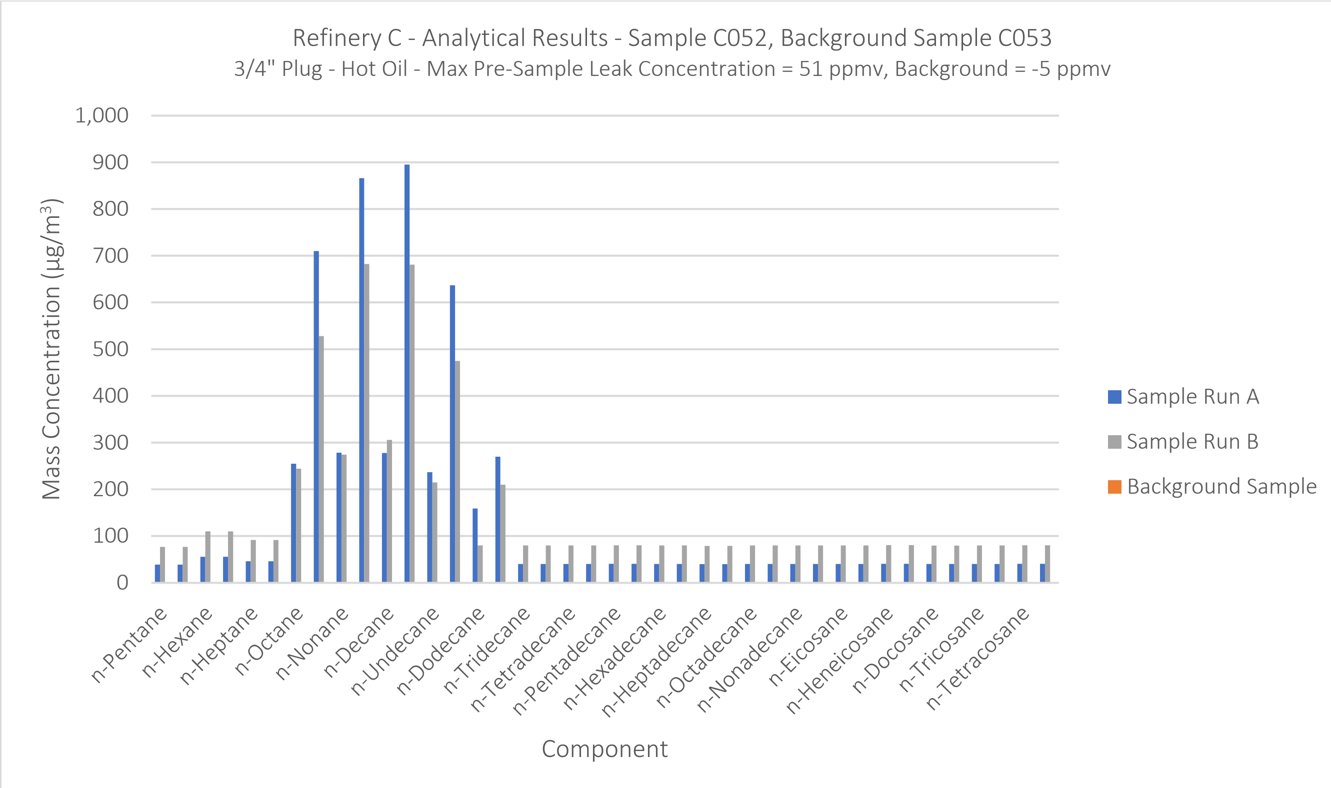


Figure B-3.88. *Plot of Analytical Results for Sample C052 and Associated Background Sample*

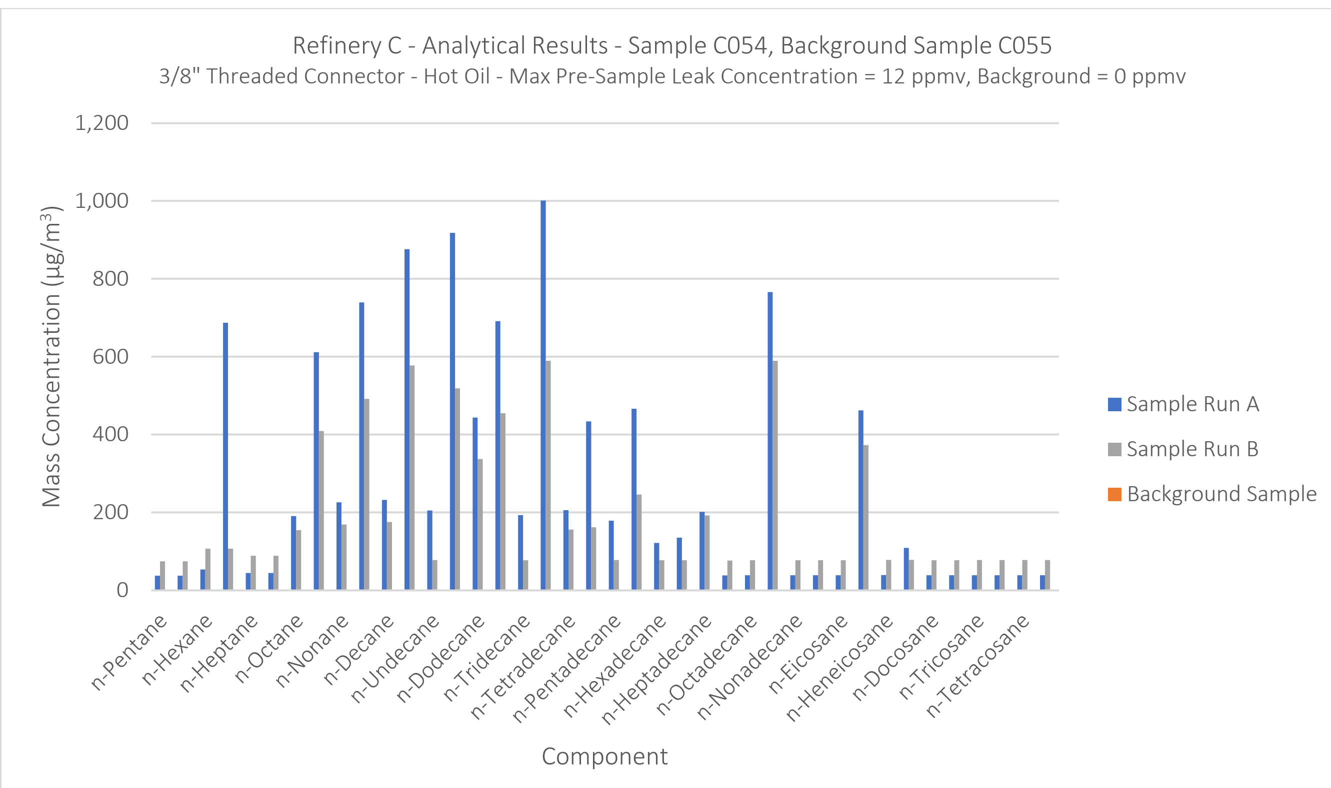


Figure B-3.89. *Plot of Analytical Results for Sample C054 and Associated Background Sample*

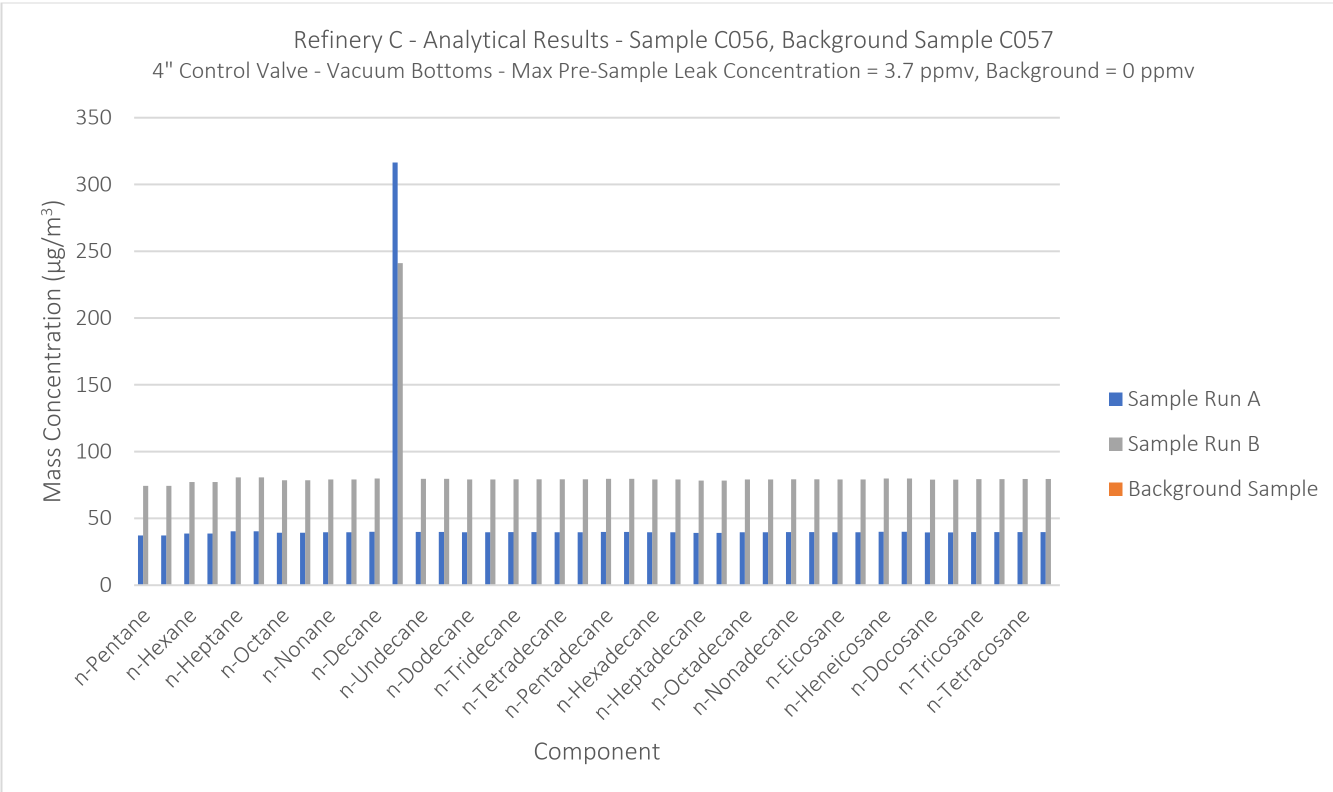


Figure B-3.90. Plot of Analytical Results for Sample C056 and Associated Background Sample

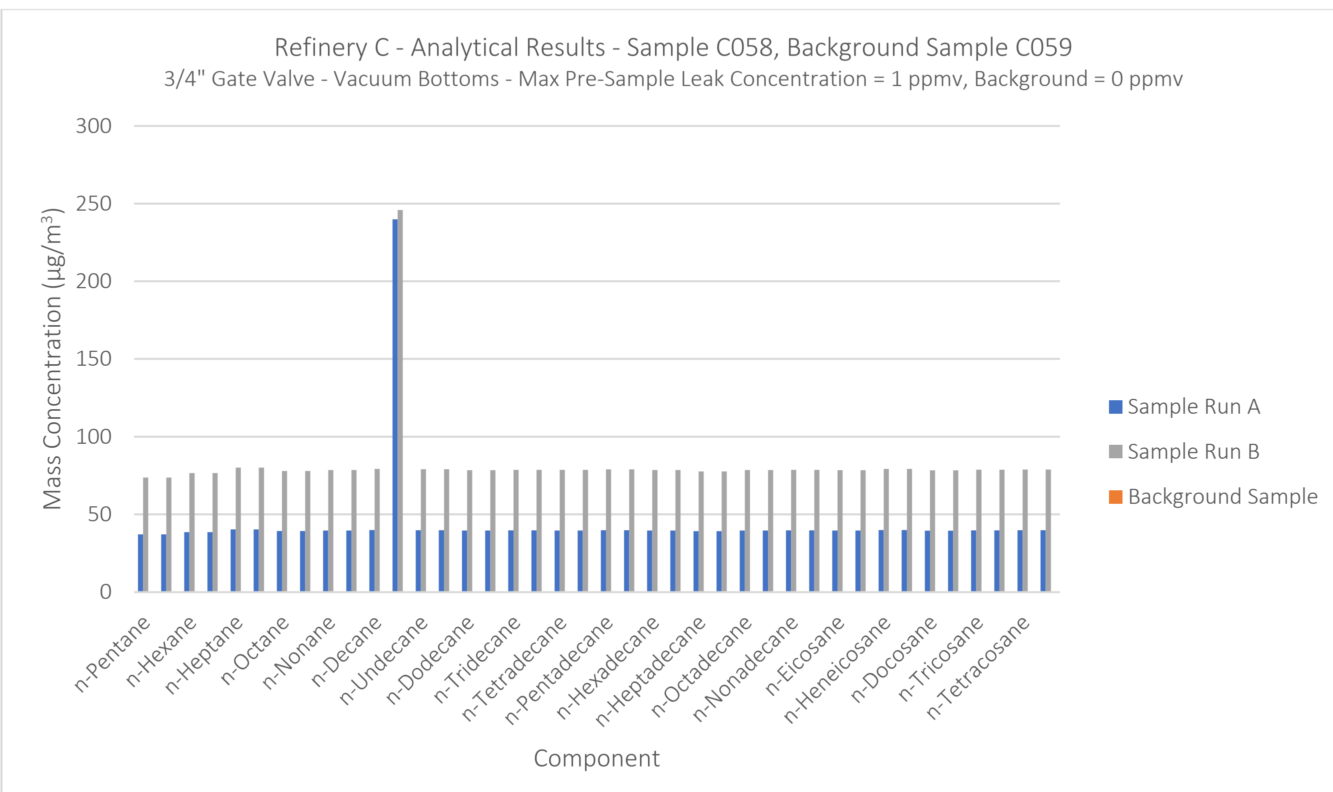


Figure B-3.91. Plot of Analytical Results for Sample C058 and Associated Background Sample

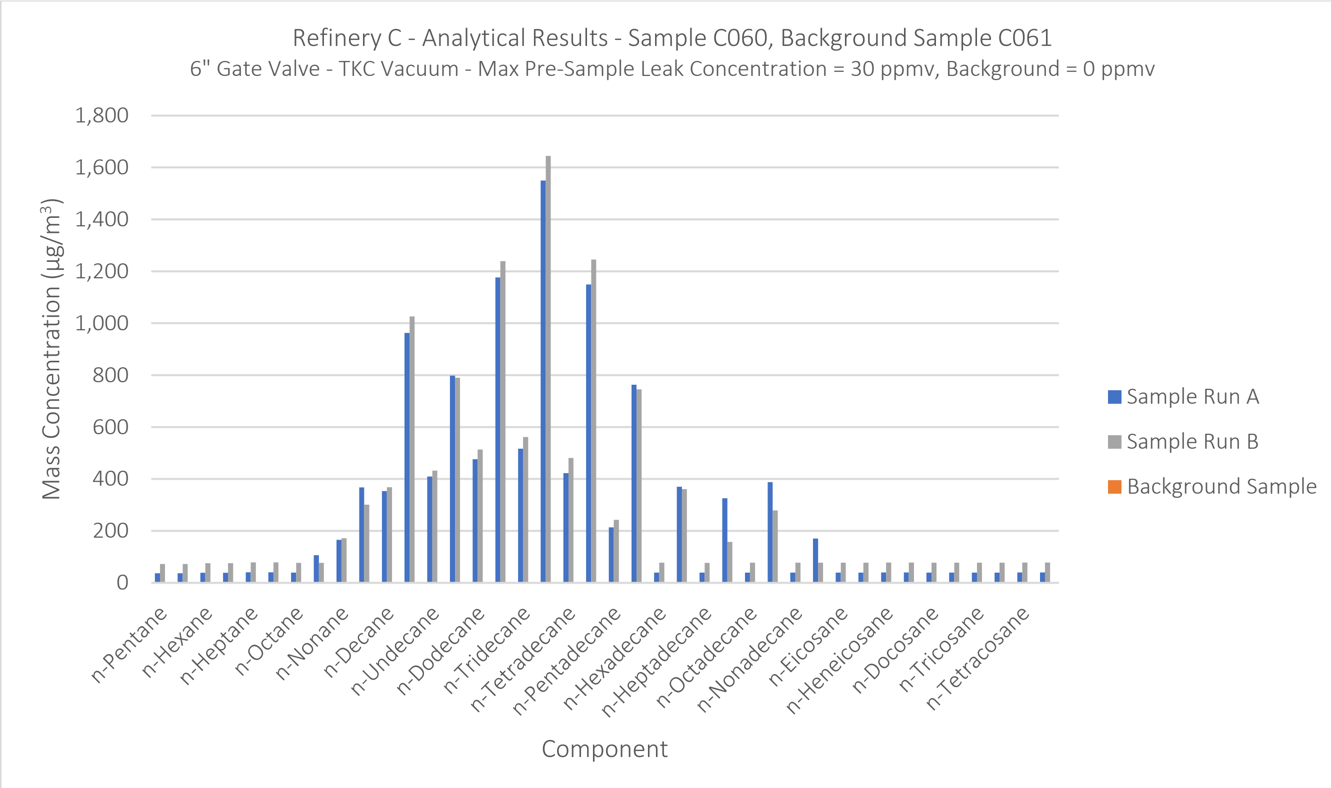


Figure B-3.92. *Plot of Analytical Results for Sample C060 and Associated Background Sample*

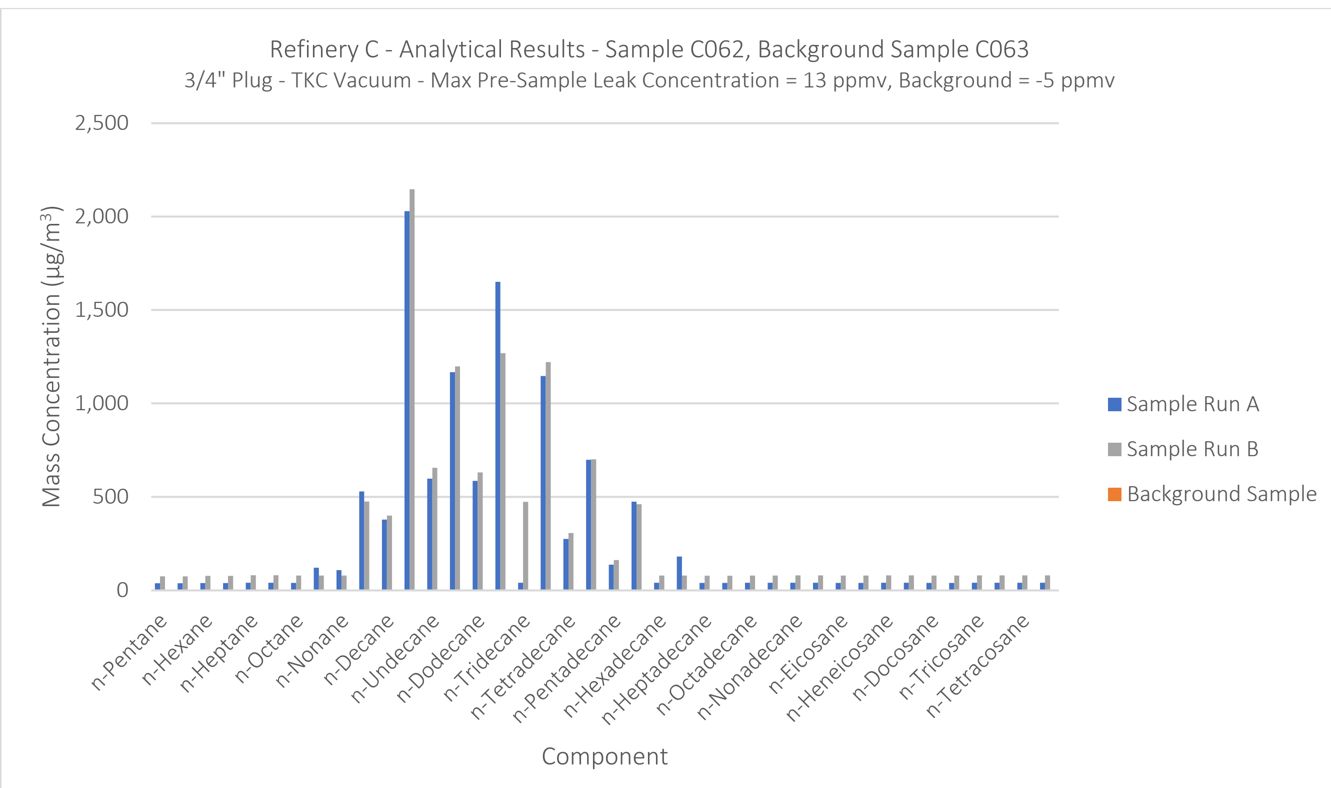


Figure B-3.93. *Plot of Analytical Results for Sample C062 and Associated Background Sample*

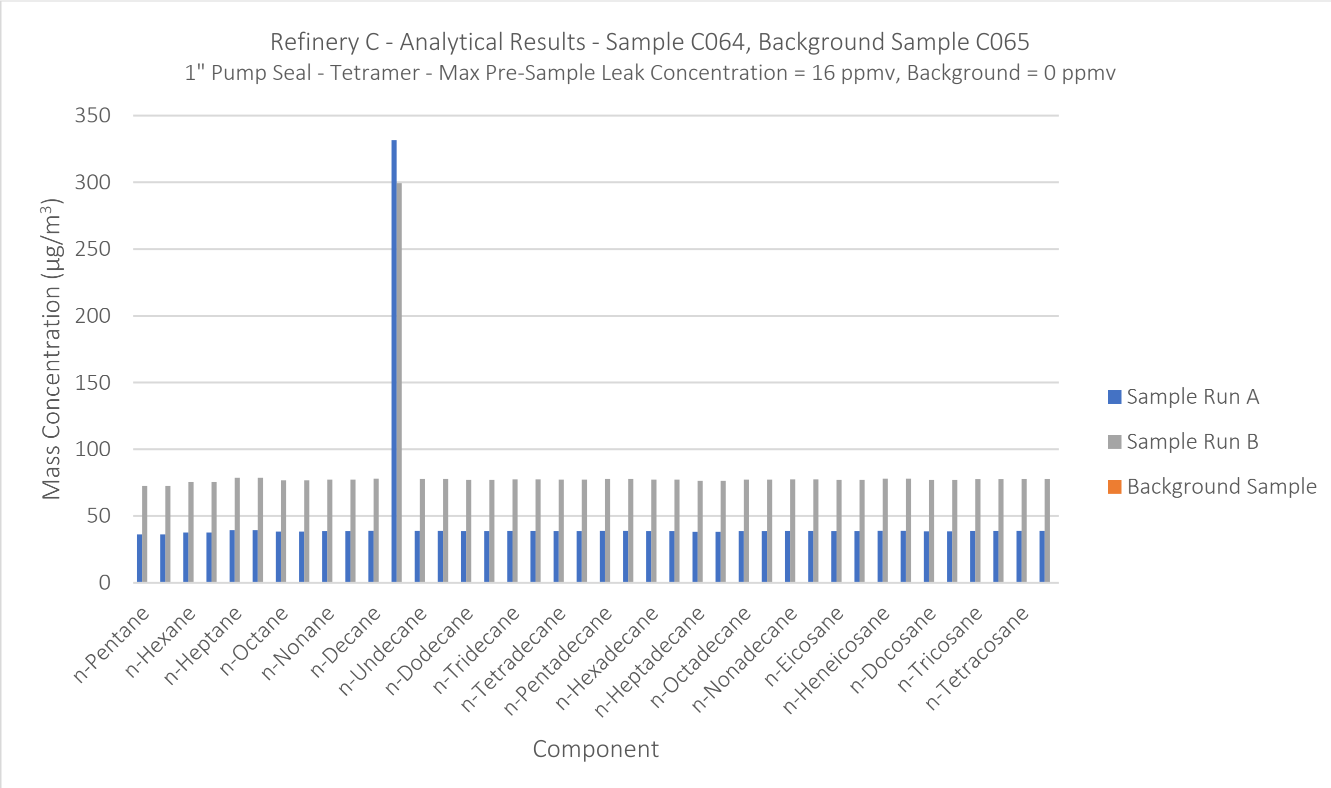


Figure B-3.94. Plot of Analytical Results for Sample C064 and Associated Background Sample

Refinery D Sample Results

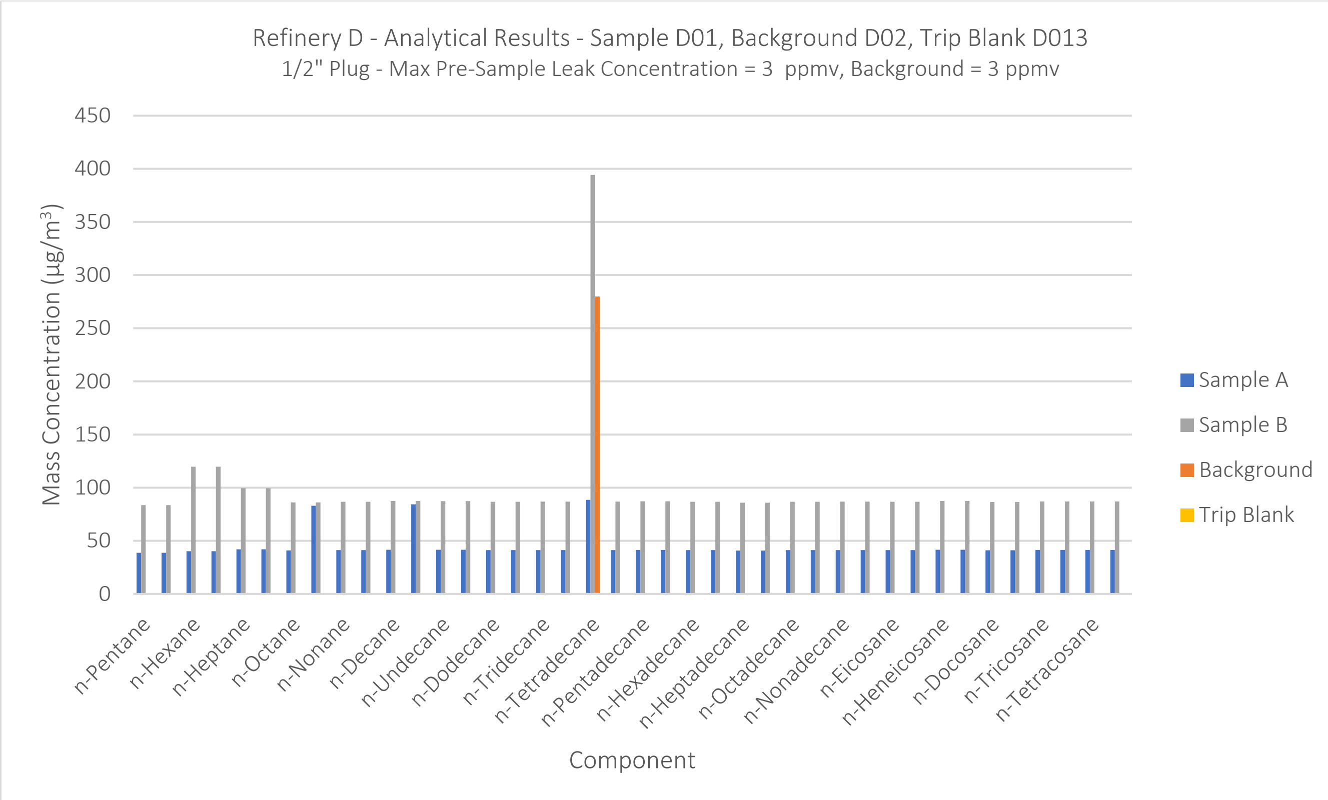


Figure B-3.95. Plot of Analytical Results for Sample D01 and Associated Background Sample

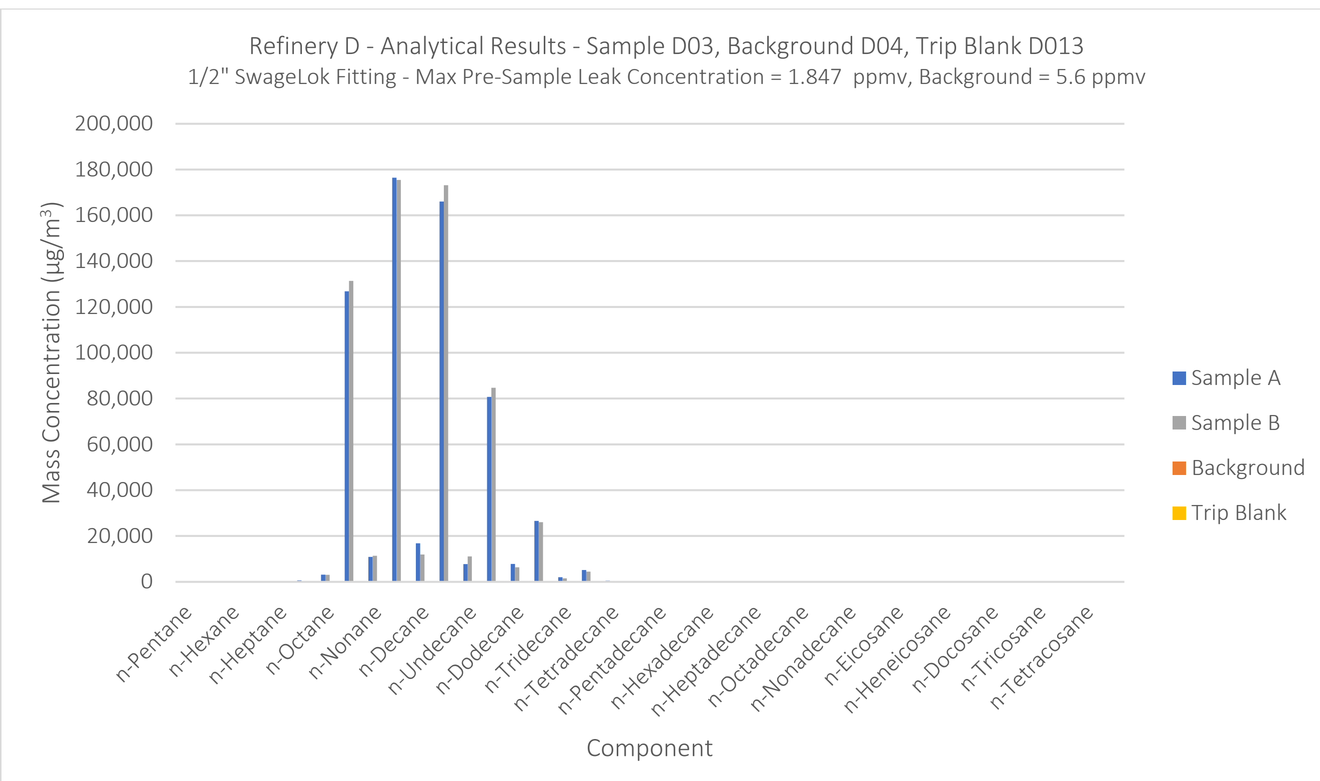


***Figure B-3.96.** Plot of Analytical Results for Sample D03 and Associated Background Sample*

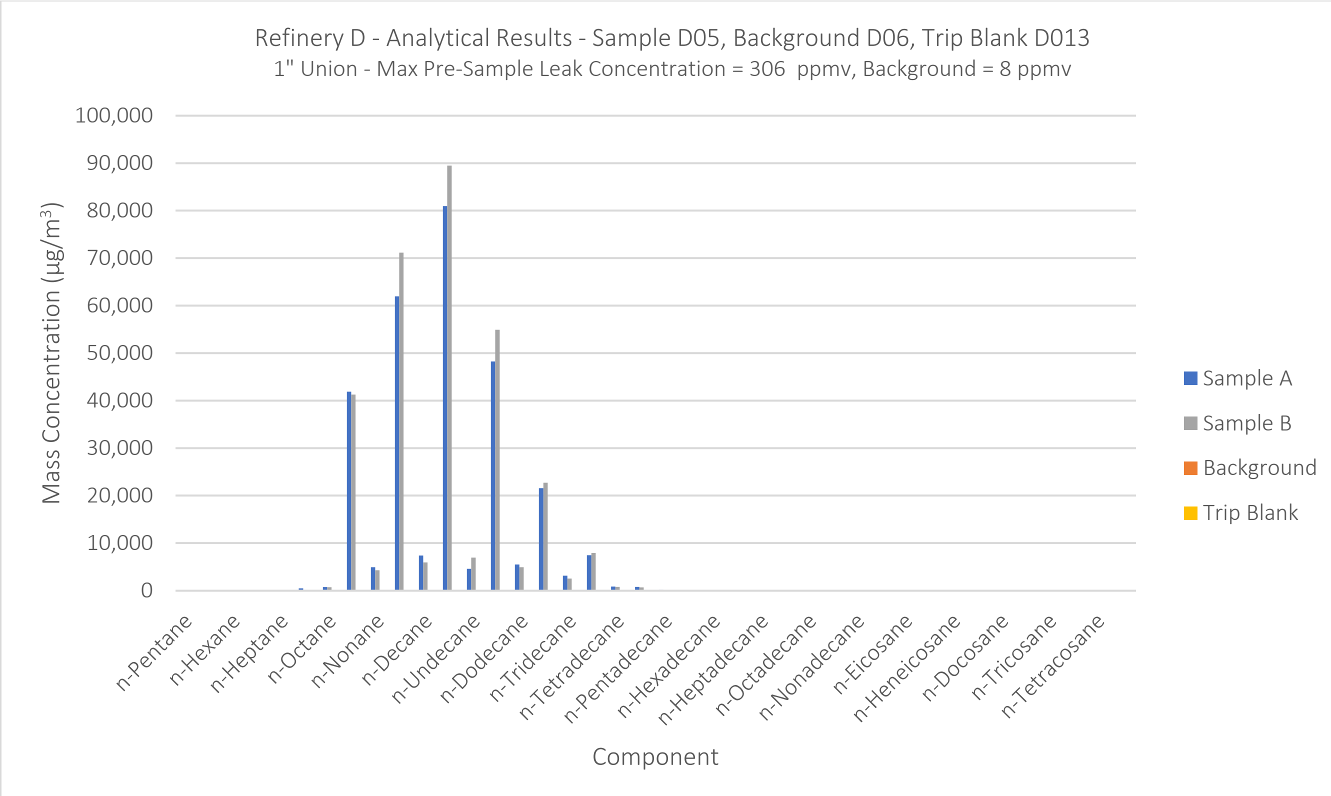


Figure B-3.97. Plot of Analytical Results for Sample D05 and Associated Background Sample

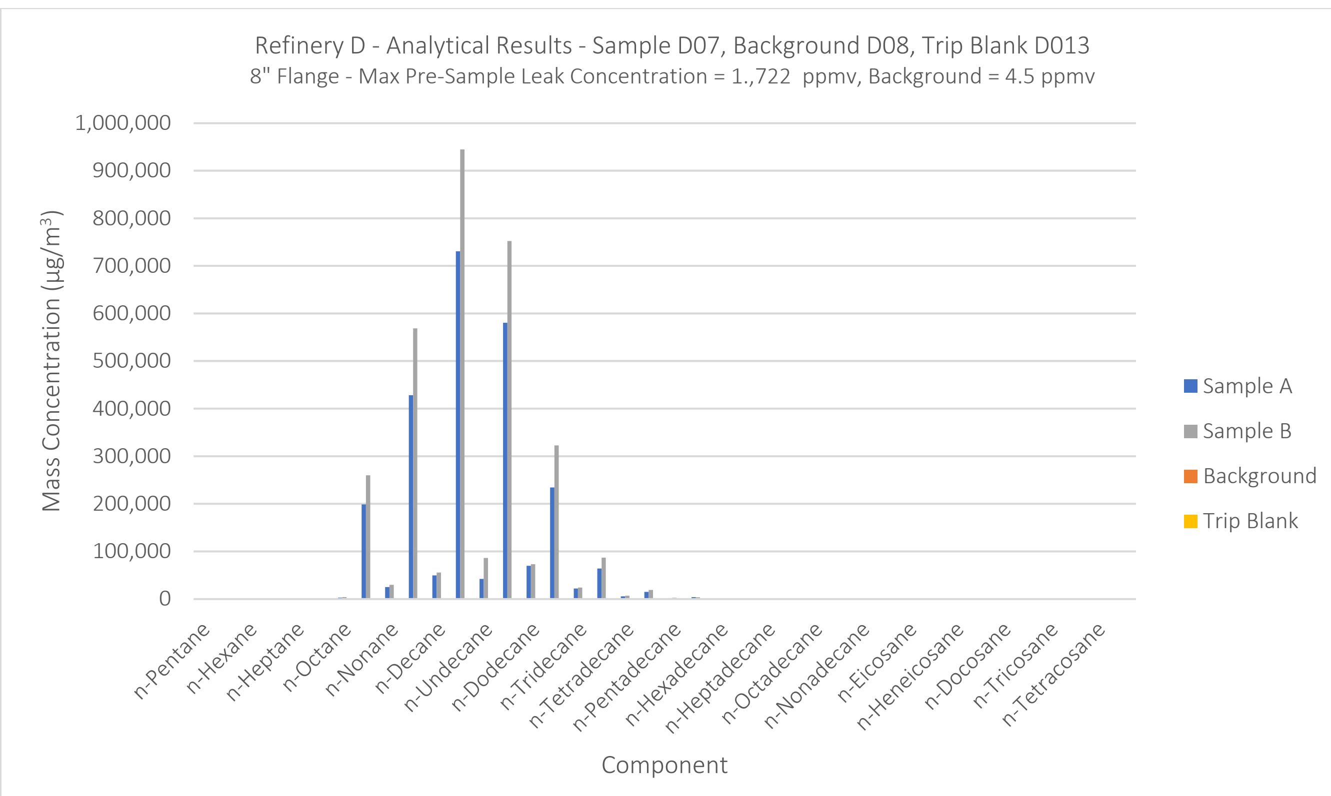


Figure B-3.98. Plot of Analytical Results for Sample D07 and Associated Background Sample

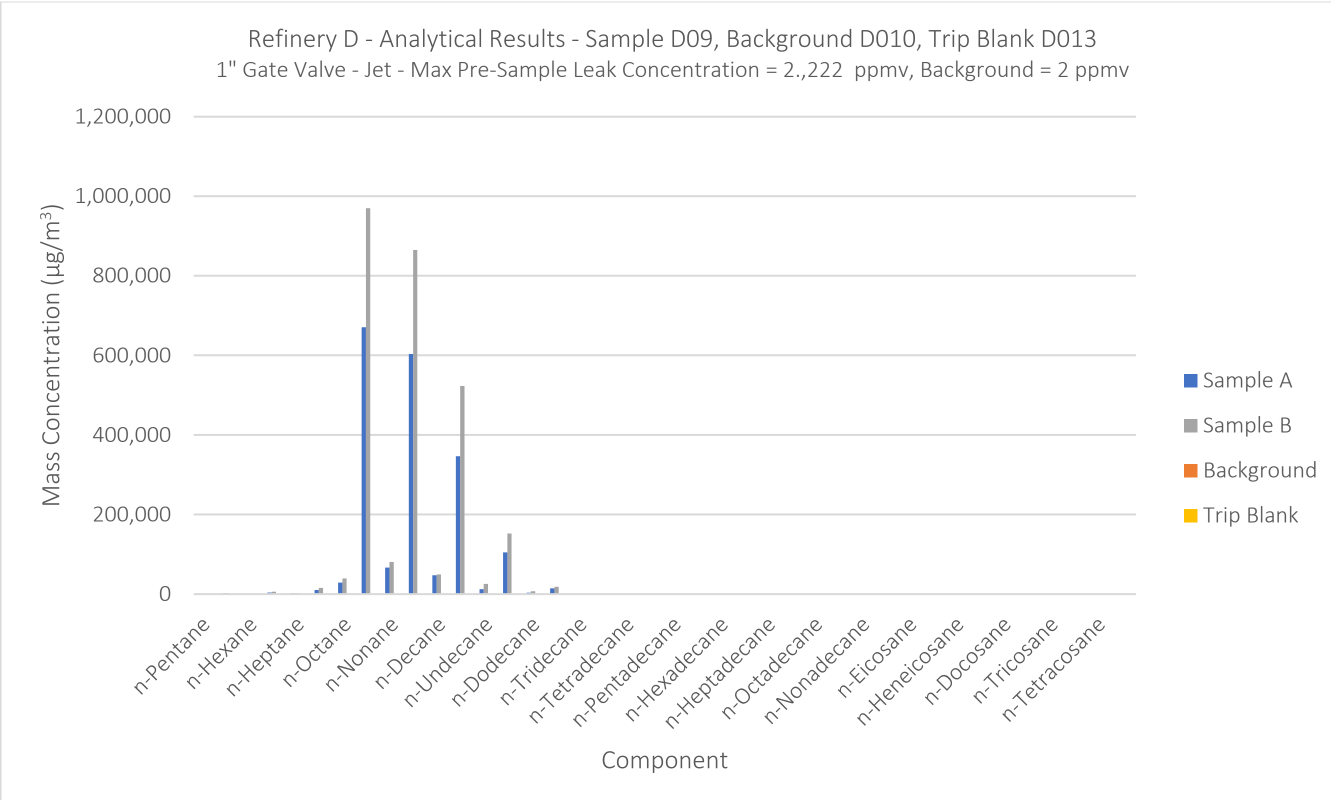


Figure B-3.99. *Plot of Analytical Results for Sample D09 and Associated Background Sample*

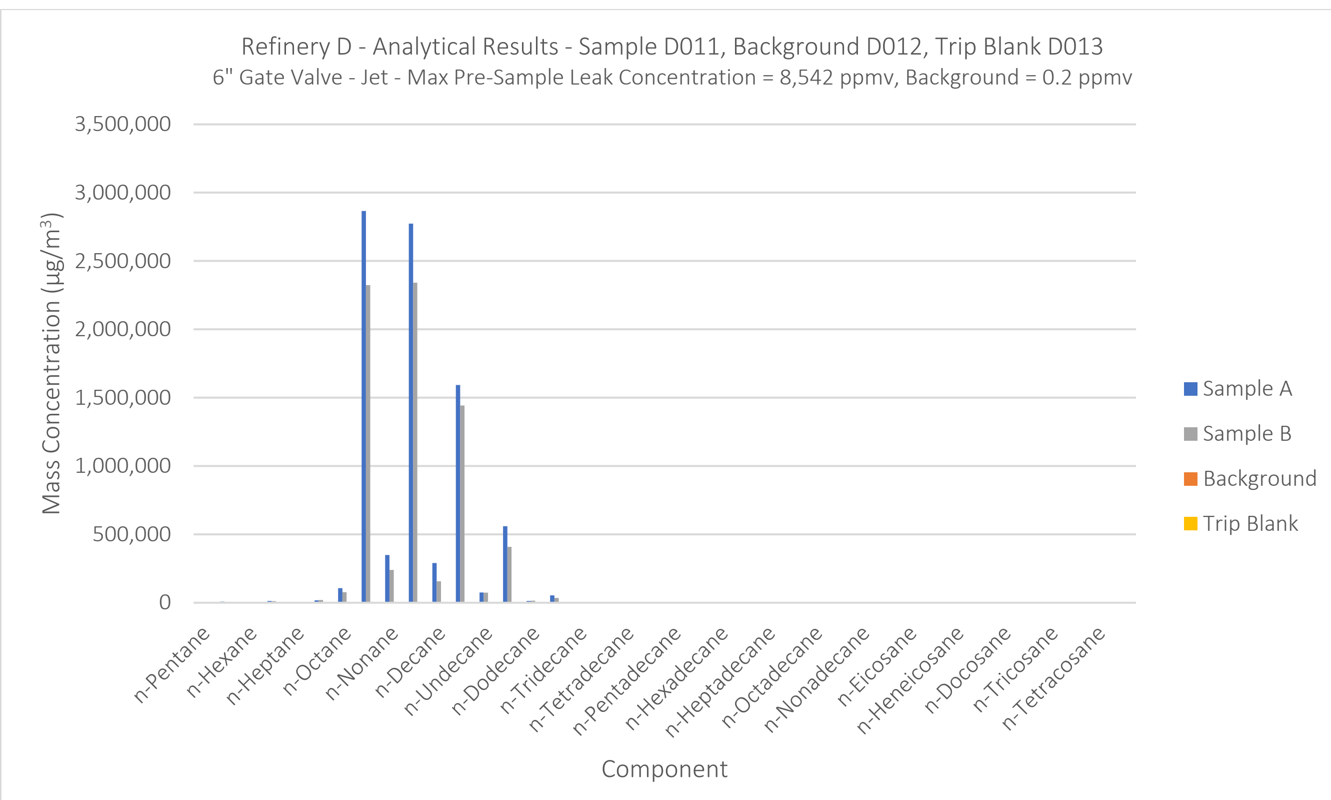


Figure B-3.100. *Plot of Analytical Results for Sample D011 and Associated Background Sample*

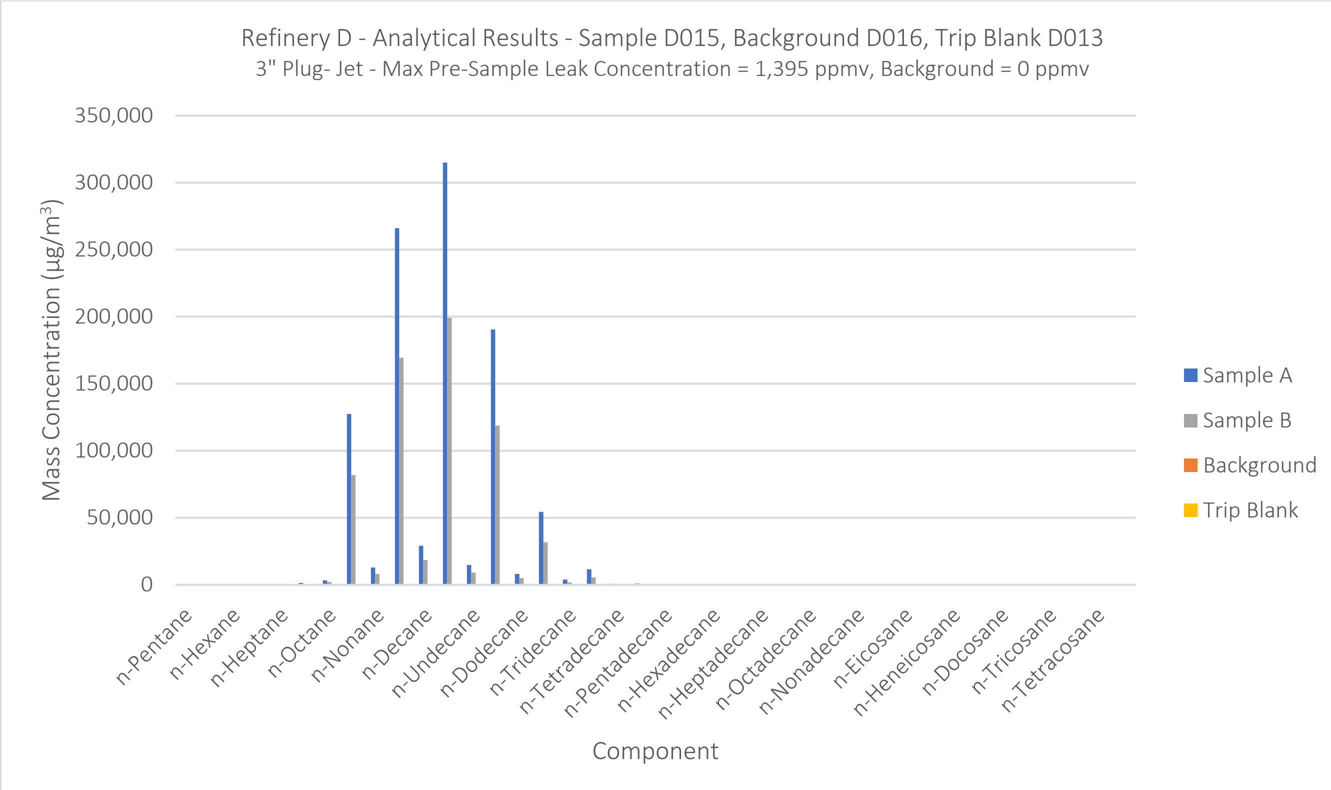


Figure B-3.101. *Plot of Analytical Results for Sample D015 and Associated Background Sample*

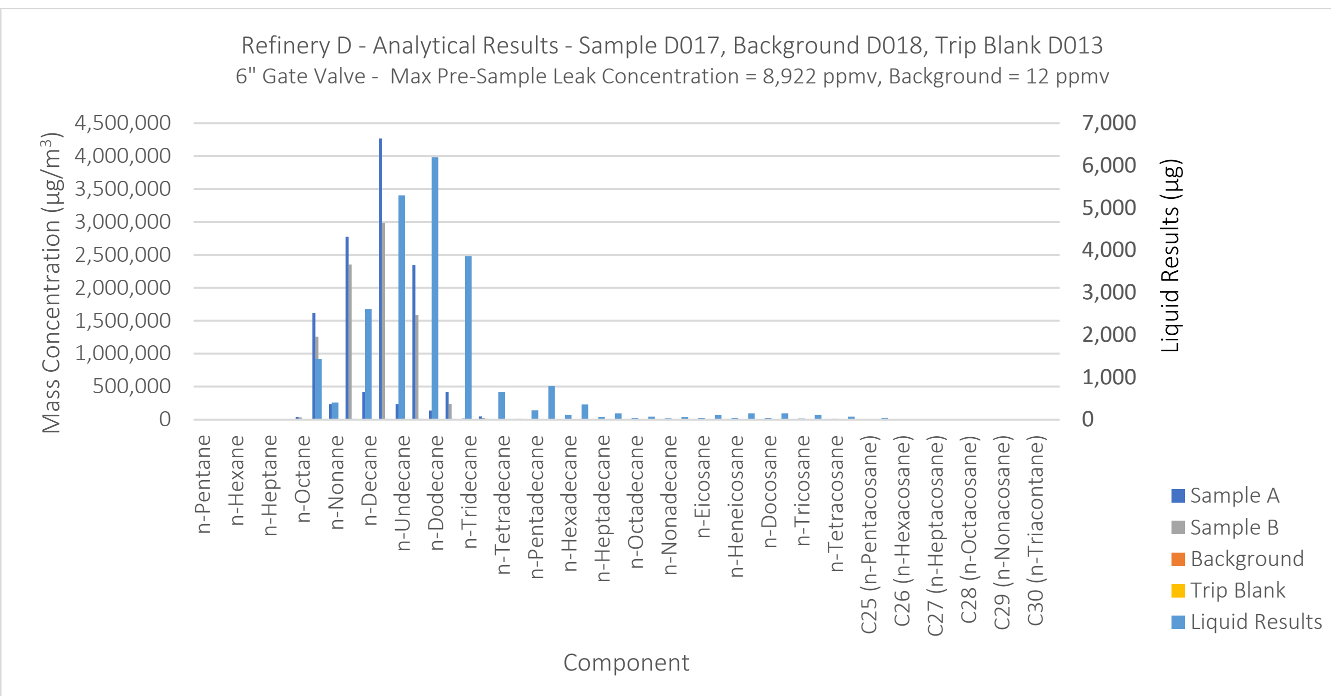


Figure B-3.102. *Plot of Analytical Results for Sample D017 and Associated Background Sample*

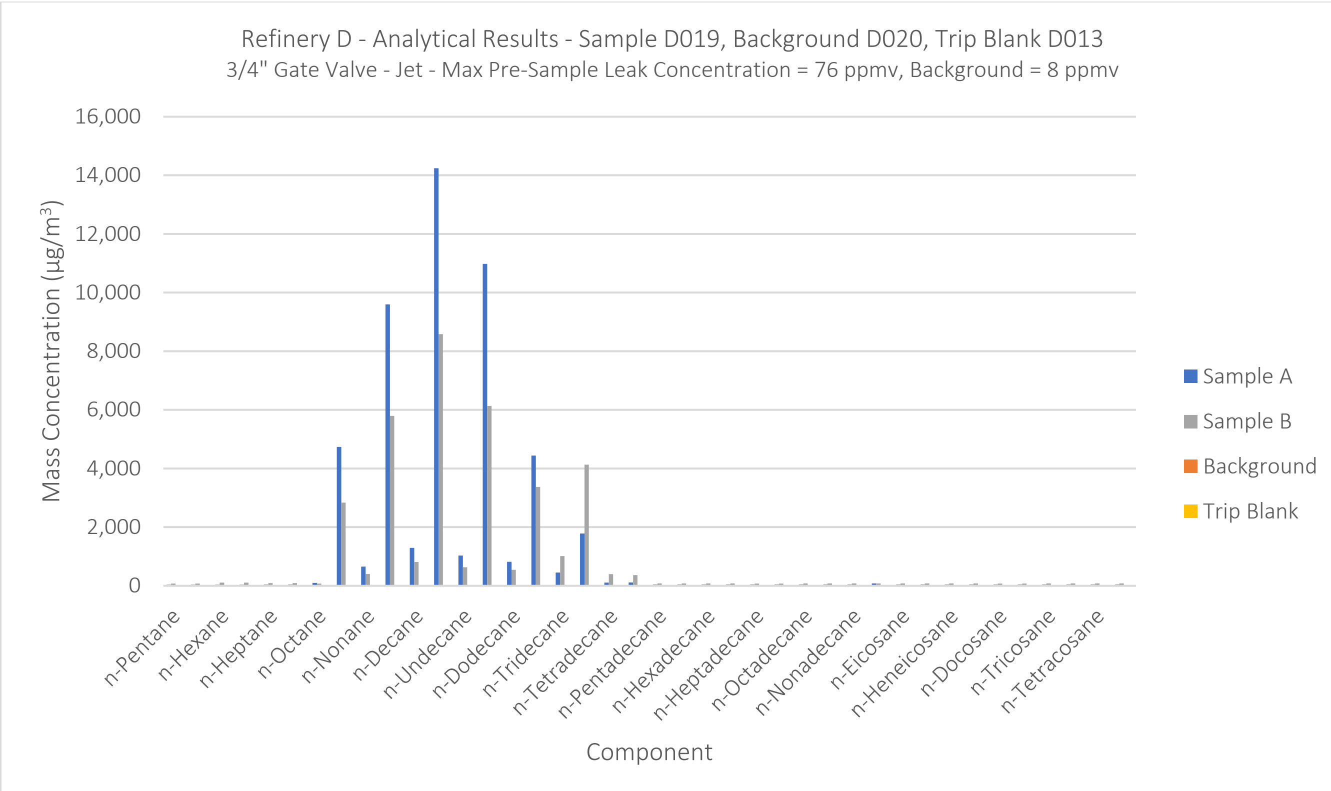


Figure B-3.103. Plot of Analytical Results for Sample D019 and Associated Background Sample

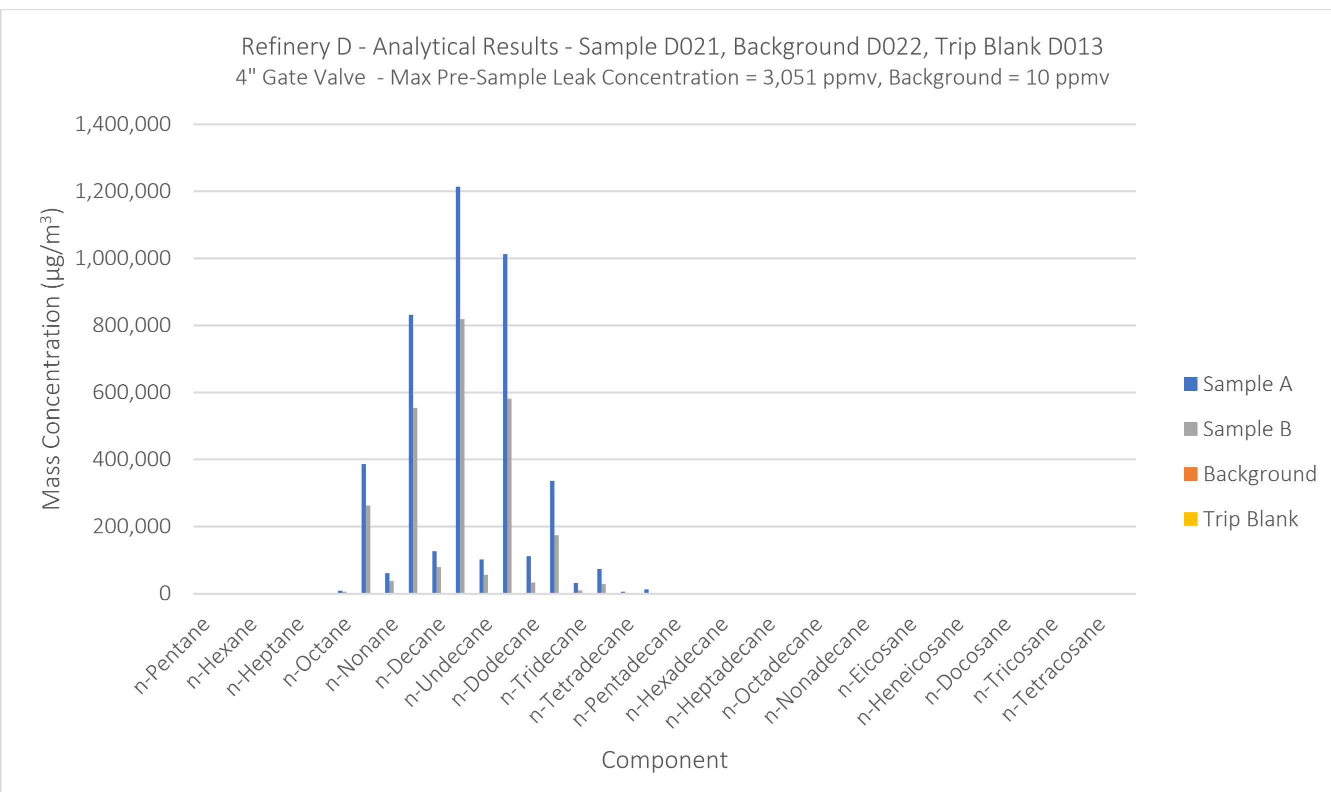


Figure B-3.104. Plot of Analytical Results for Sample D021 and Associated Background Sample

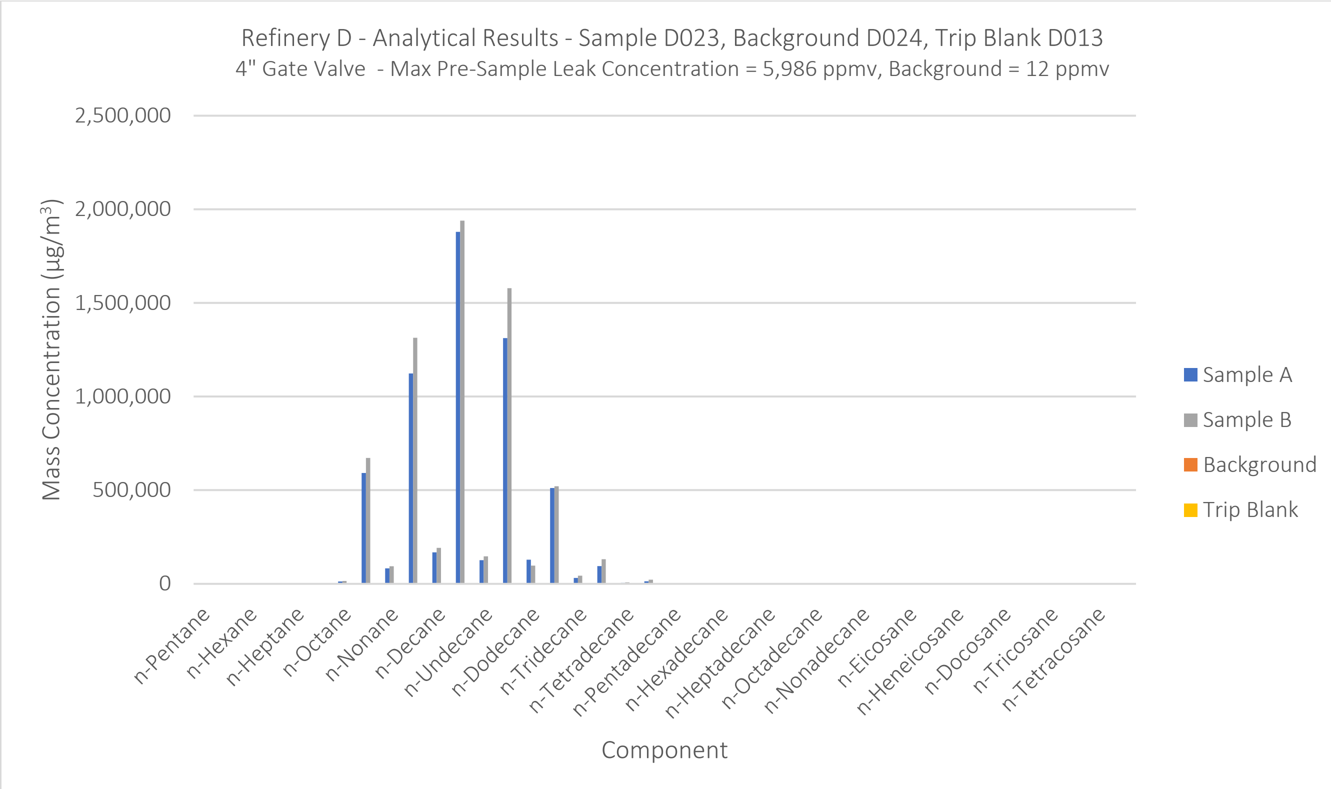


Figure B-3.105. Plot of Analytical Results for Sample D023 and Associated Background Sample

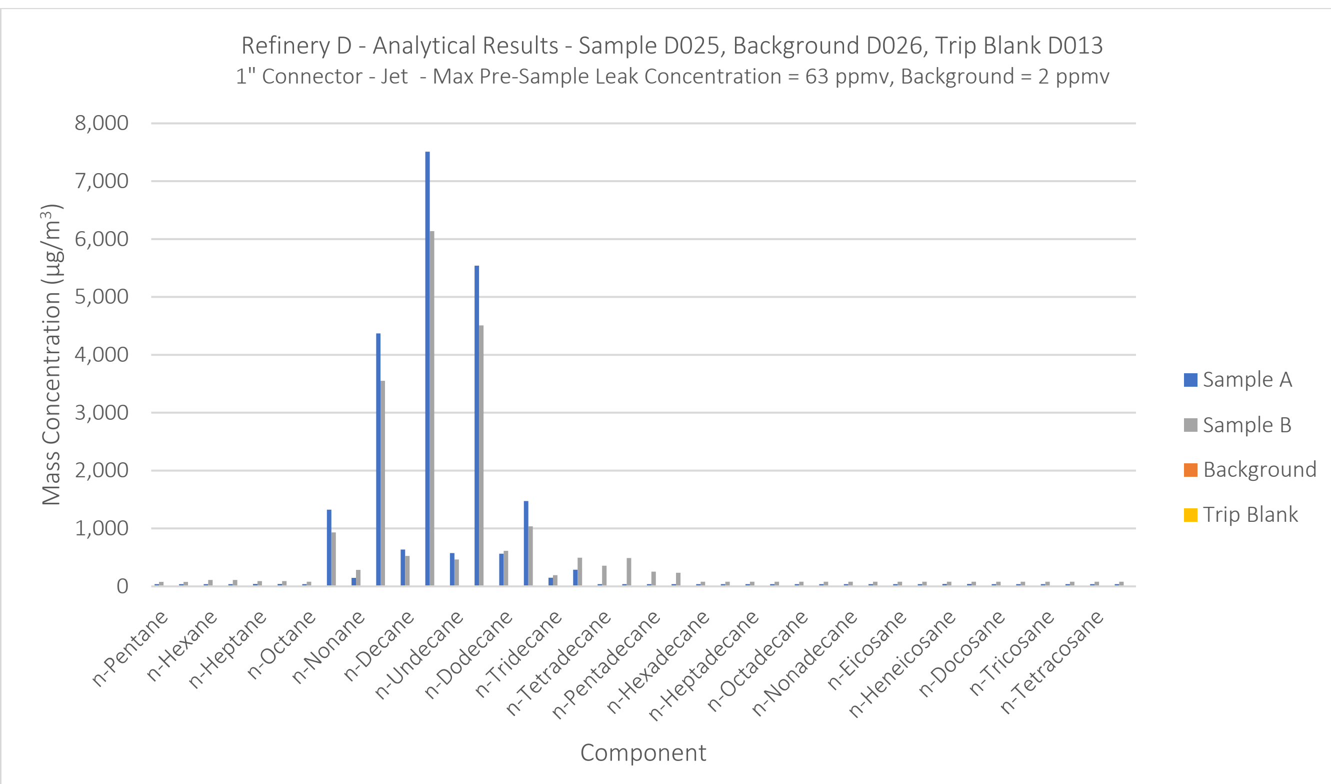


Figure B-3.106. Plot of Analytical Results for Sample D025 and Associated Background Sample

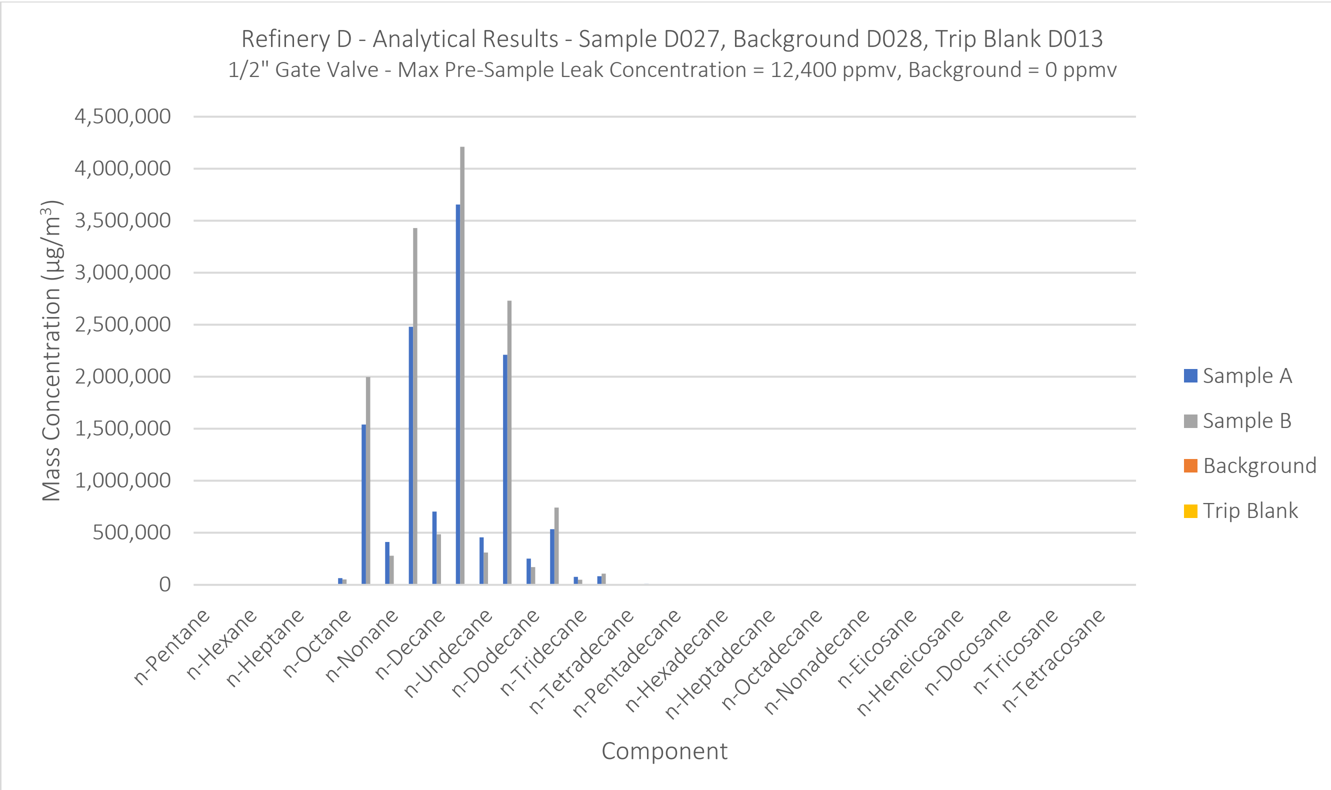


Figure B-3.107. Plot of Analytical Results for Sample D027 and Associated Background Sample

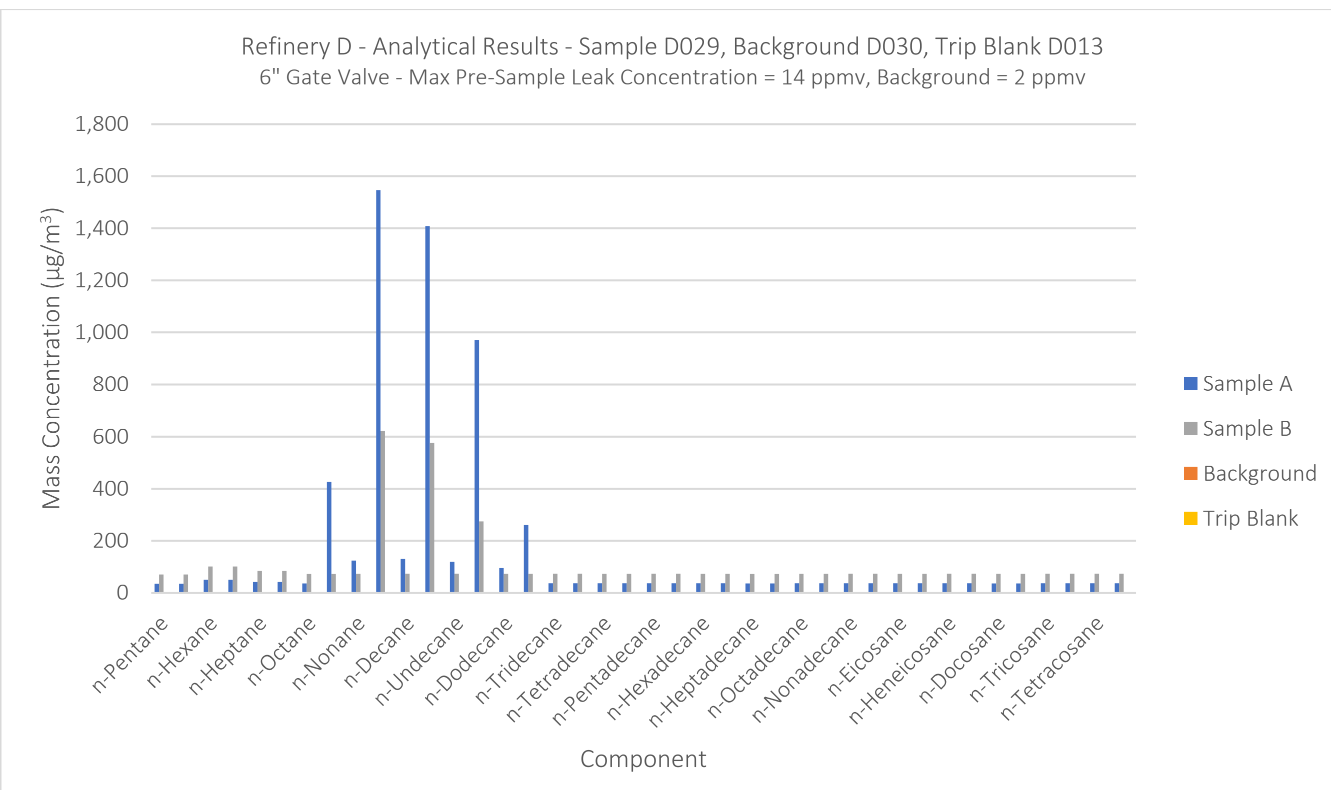


Figure B-3.108. Plot of Analytical Results for Sample D029 and Associated Background Sample

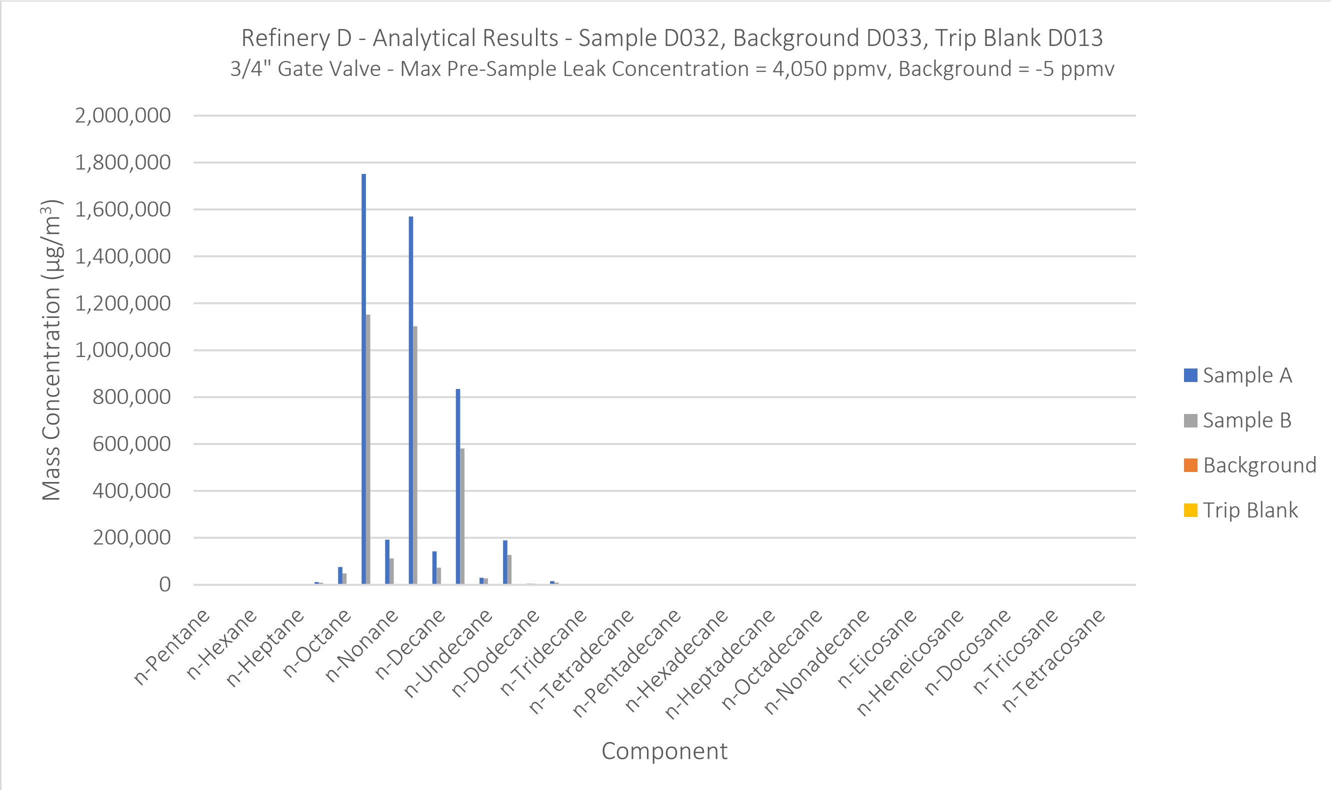


Figure B-3.109. Plot of Analytical Results for Sample D032 and Associated Background Sample

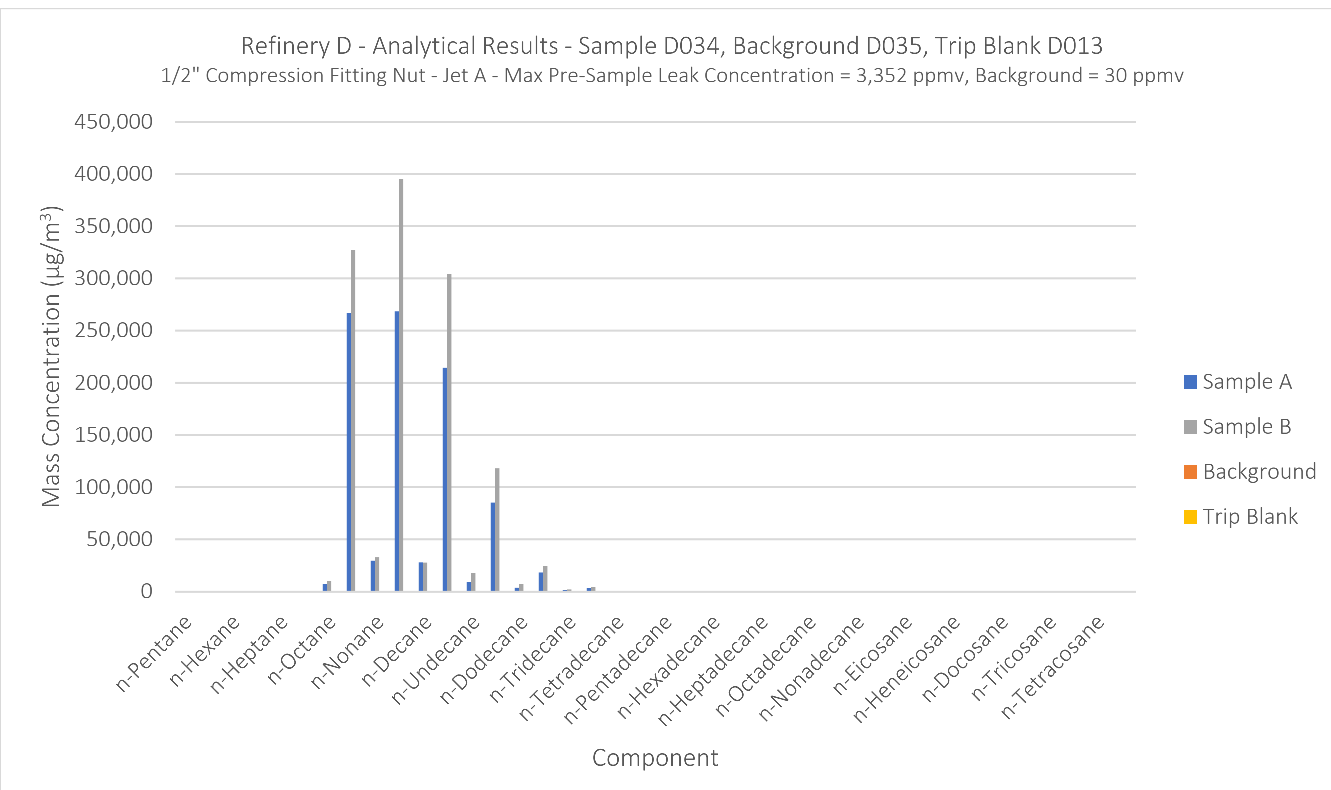


Figure B-3.110. Plot of Analytical Results for Sample D034 and Associated Background Sample

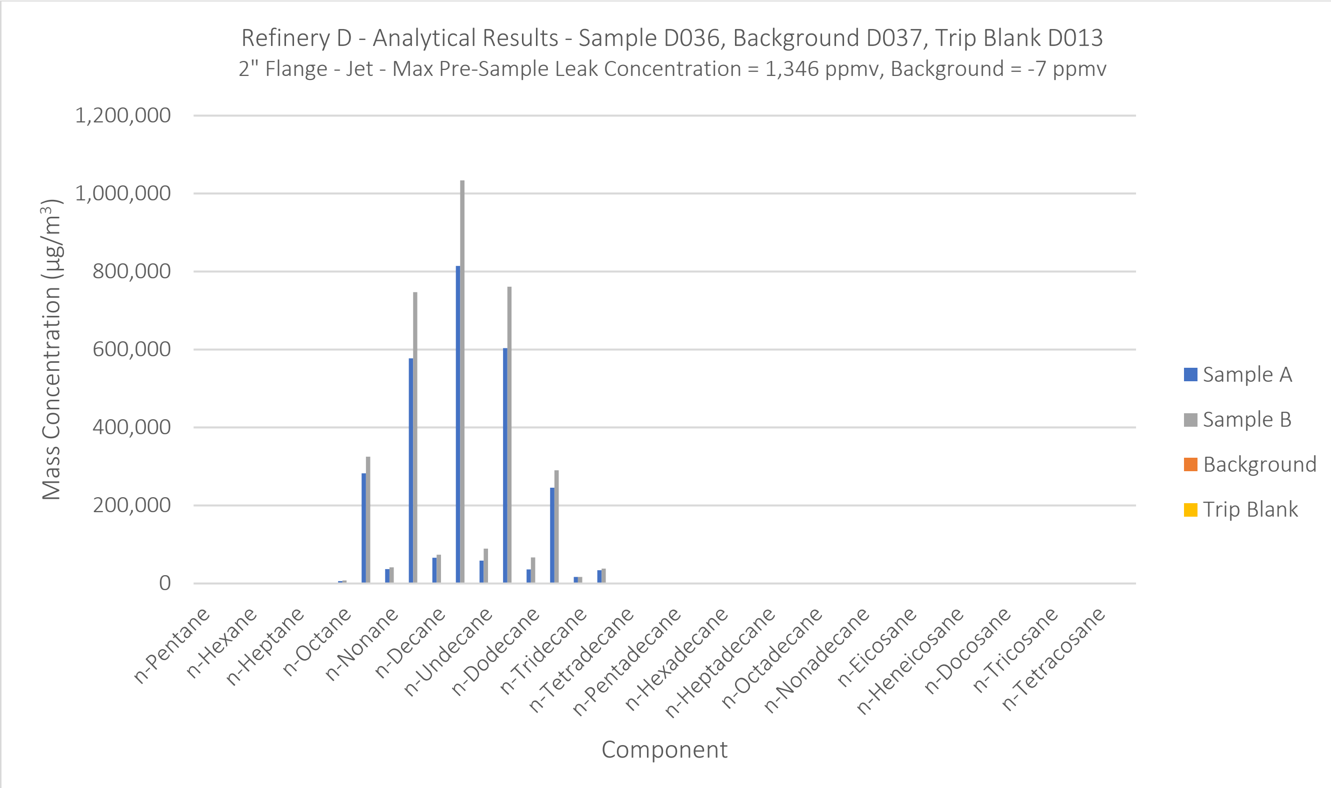


Figure B-3.111. Plot of Analytical Results for Sample D036 and Associated Background Sample

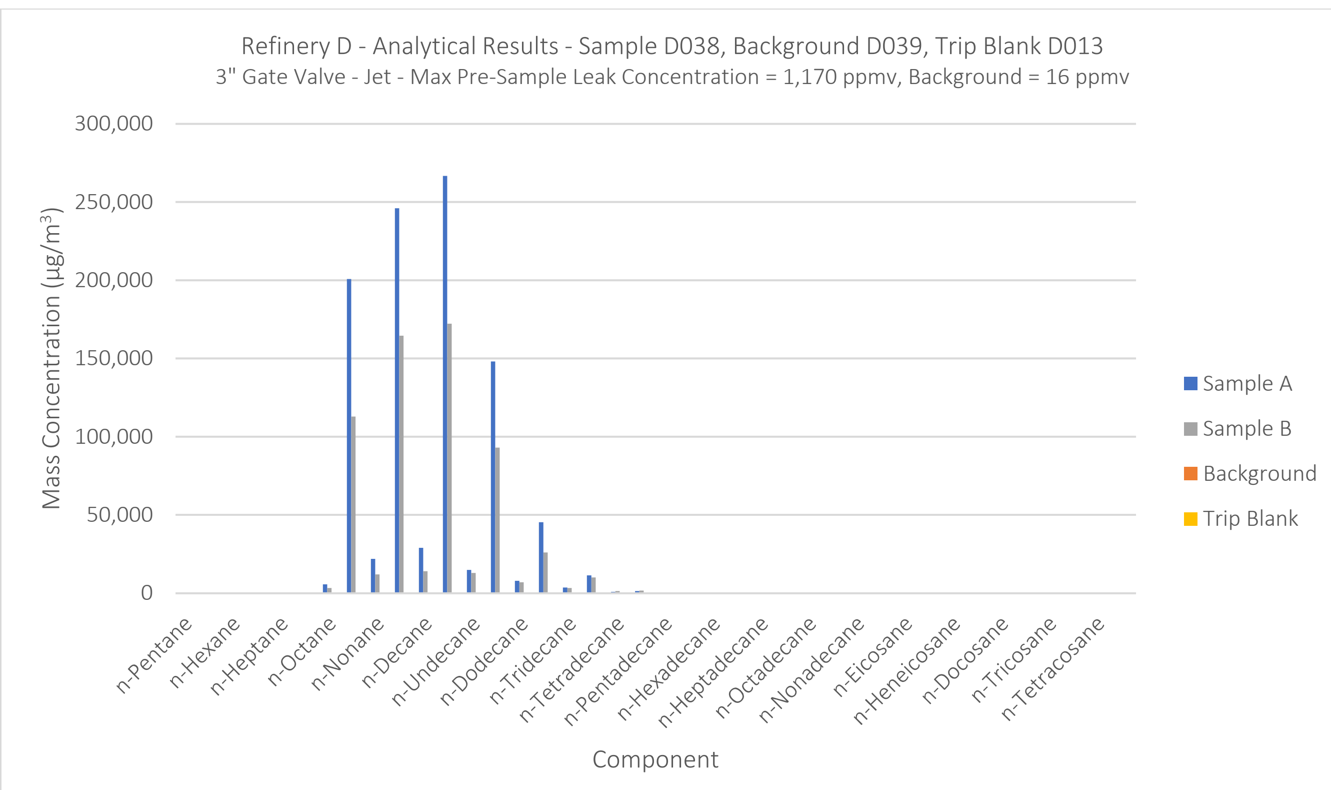


Figure B-3.112. Plot of Analytical Results for Sample D038 and Associated Background Sample

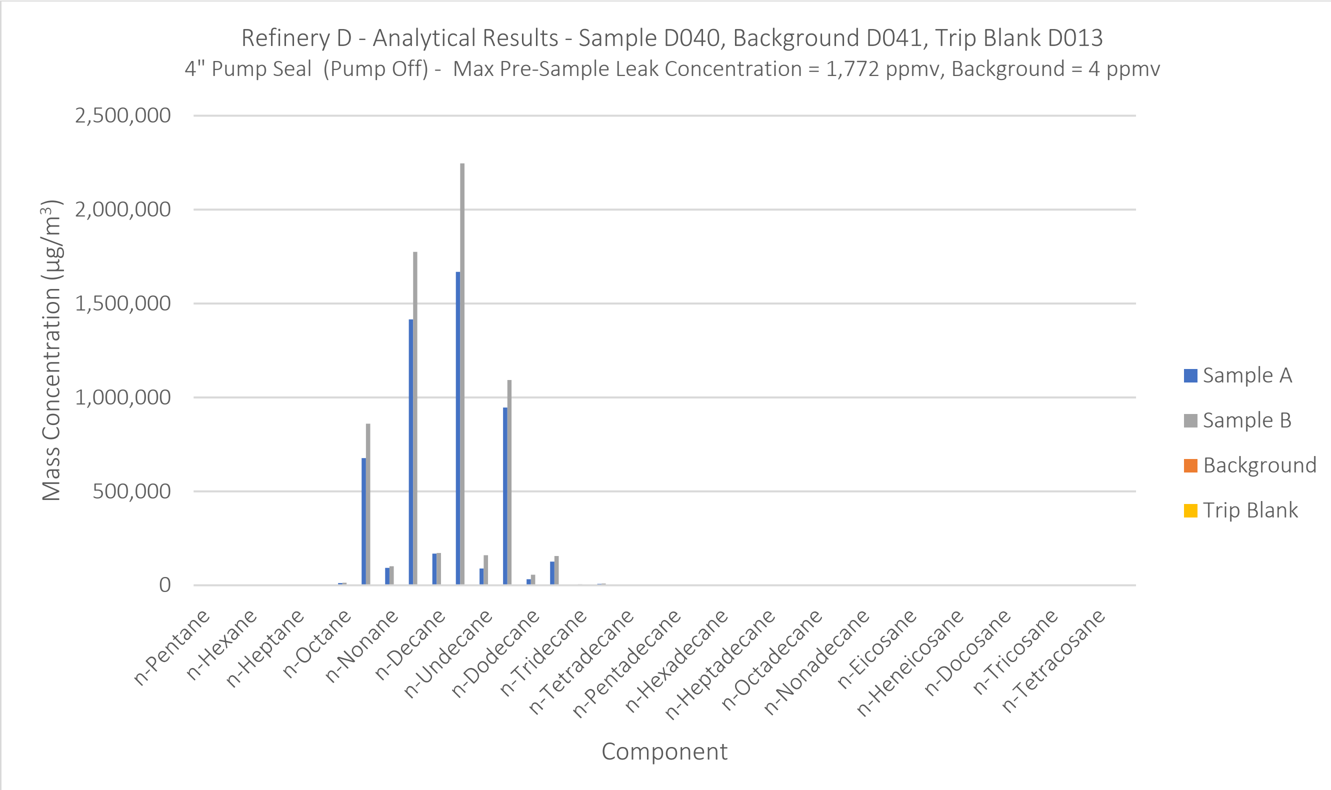


Figure B-3.113. *Plot of Analytical Results for Sample D040 and Associated Background Sample*

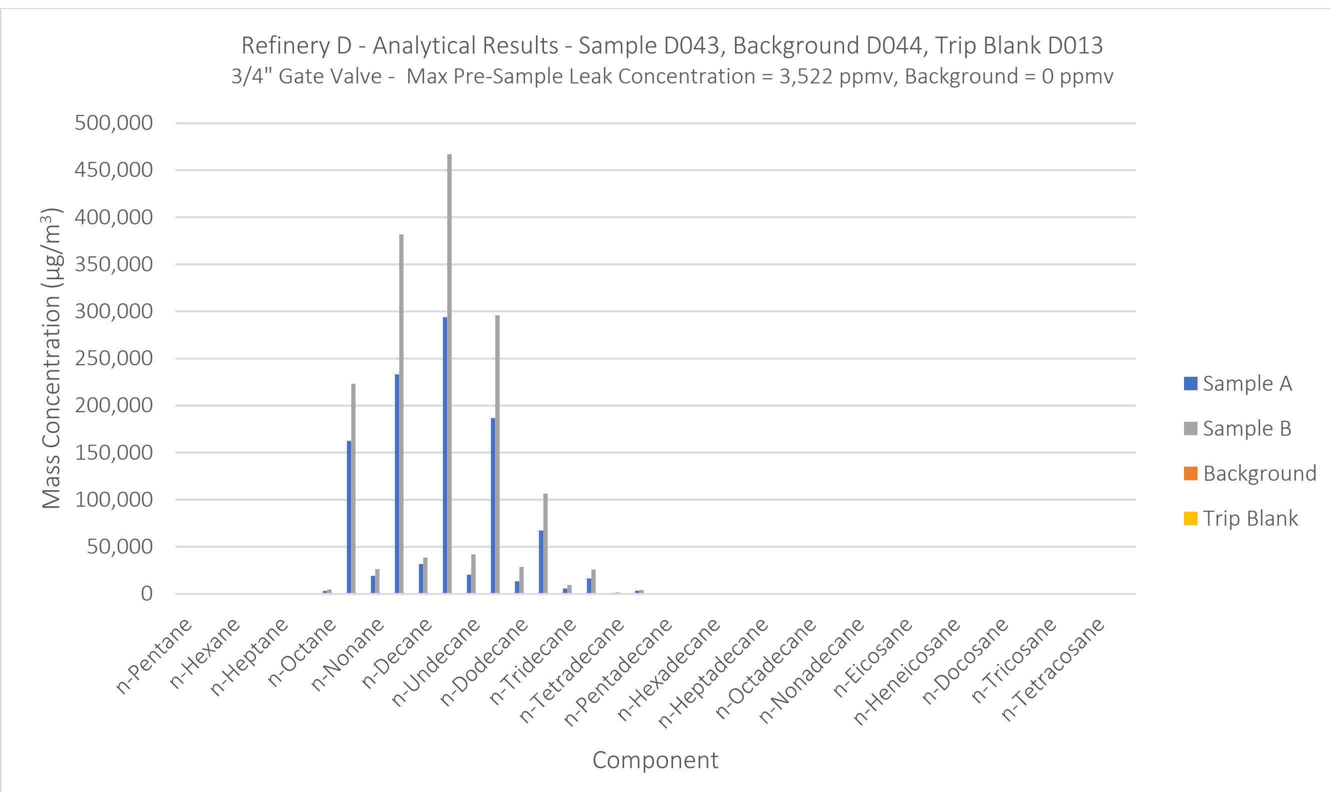


Figure B-3.114. *Plot of Analytical Results for Sample D043 and Associated Background Sample*

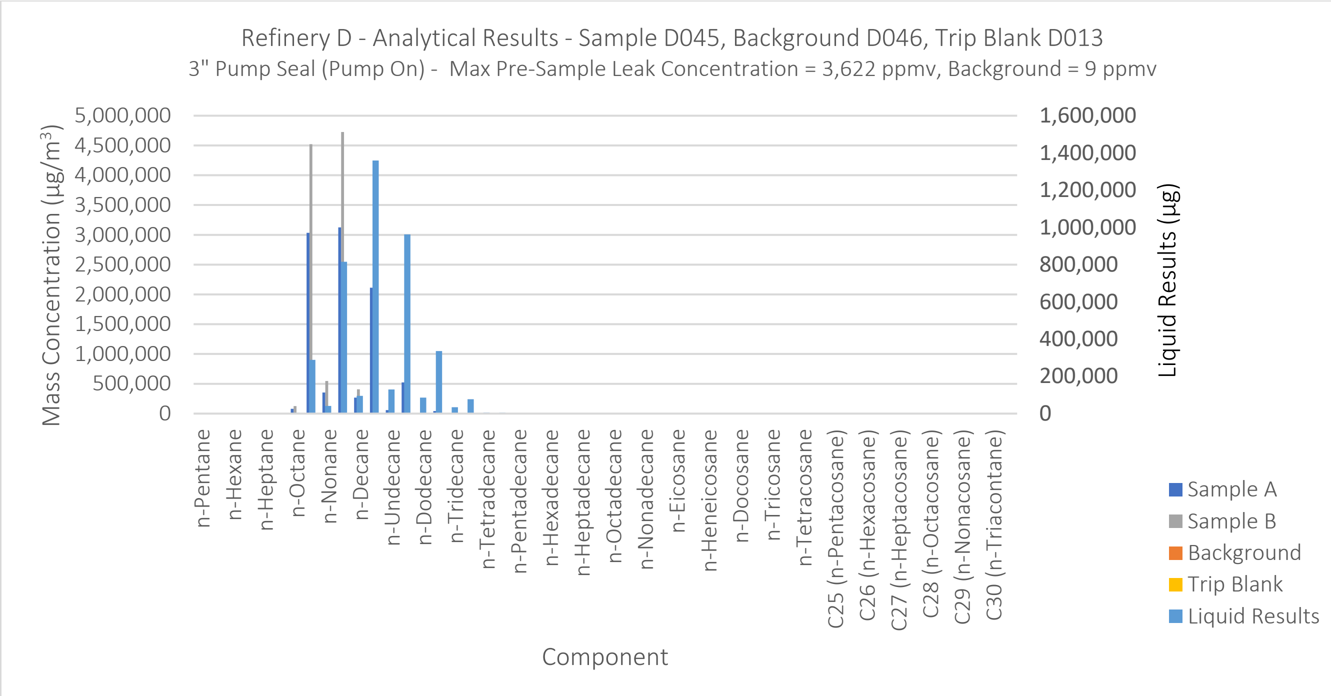


Figure B-3.115. Plot of Analytical Results for Sample D045 and Associated Background Sample

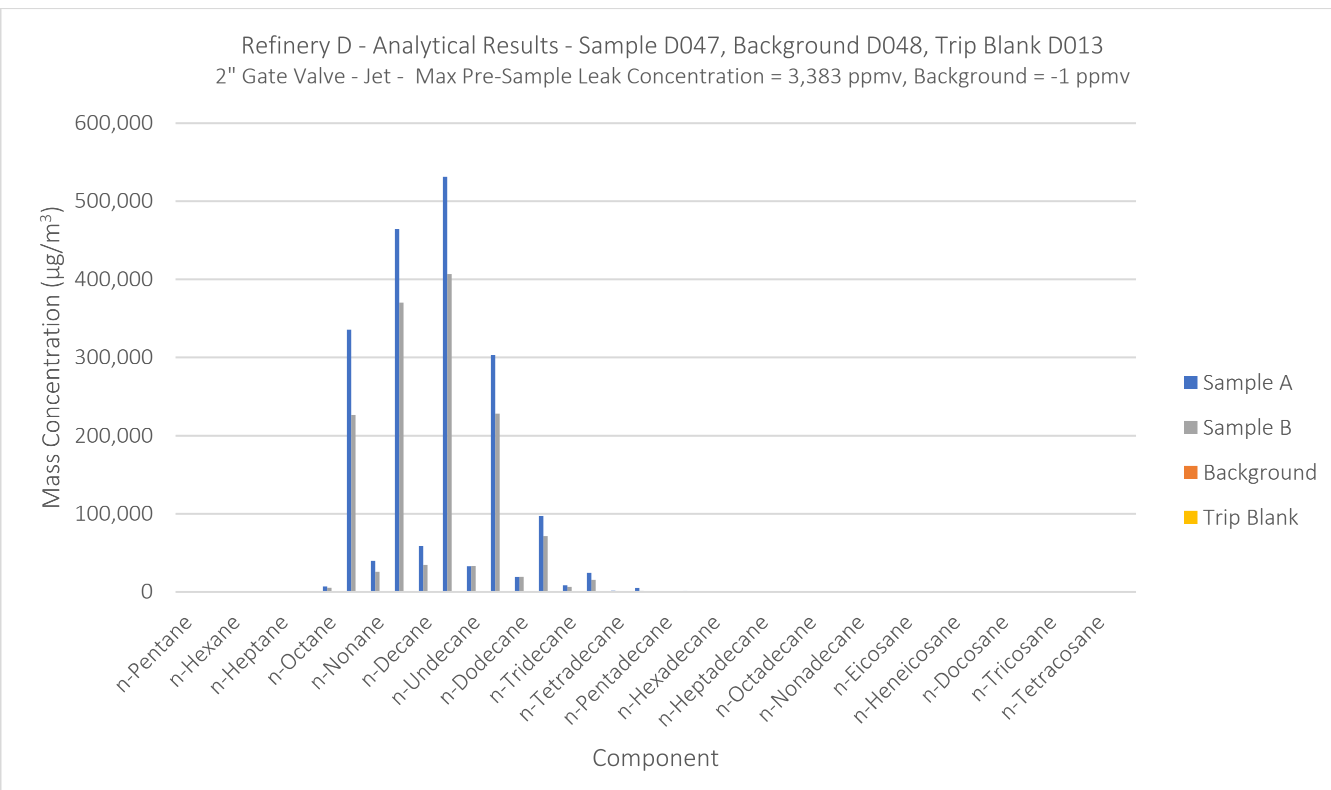


Figure B-3.116. Plot of Analytical Results for Sample D047 and Associated Background Sample

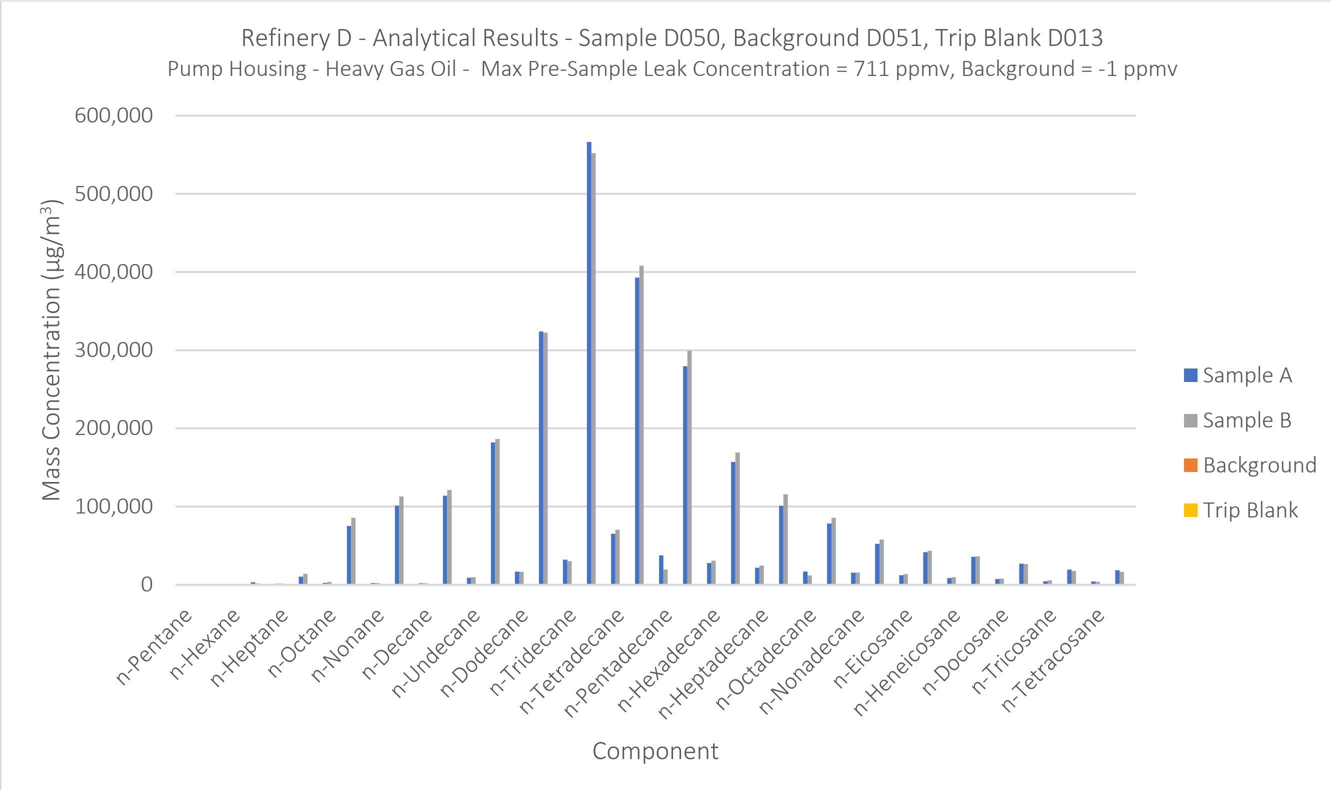


Figure B-3.117. *Plot of Analytical Results for Sample D050 and Associated Background Sample*

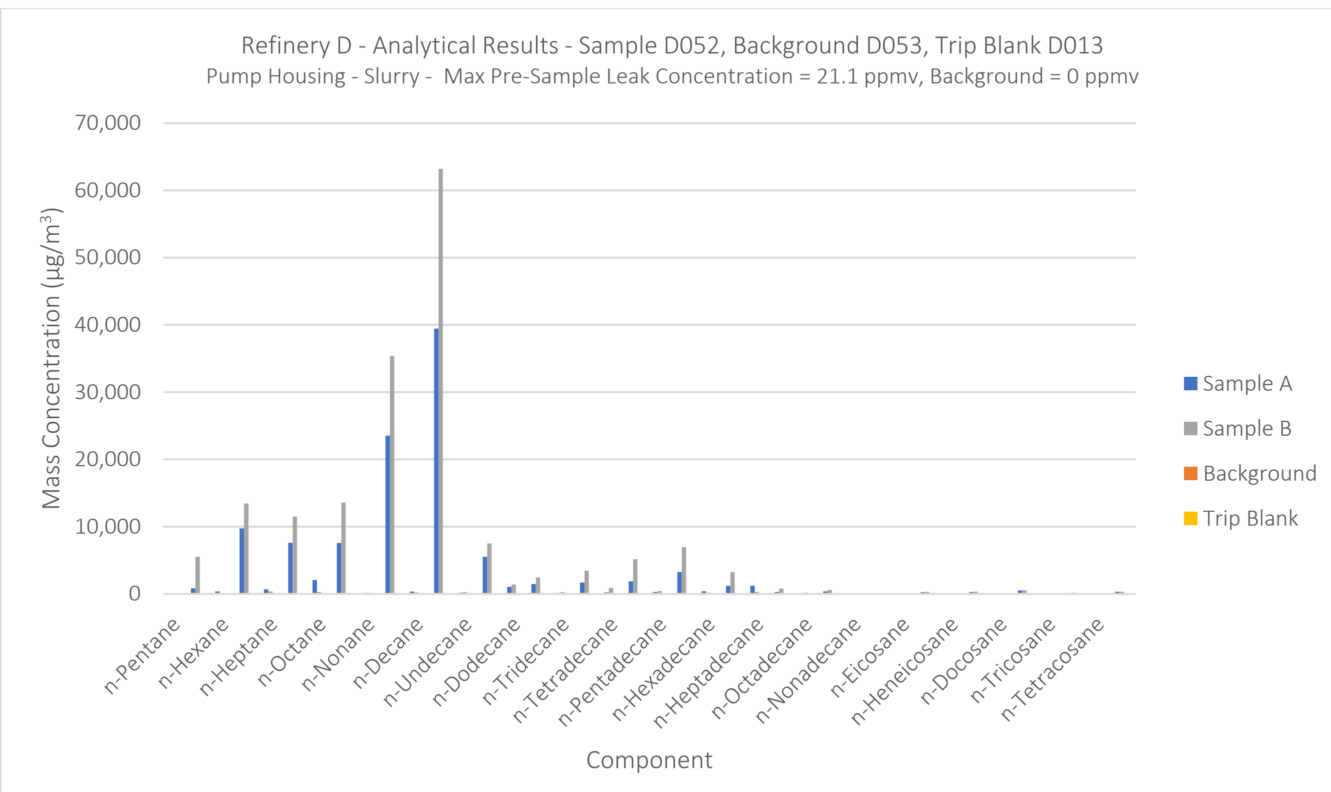


Figure B-3.118. *Plot of Analytical Results for Sample D052 and Associated Background Sample*

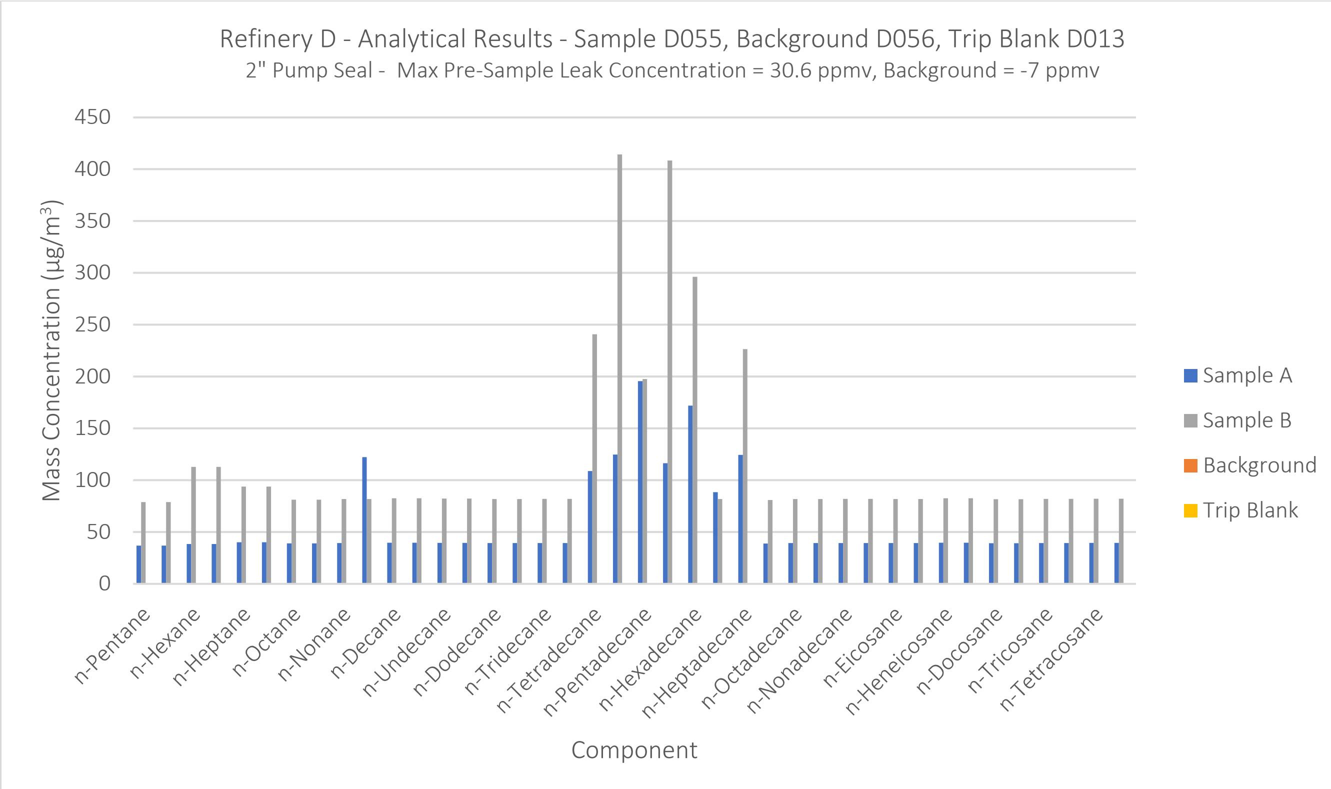


Figure B-3.119. *Plot of Analytical Results for Sample D055 and Associated Background Sample*

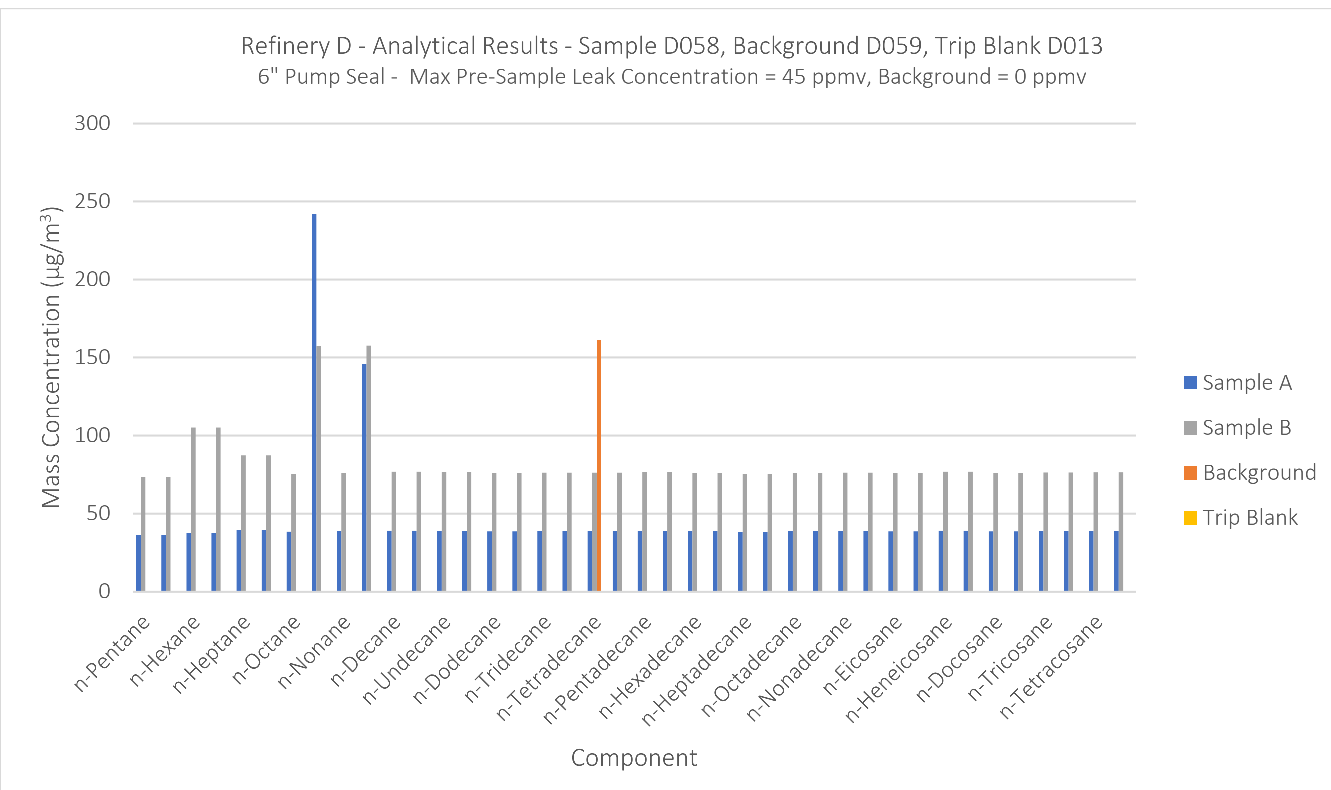


Figure B-3.120. *Plot of Analytical Results for Sample D058 and Associated Background Sample*

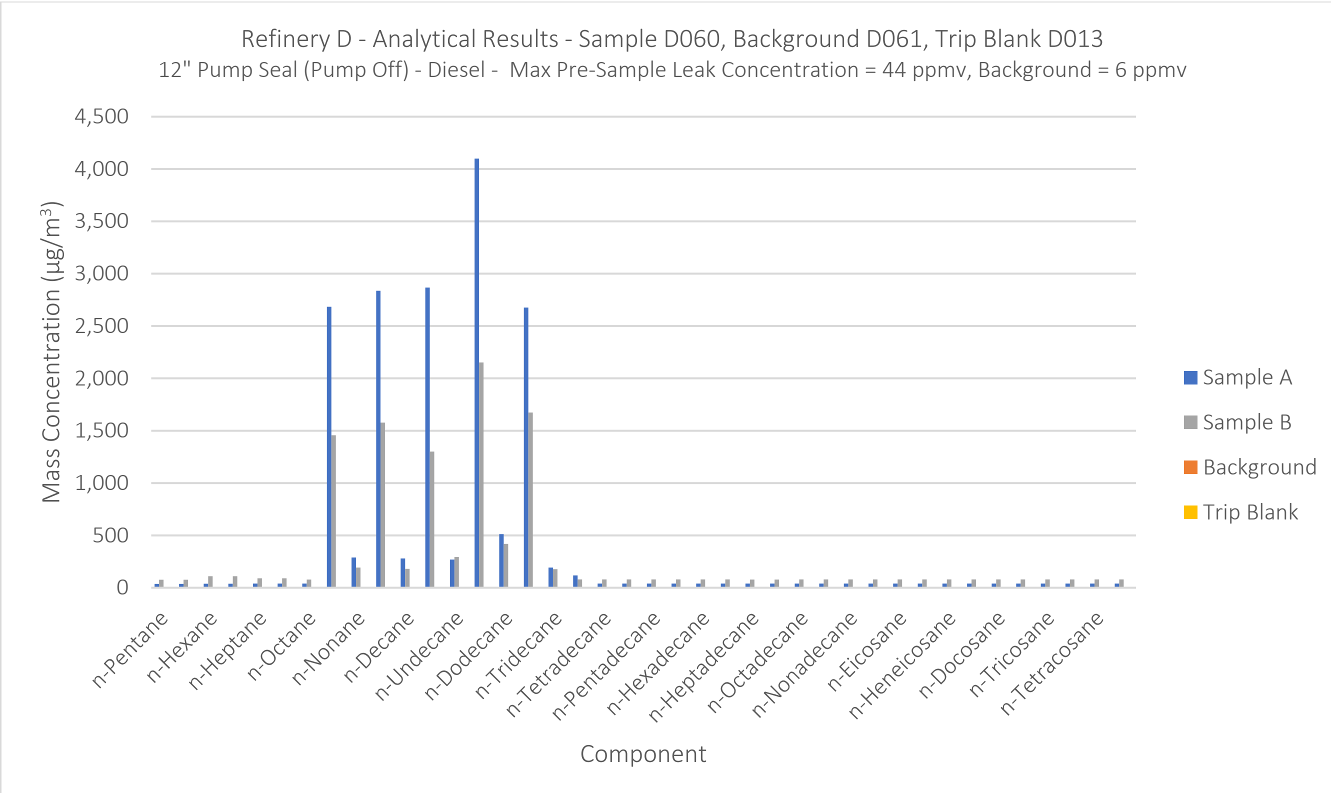


Figure B-3.121. Plot of Analytical Results for Sample D060 and Associated Background Sample

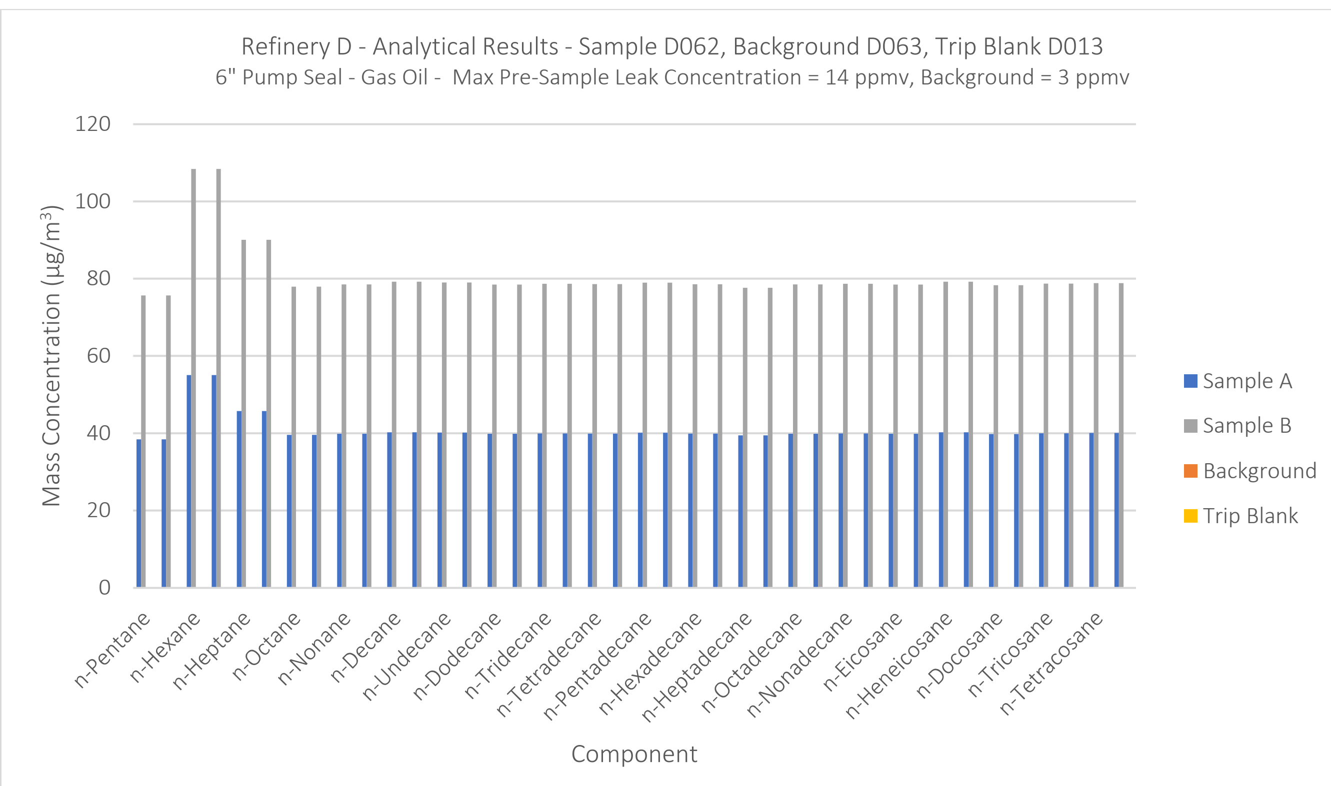


Figure B-3.122. Plot of Analytical Results for Sample D062 and Associated Background Sample

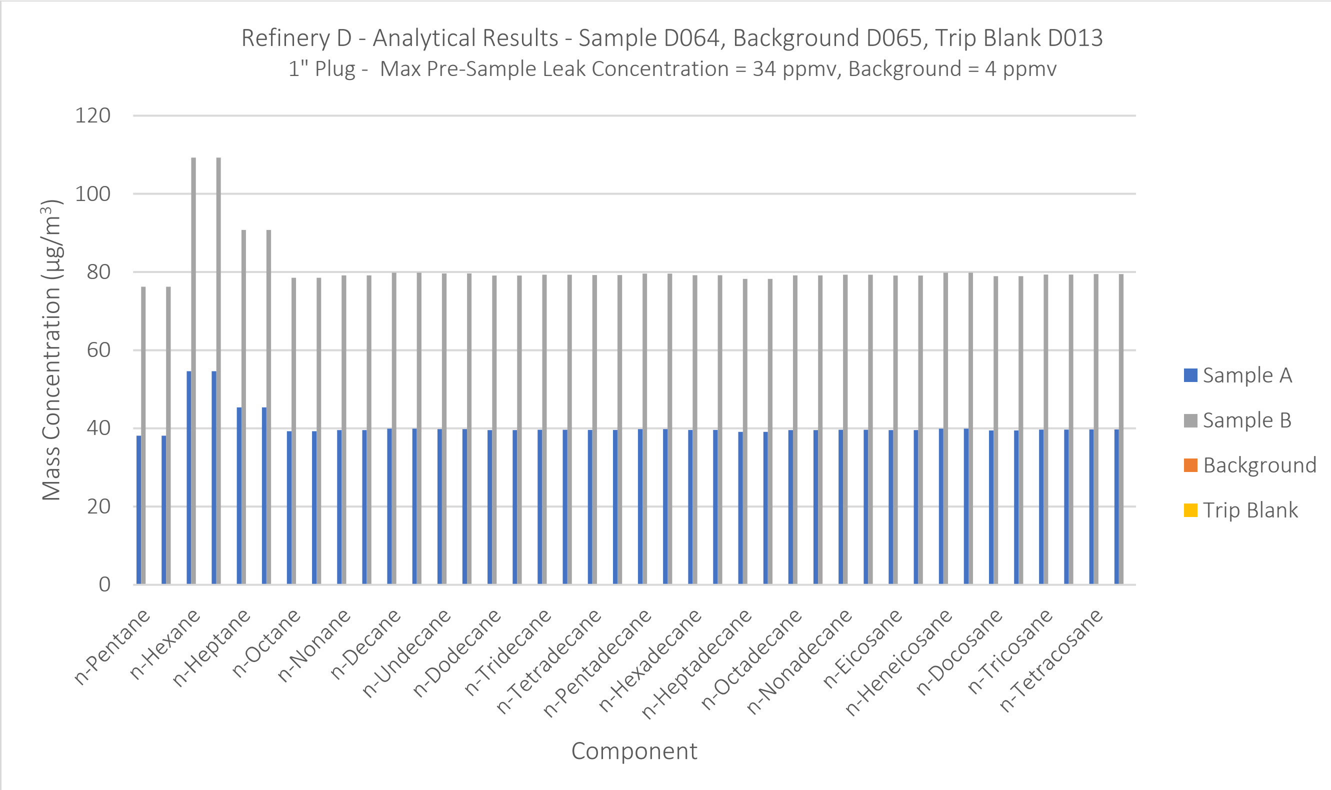


Figure B-3.123. Plot of Analytical Results for Sample D060 and Associated Background Sample

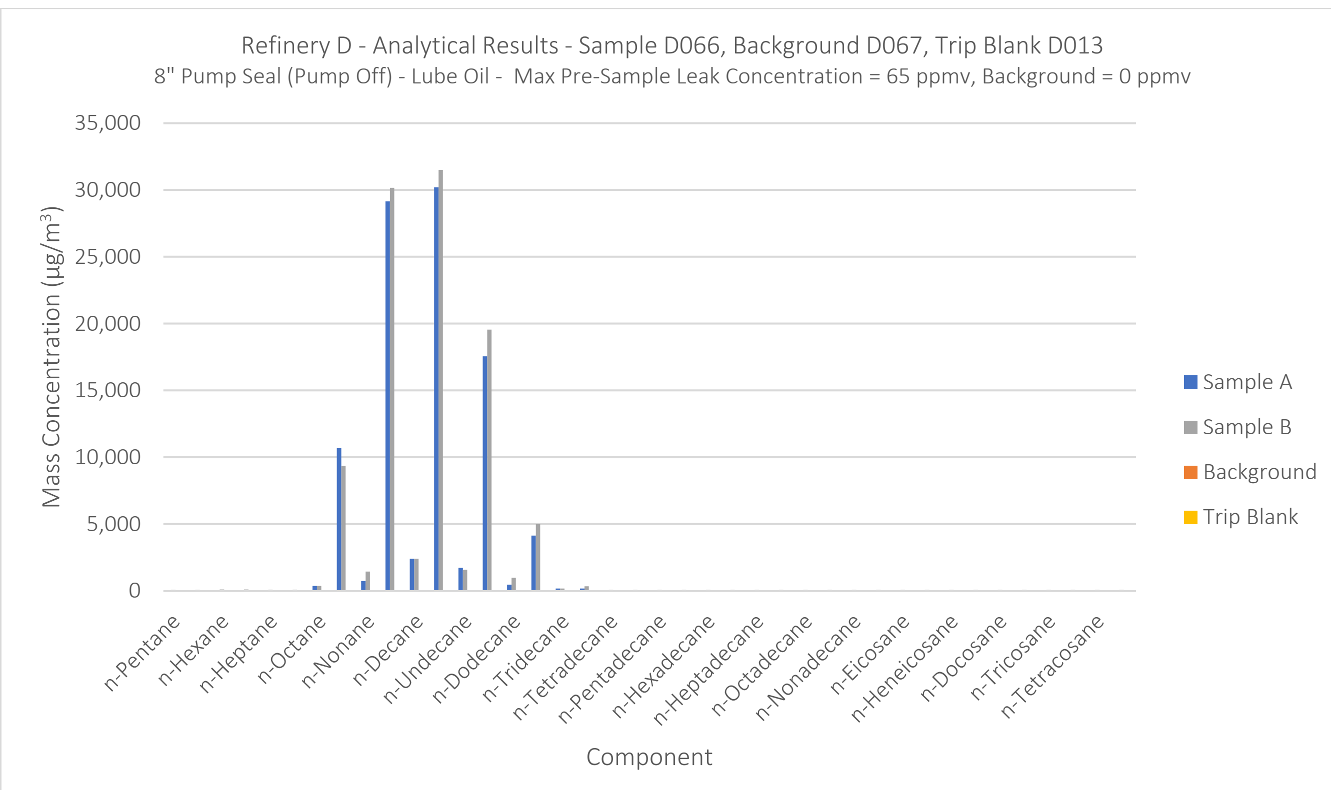


Figure B-3.124. Plot of Analytical Results for Sample D060 and Associated Background Sample

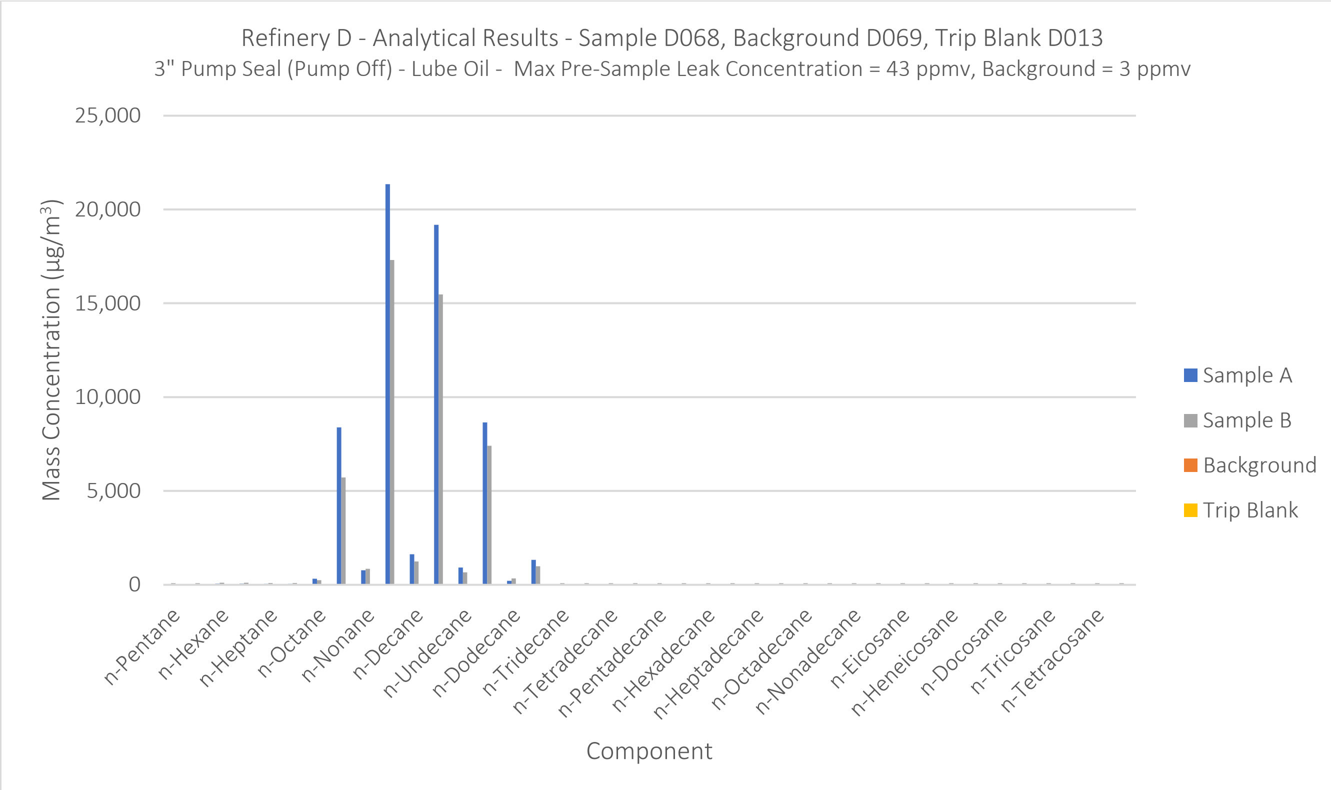


Figure B-3.125. Plot of Analytical Results for Sample D068 and Associated Background Sample

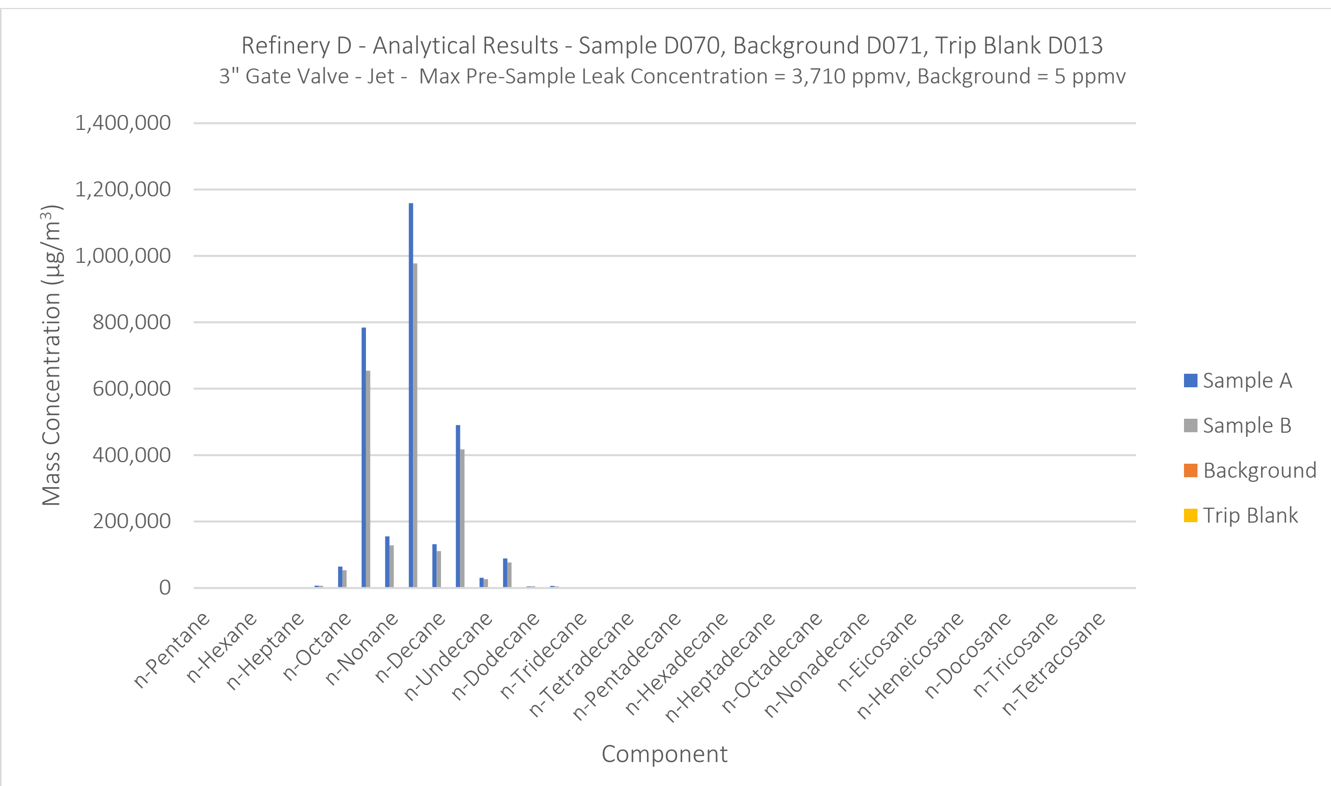


Figure B-3.126. Plot of Analytical Results for Sample D070 and Associated Background Sample

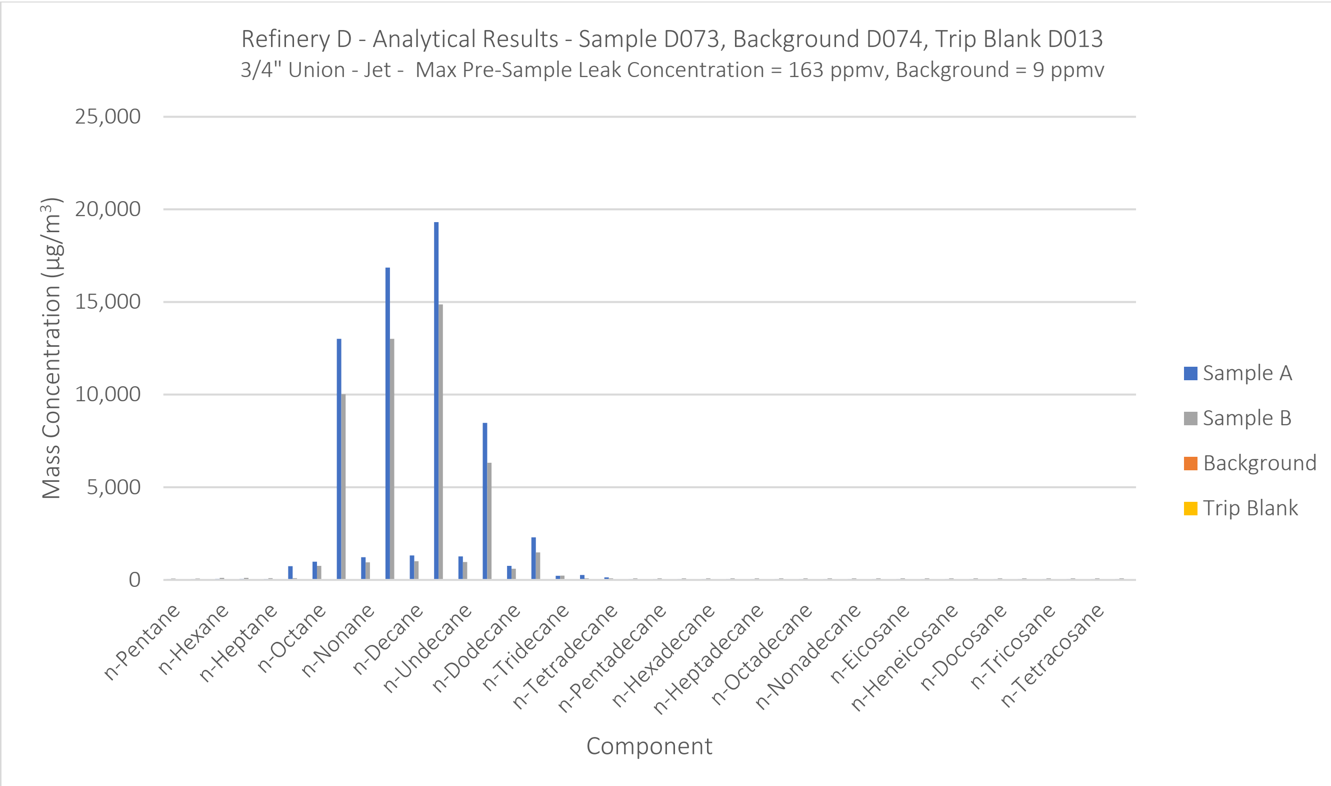


Figure B-3.127. Plot of Analytical Results for Sample D073 and Associated Background Sample

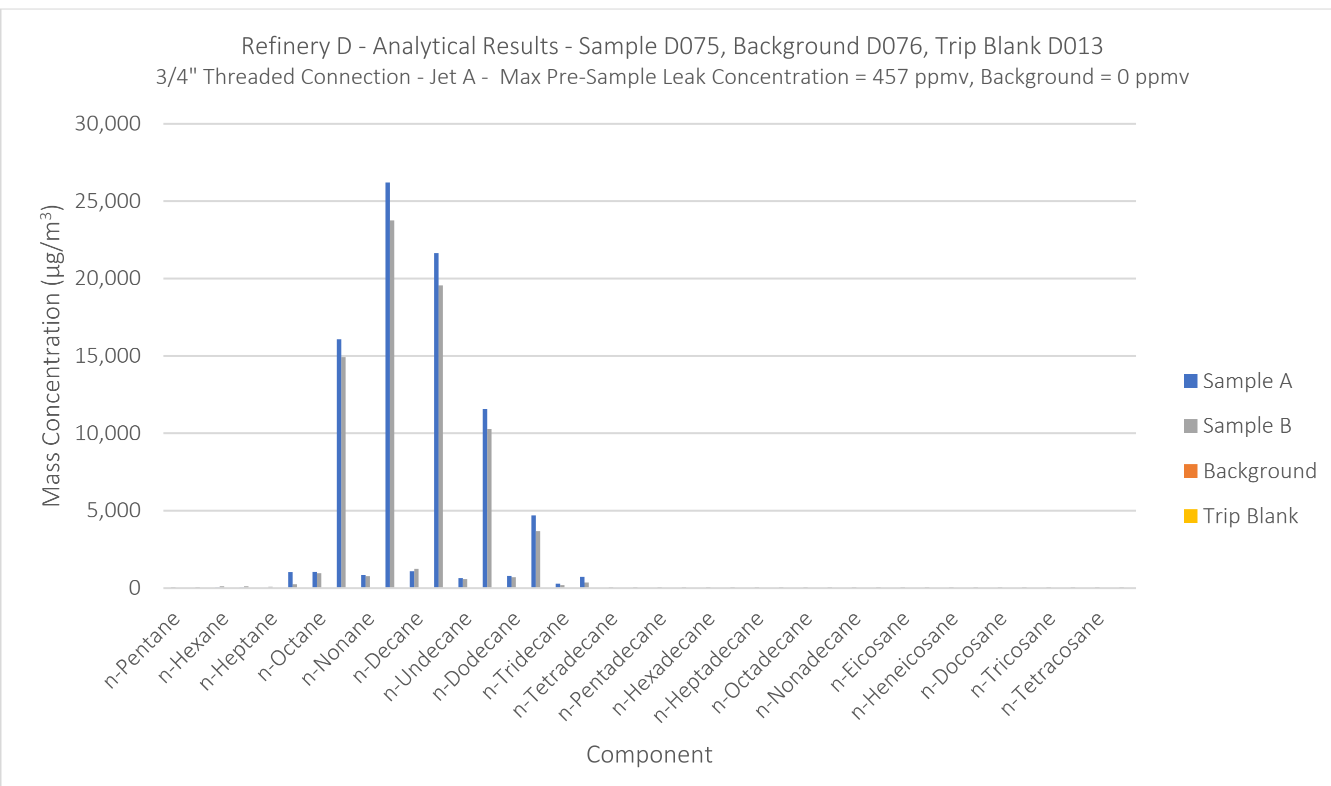


Figure B-3.128. Plot of Analytical Results for Sample D075 and Associated Background Sample

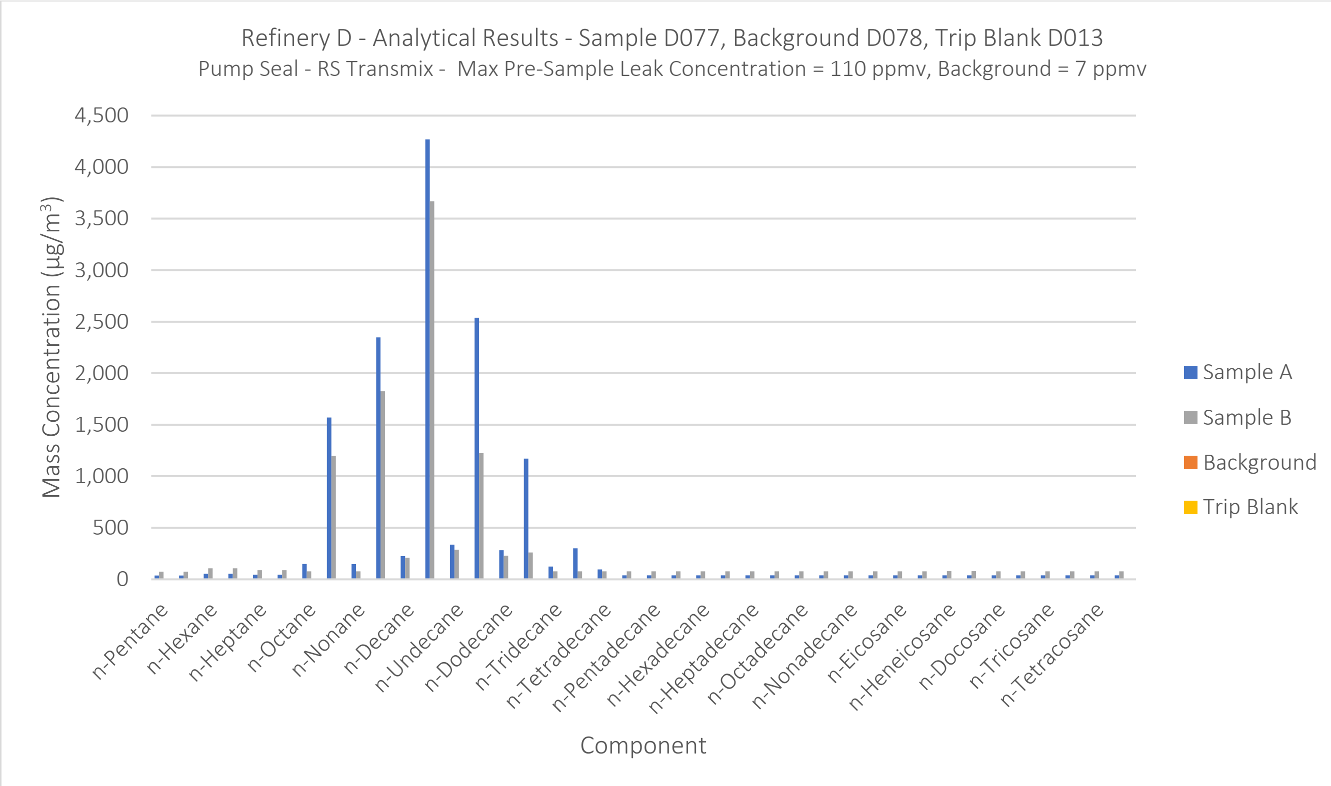


Figure B-3.129. Plot of Analytical Results for Sample D077 and Associated Background Sample

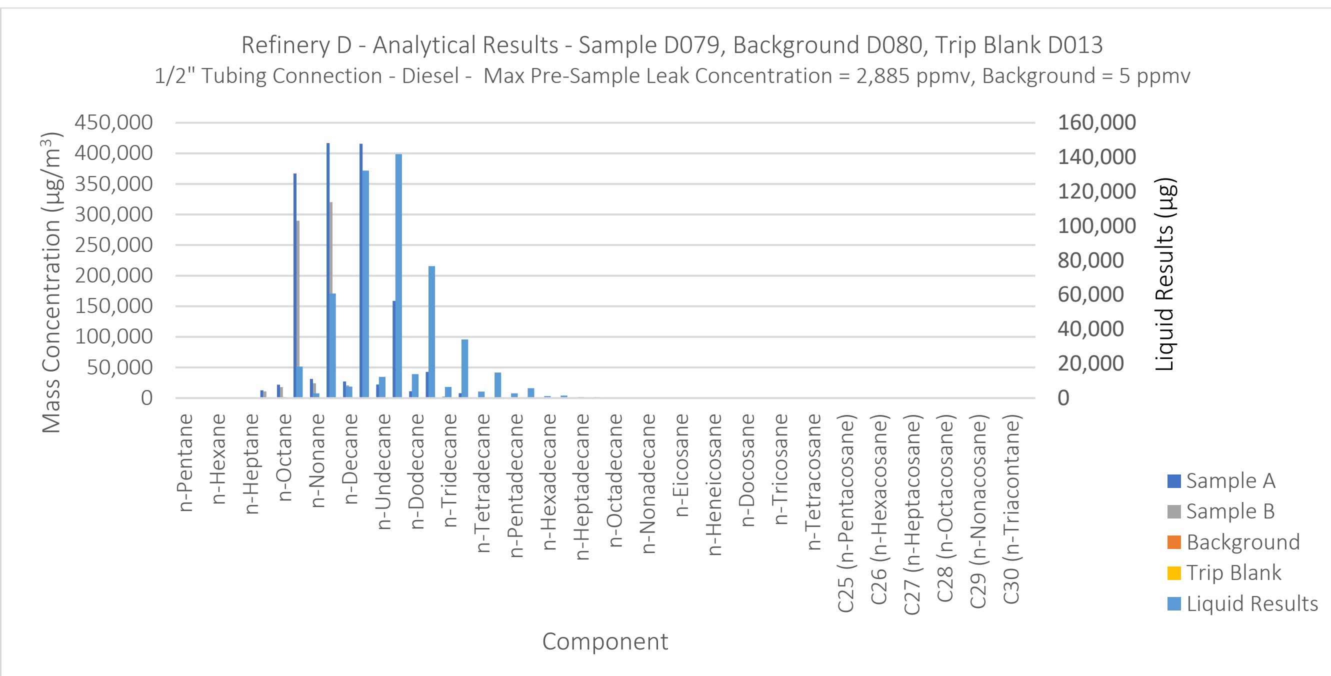


Figure B-3.130. Plot of Analytical Results for Sample D079 and Associated Background Sample

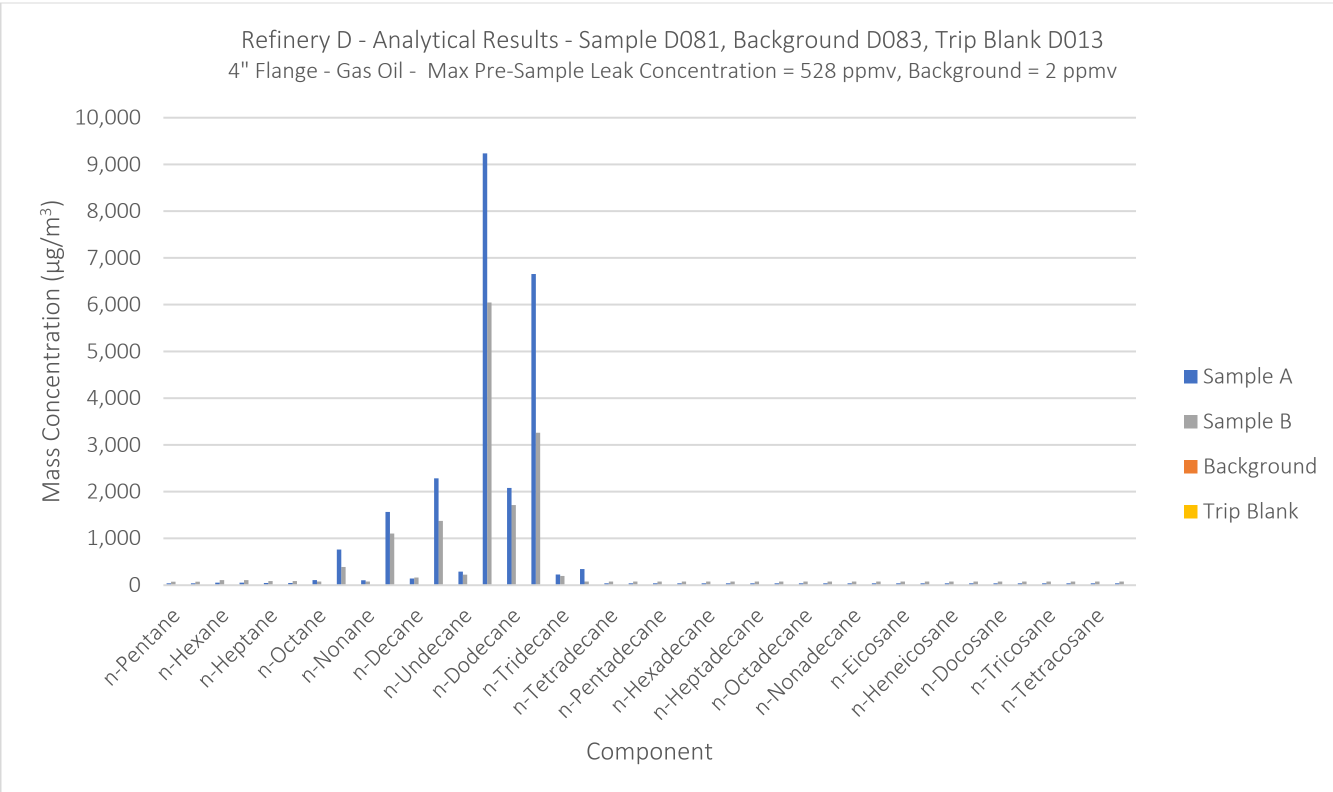


Figure B-3.131. Plot of Analytical Results for Sample D081 and Associated Background Sample

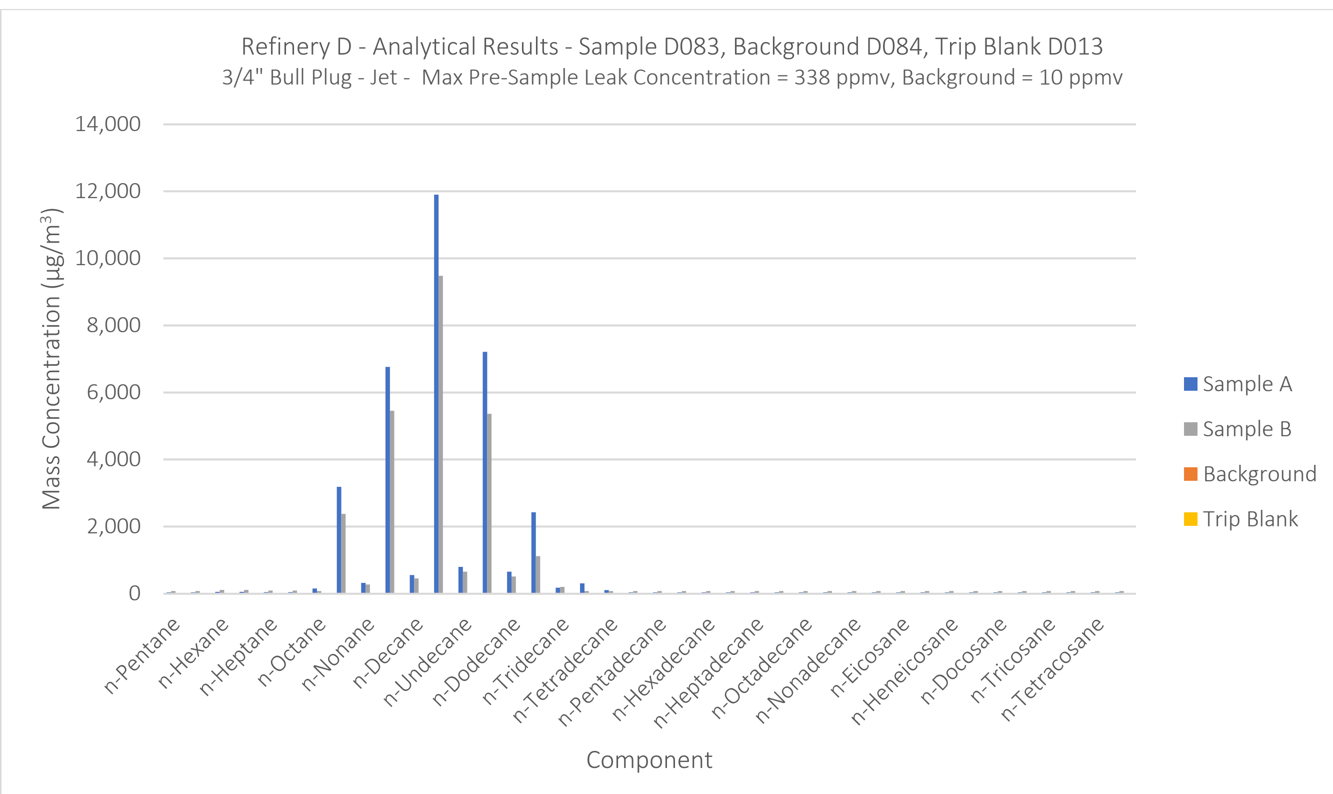


Figure B-3.132. Plot of Analytical Results for Sample D083 and Associated Background Sample

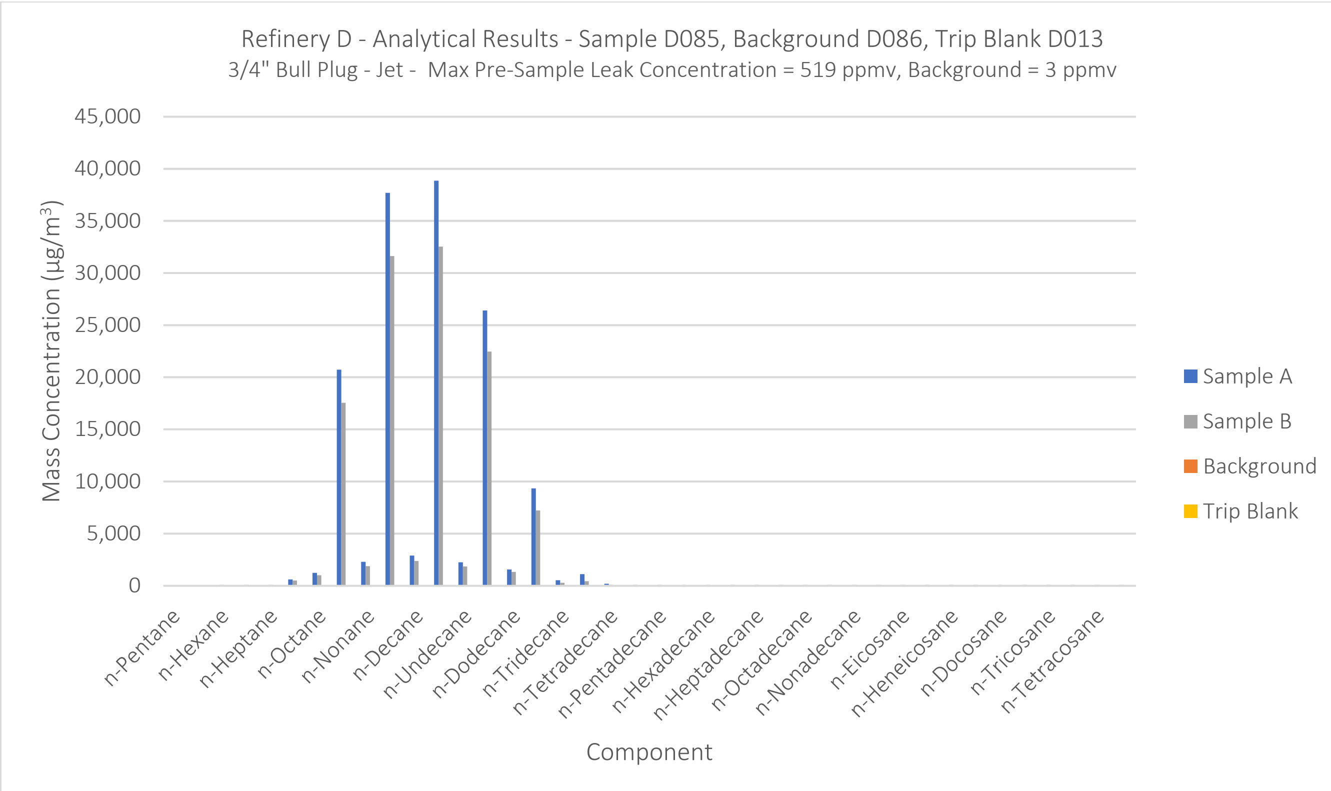


Figure B-3.133. *Plot of Analytical Results for Sample D085 and Associated Background Sample*

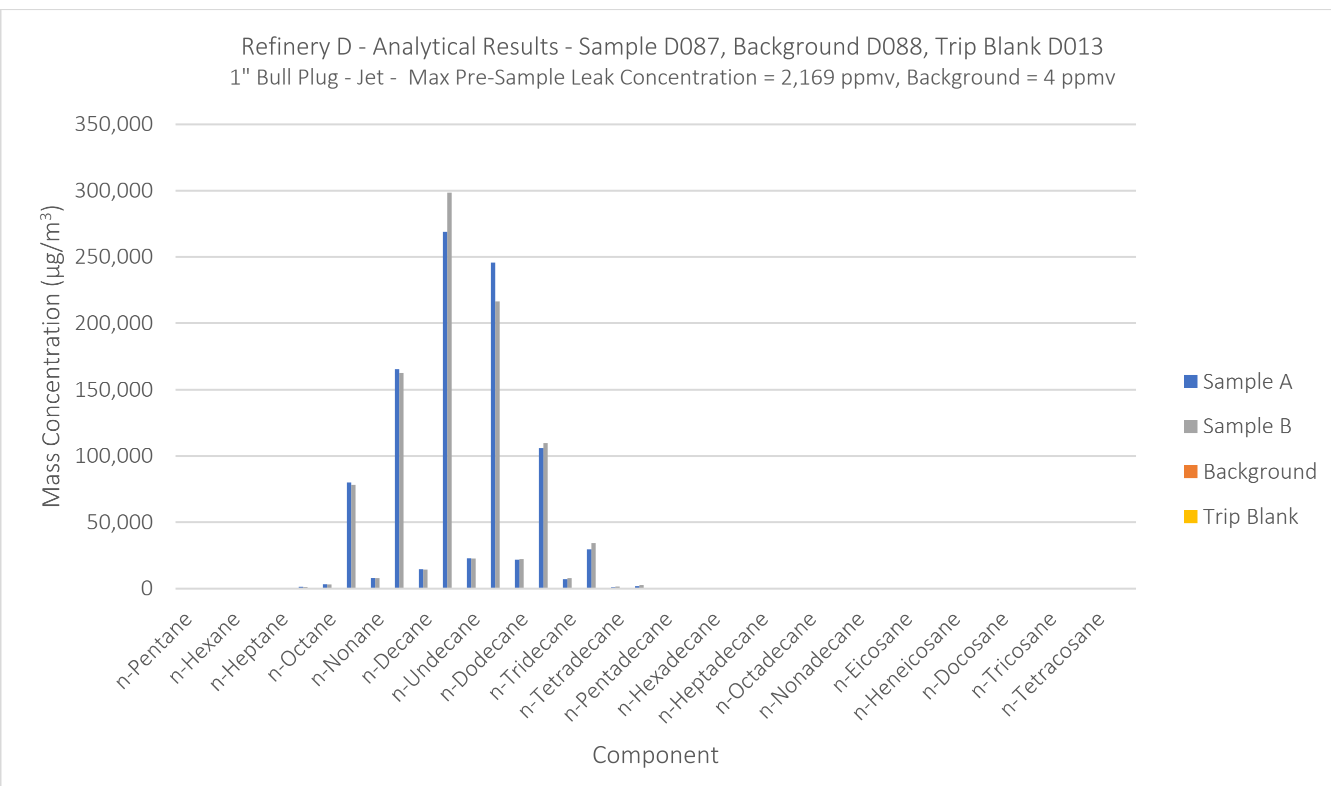


Figure B-3.134. *Plot of Analytical Results for Sample D087 and Associated Background Sample*

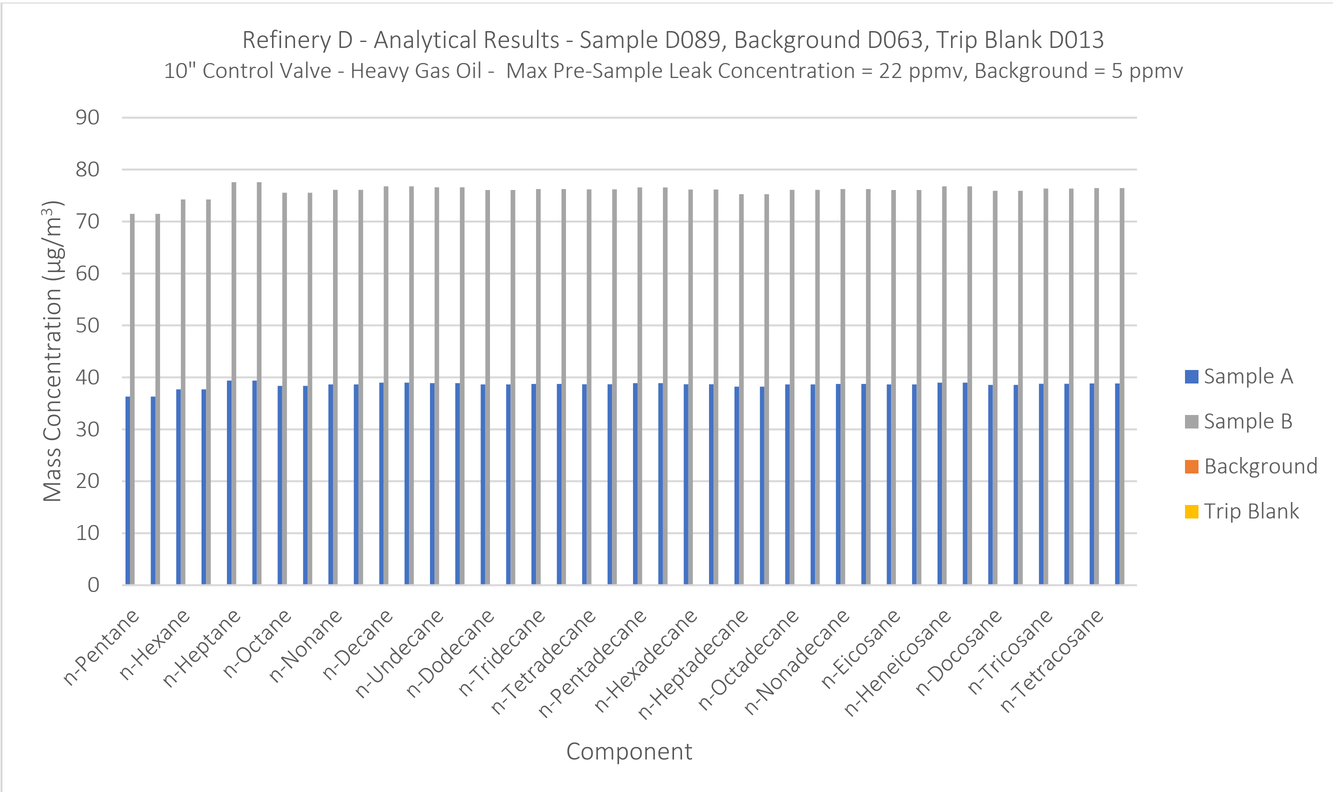


Figure B-3.135. Plot of Analytical Results for Sample D089 and Associated Background Sample

Refinery E Sample Results

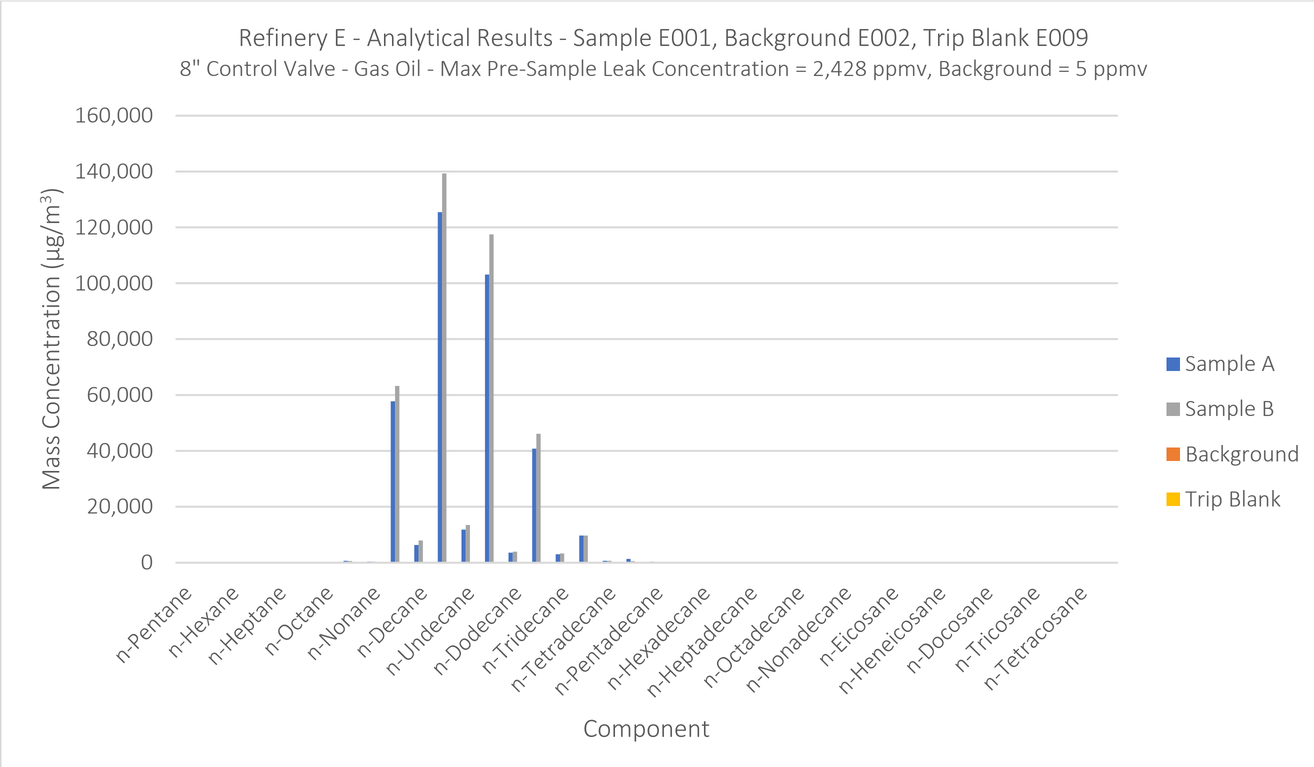


Figure B-3.136. Plot of Analytical Results for Sample E001 and Associated Background Sample

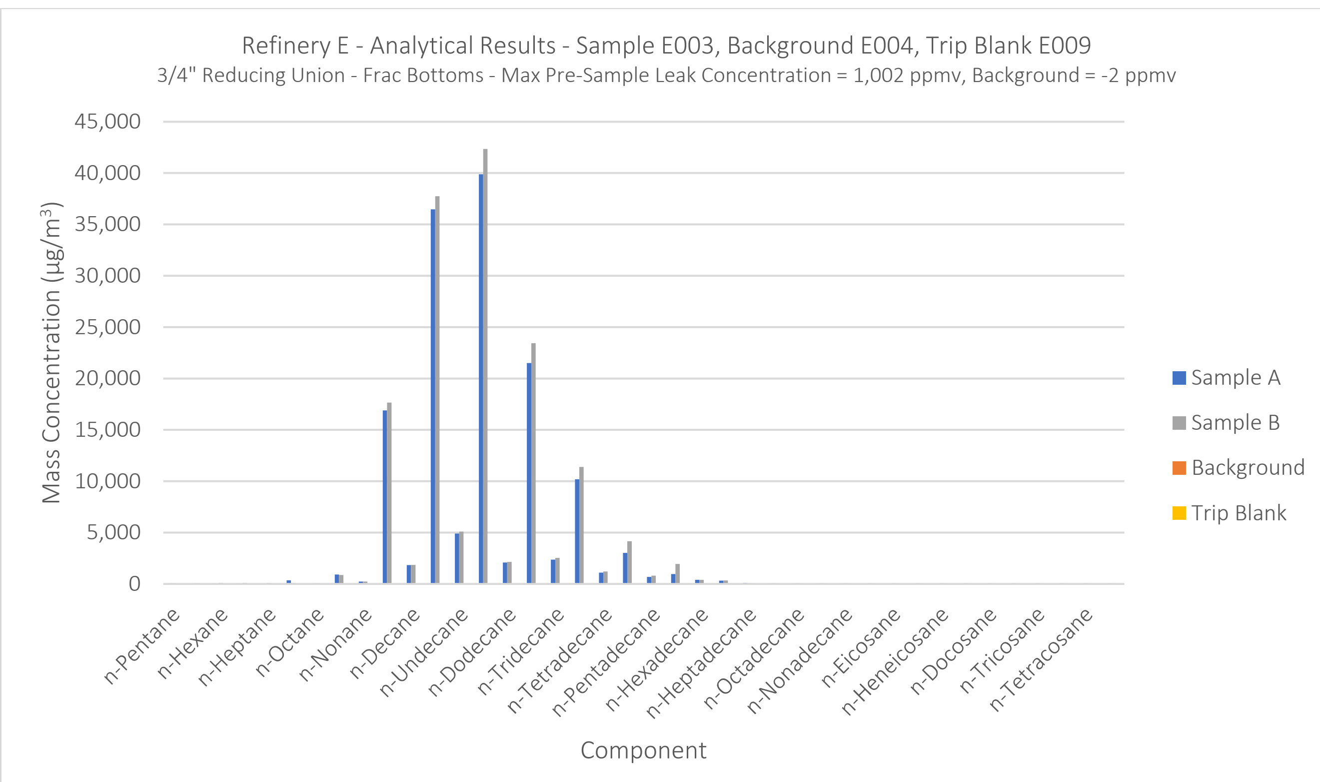


Figure B-3.137. Plot of Analytical Results for Sample E003 and Associated Background Sample

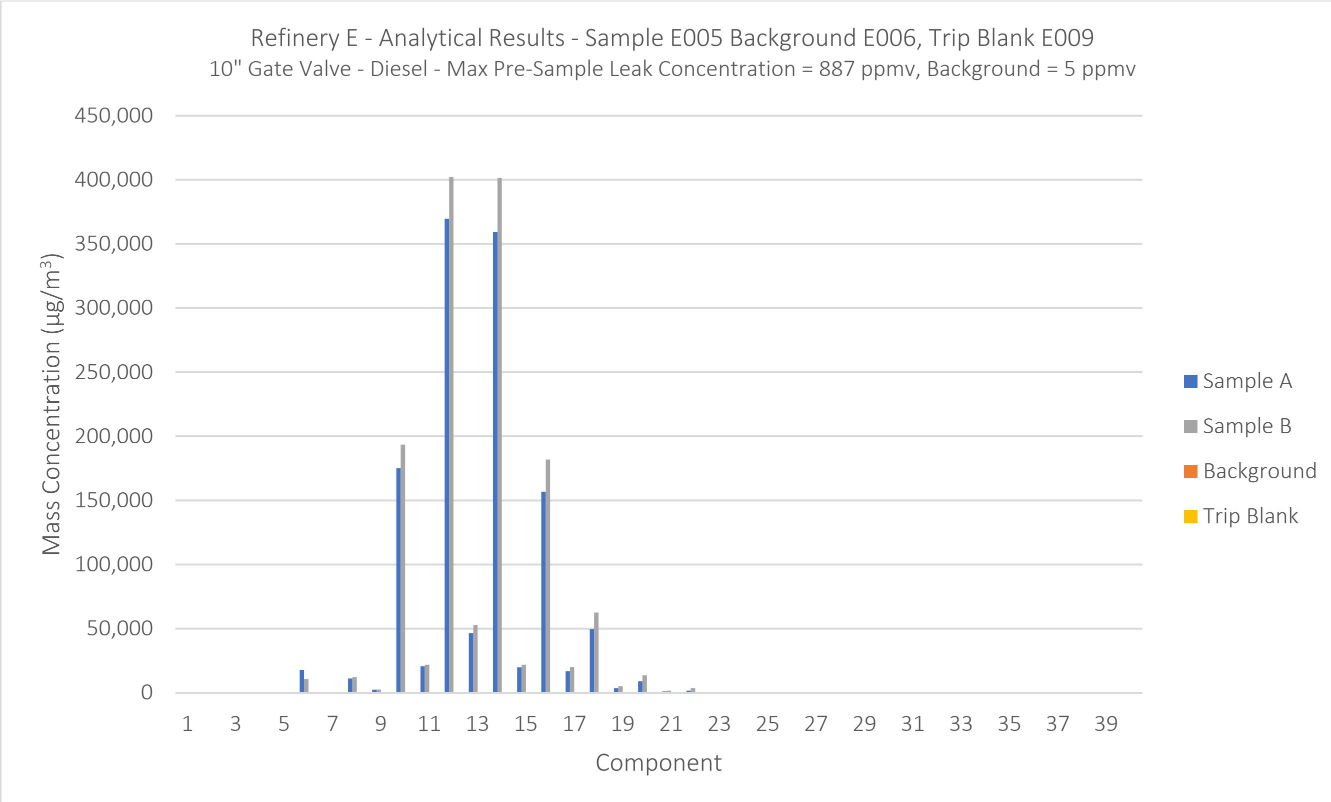


Figure B-3.138. Plot of Analytical Results for Sample E005 and Associated Background Sample

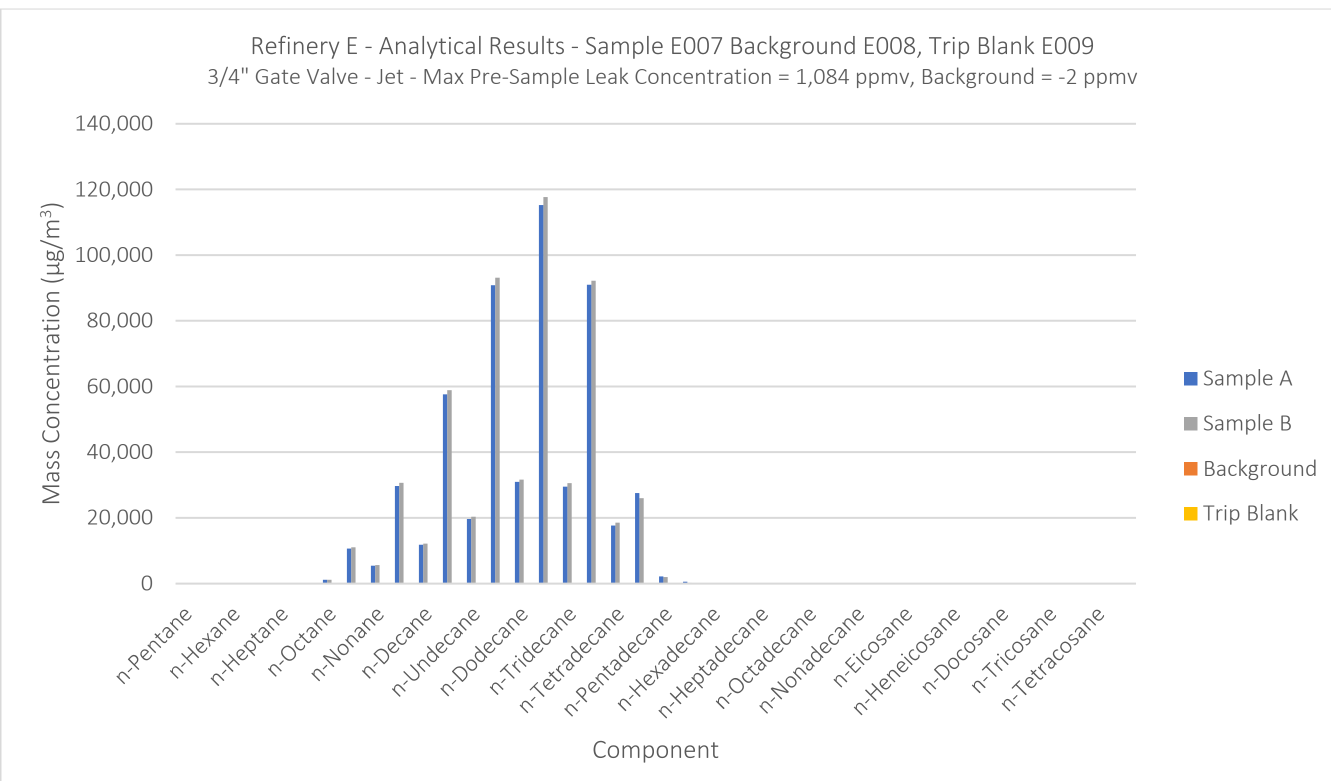


Figure B-3.139. Plot of Analytical Results for Sample E007 and Associated Background Sample

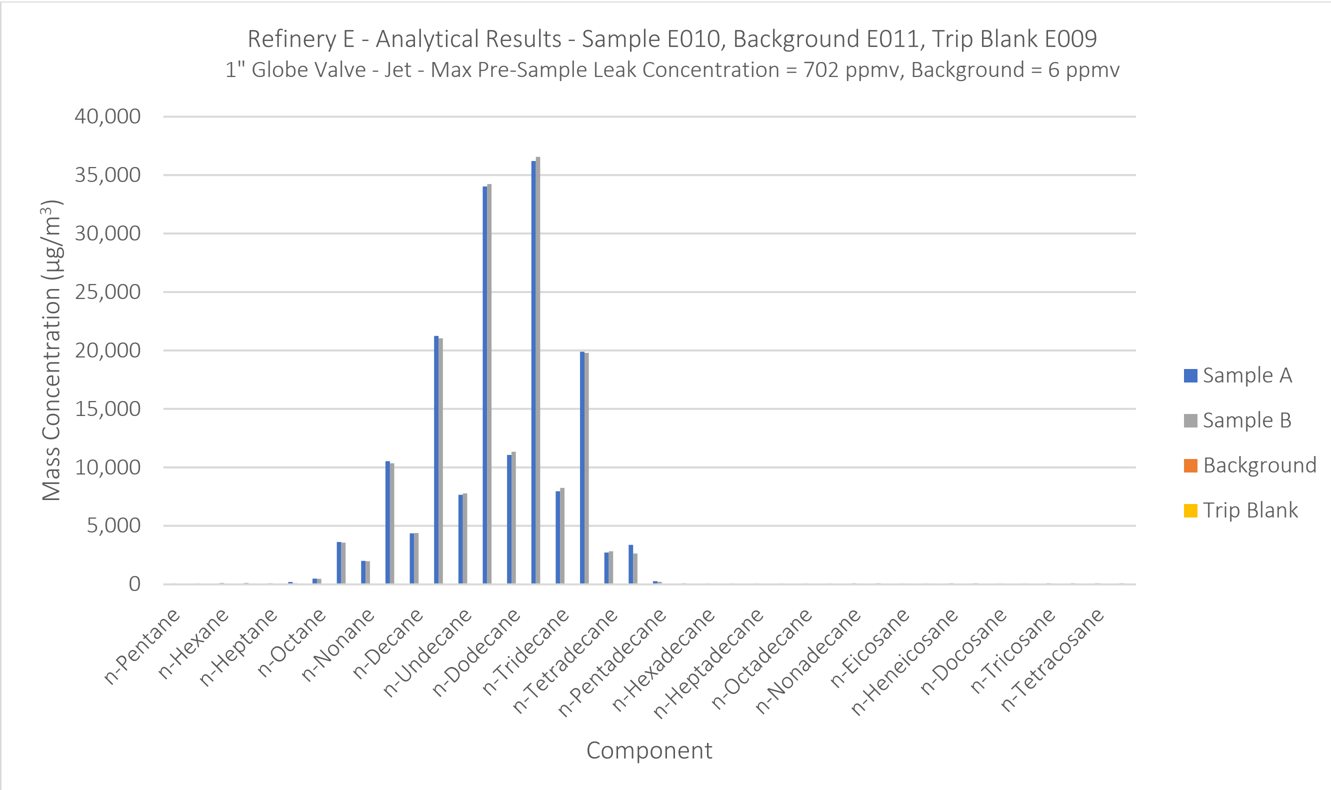


Figure B-3.140. Plot of Analytical Results for Sample E010 and Associated Background Sample

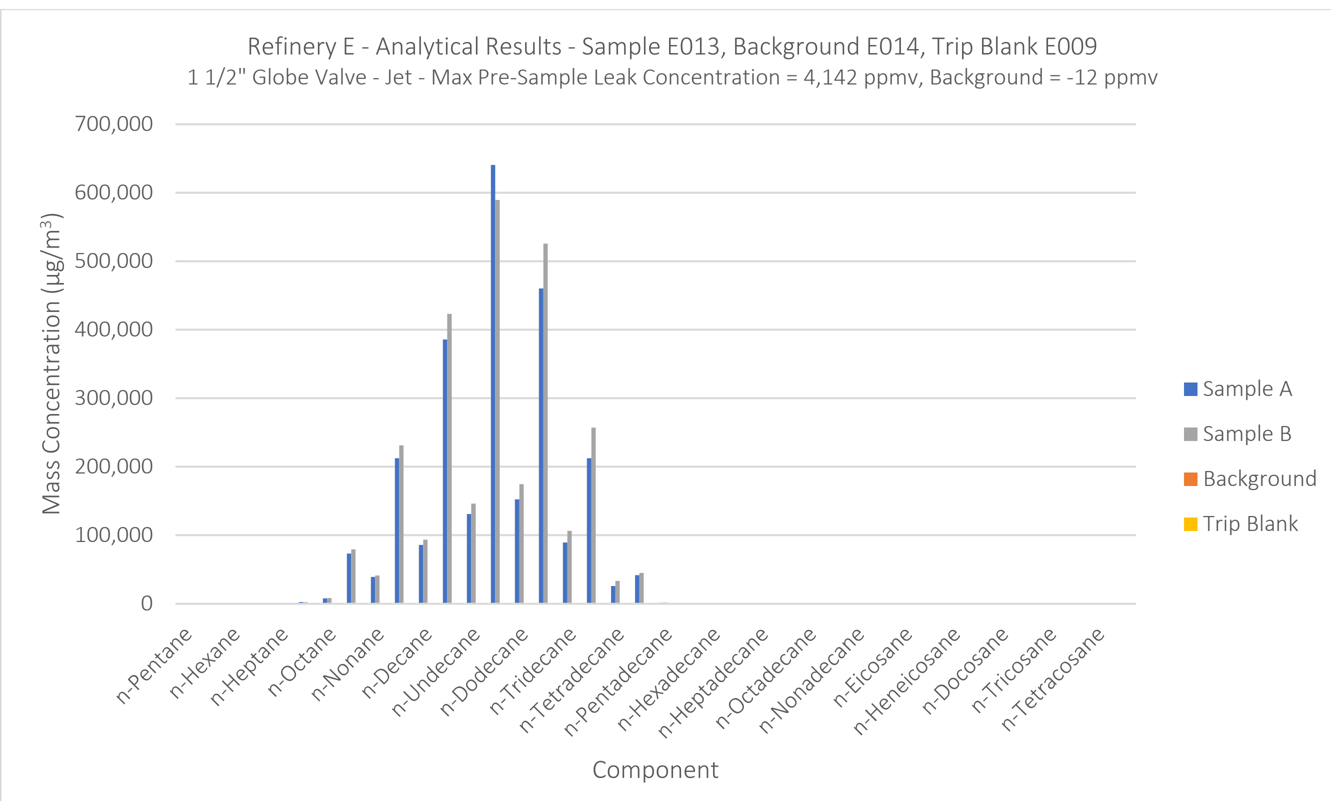


Figure B-3.141. Plot of Analytical Results for Sample E013 and Associated Background Sample

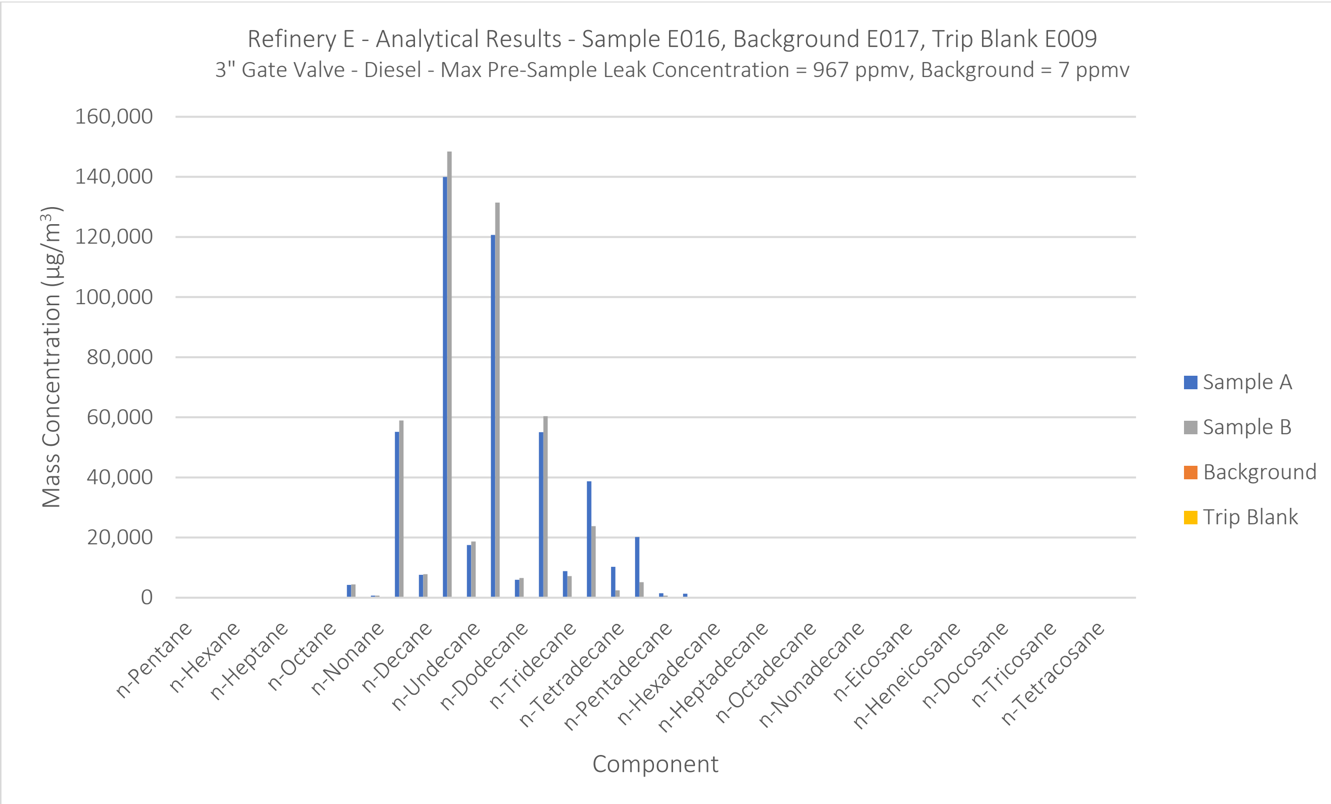


Figure B-3.142. Plot of Analytical Results for Sample E016 and Associated Background Sample

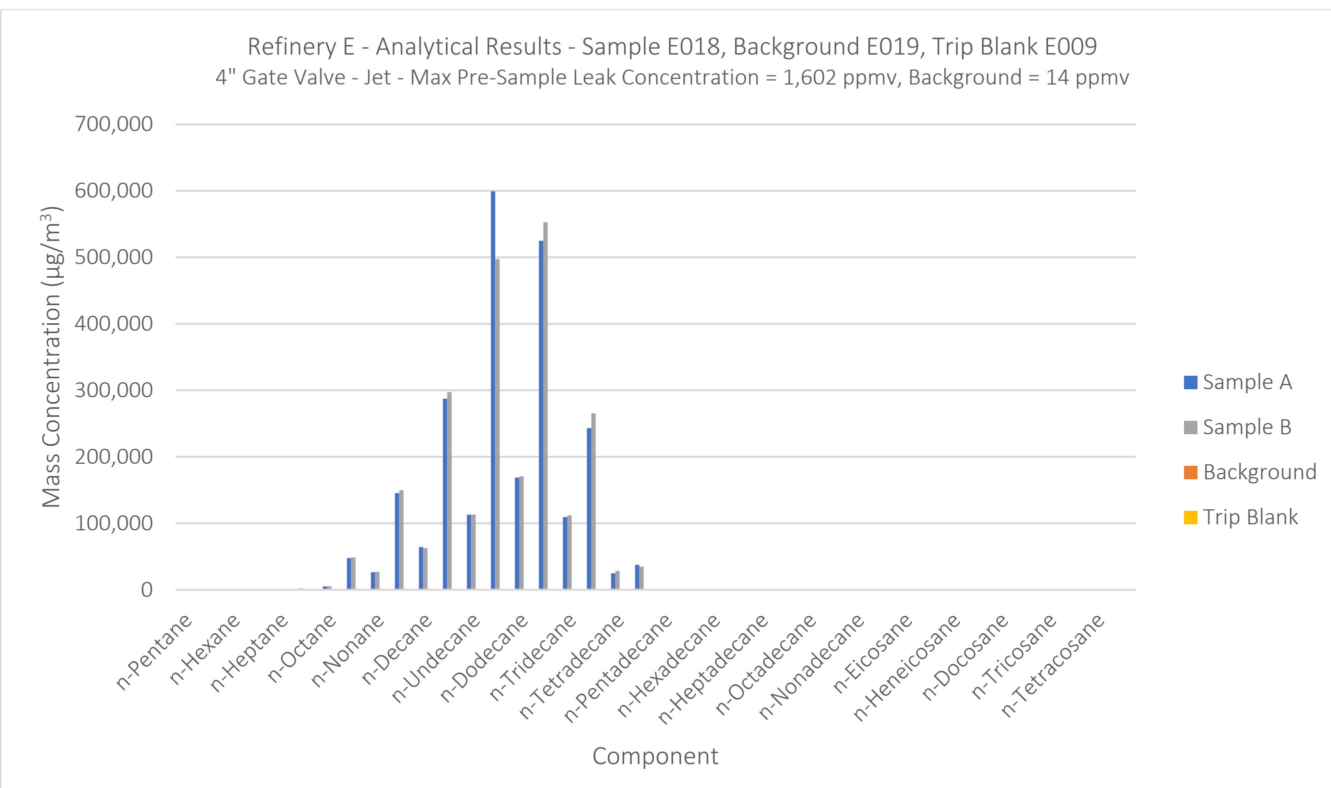


Figure B-3.143. Plot of Analytical Results for Sample E018 and Associated Background Sample

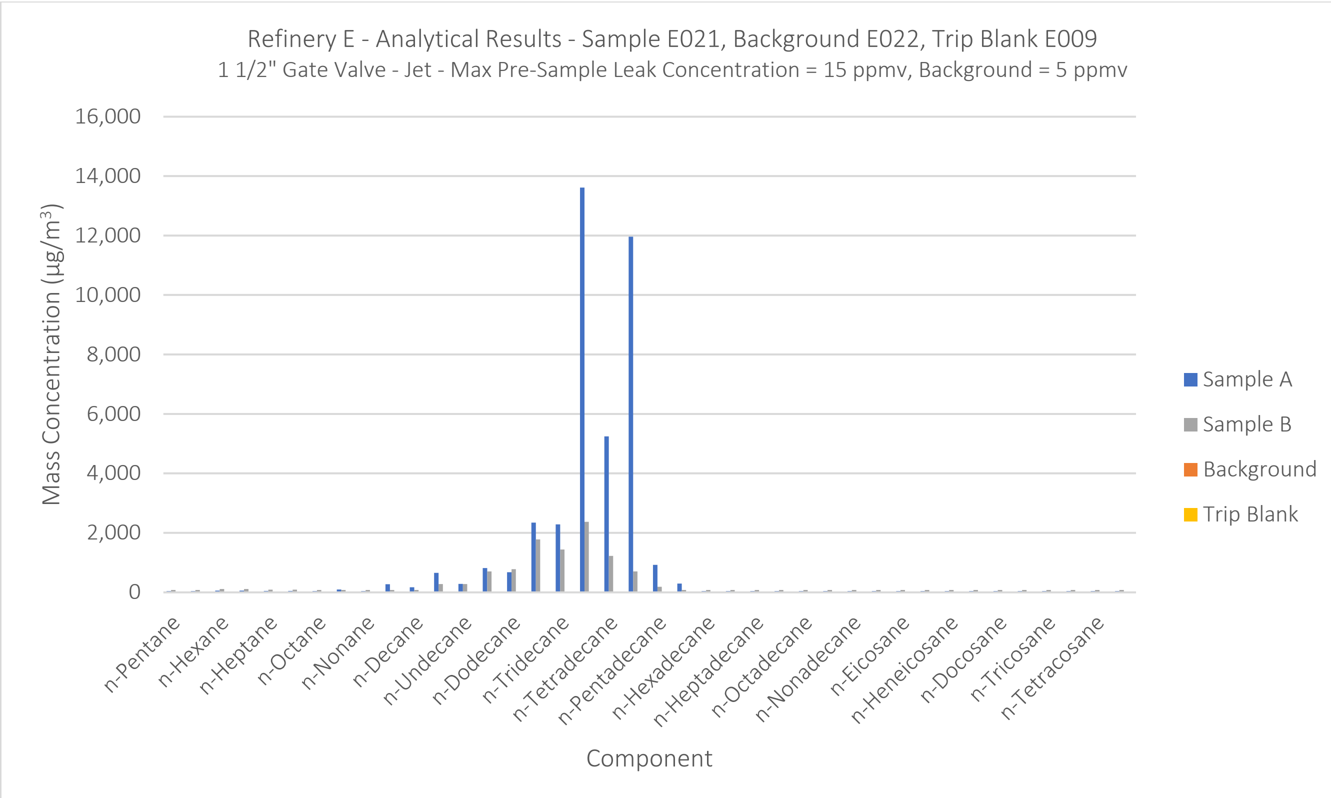


Figure B-3.144. Plot of Analytical Results for Sample E021 and Associated Background Sample

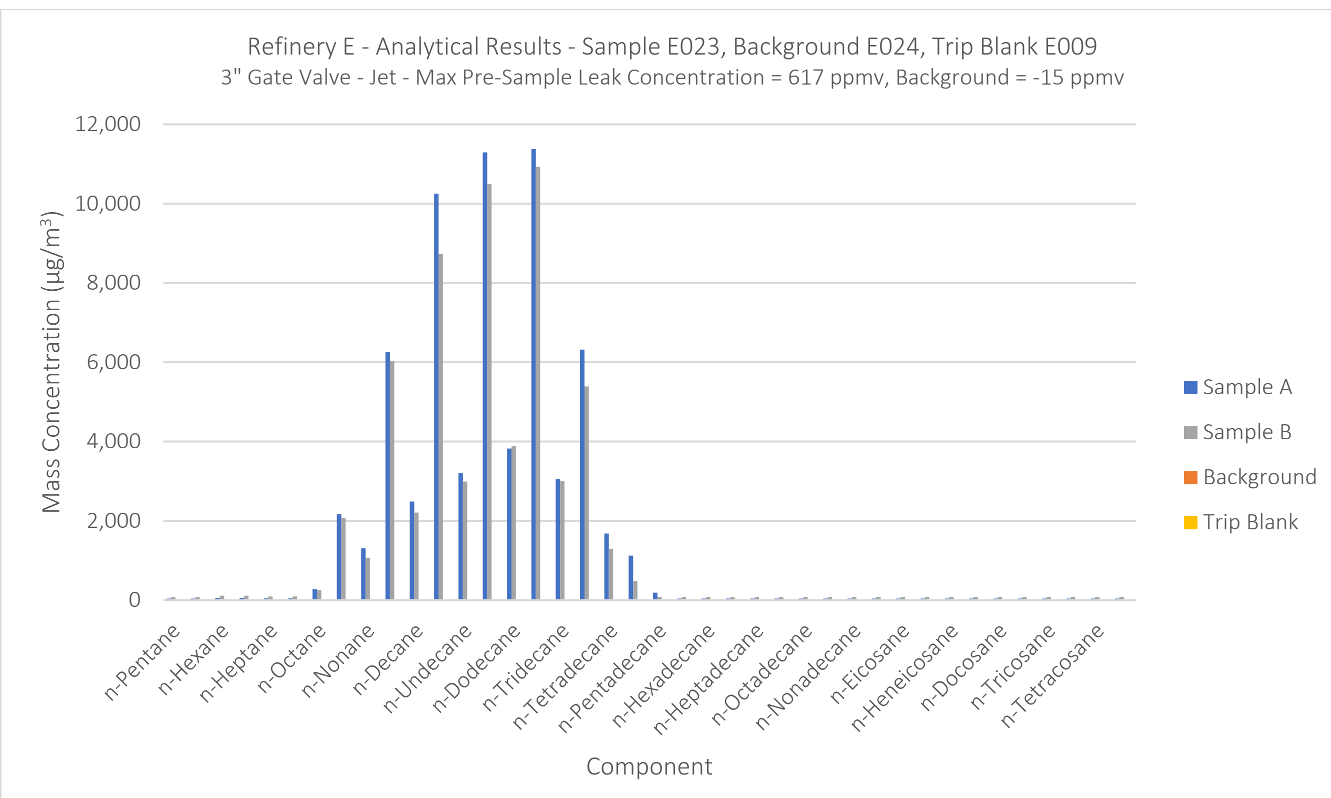


Figure B-3.145. Plot of Analytical Results for Sample E023 and Associated Background Sample

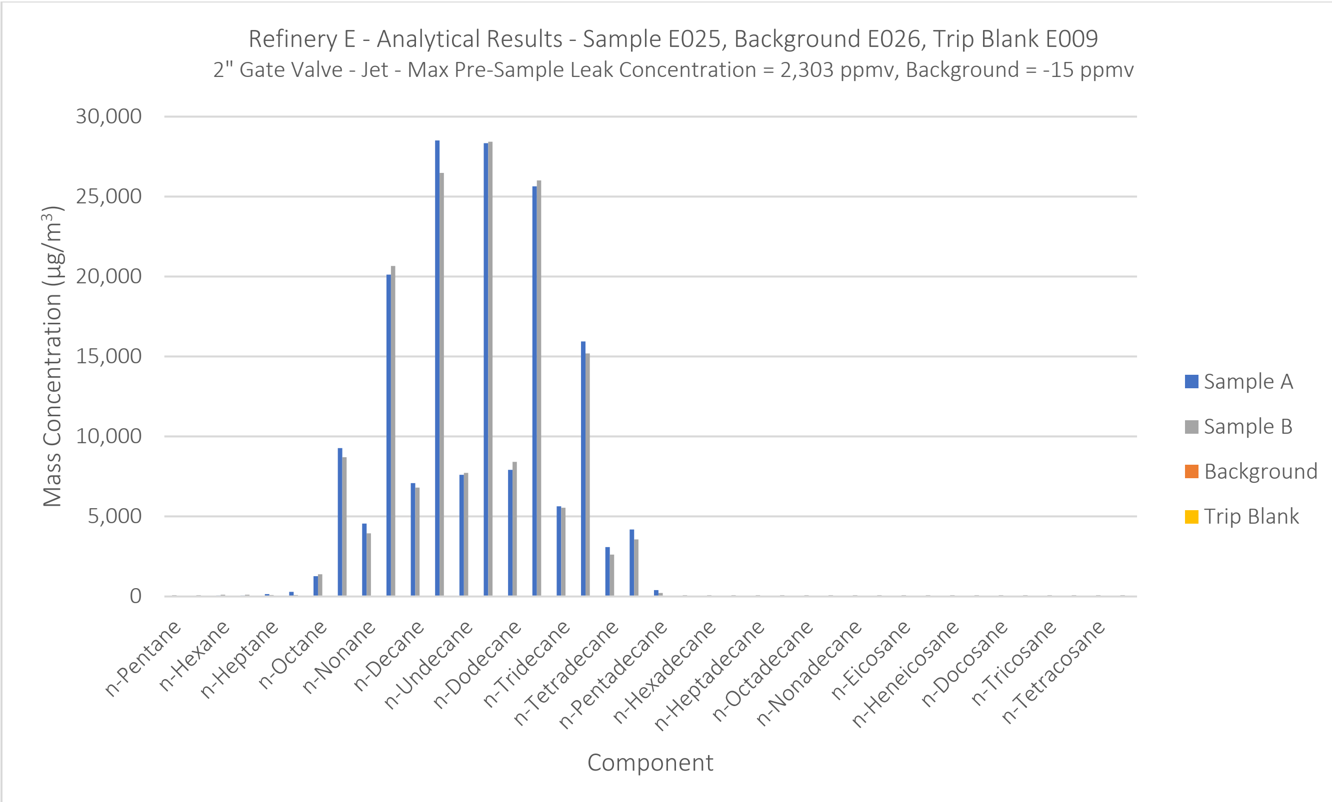


Figure B-3.146. Plot of Analytical Results for Sample E025 and Associated Background Sample

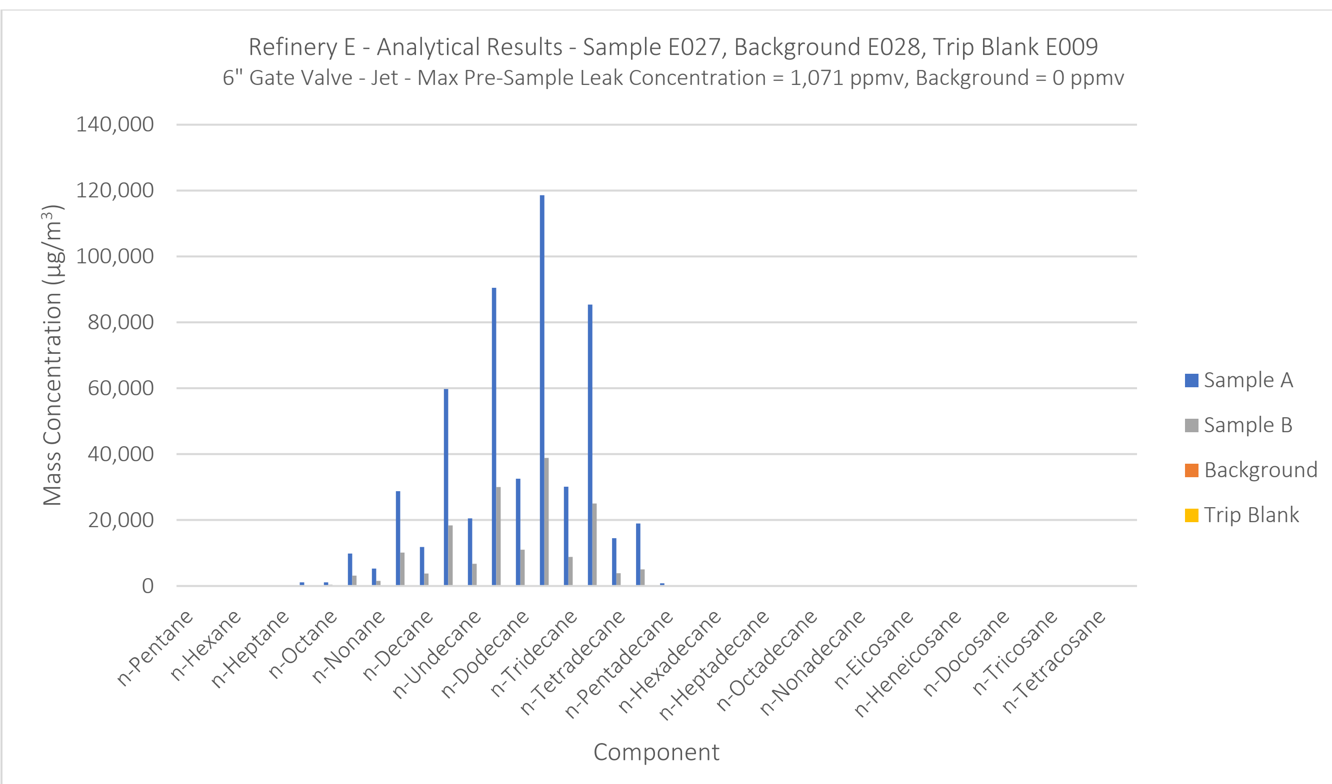


Figure B-3.147. Plot of Analytical Results for Sample E027 and Associated Background Sample

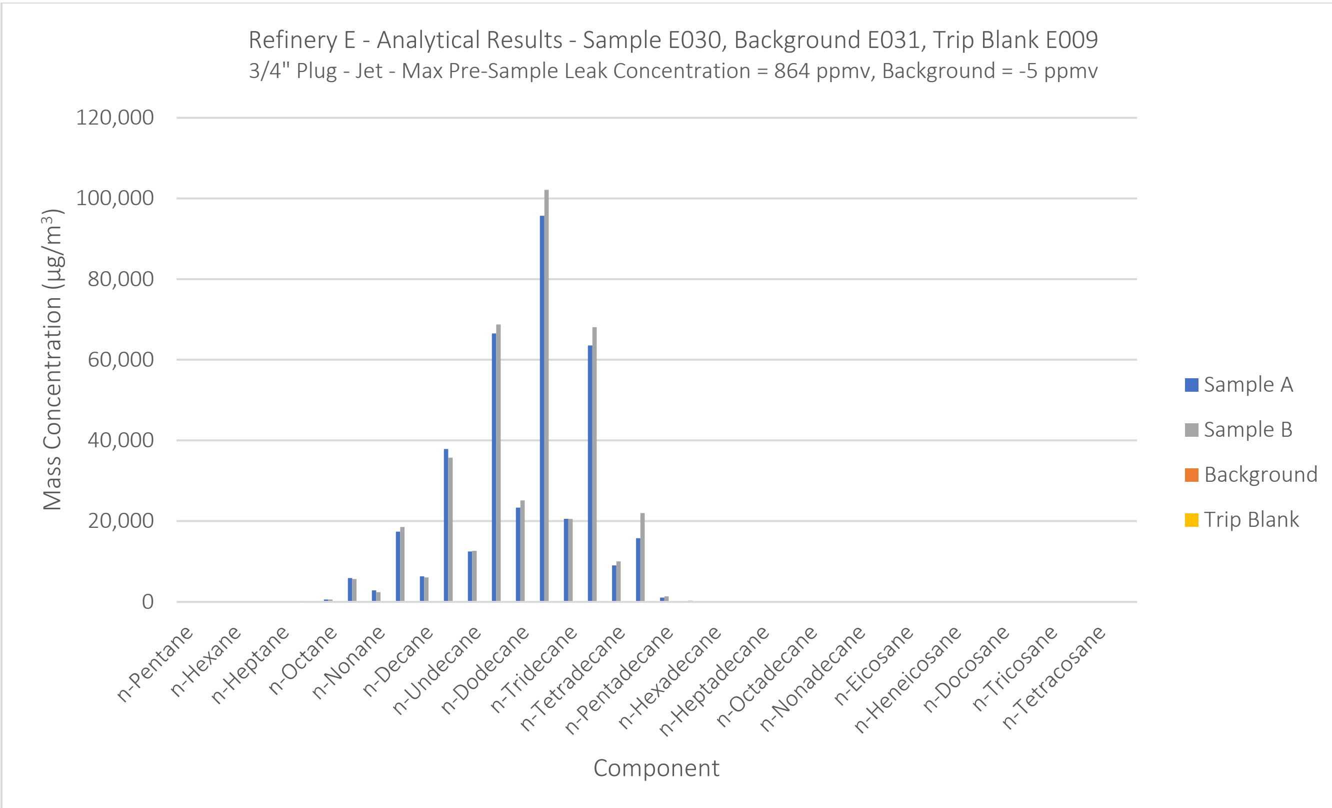


Figure B-3.148. Plot of Analytical Results for Sample E030 and Associated Background Sample

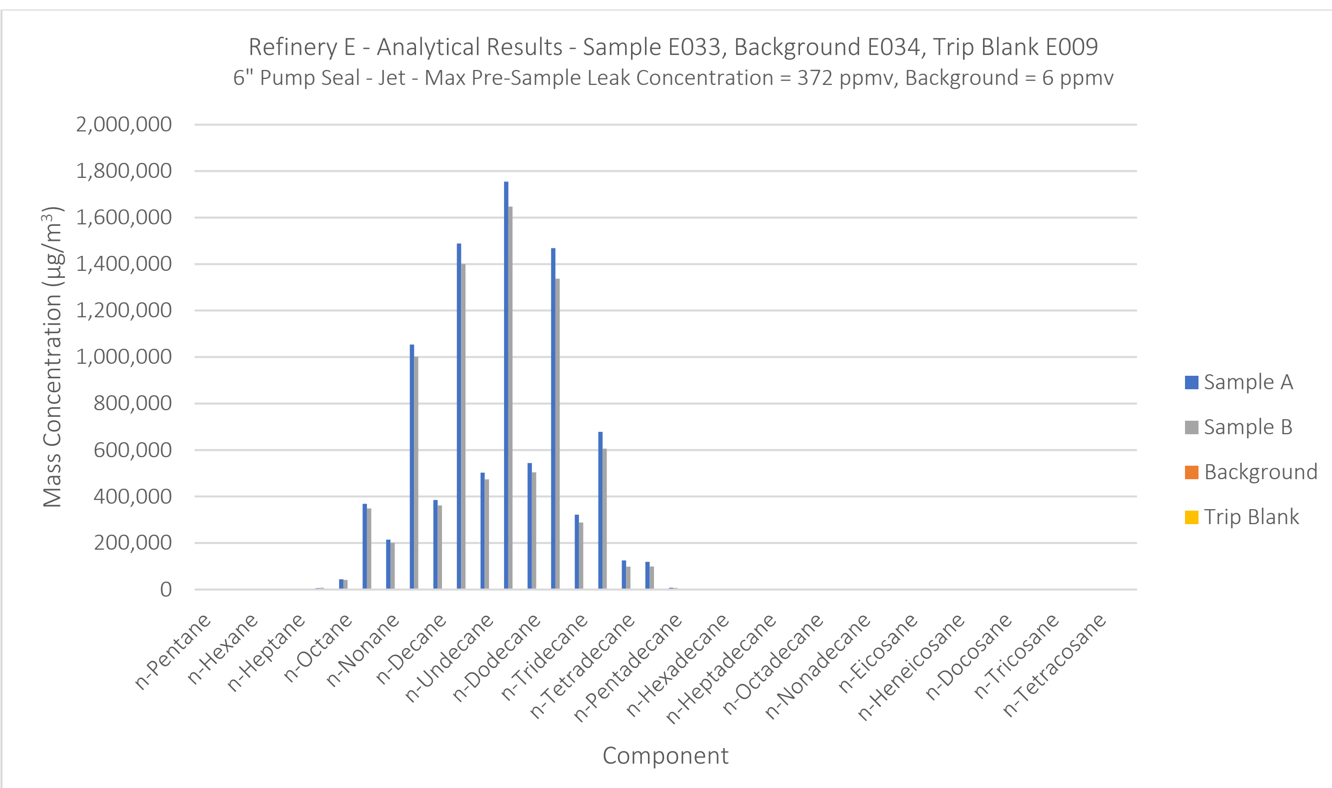


Figure B-3.149. Plot of Analytical Results for Sample E033 and Associated Background Sample

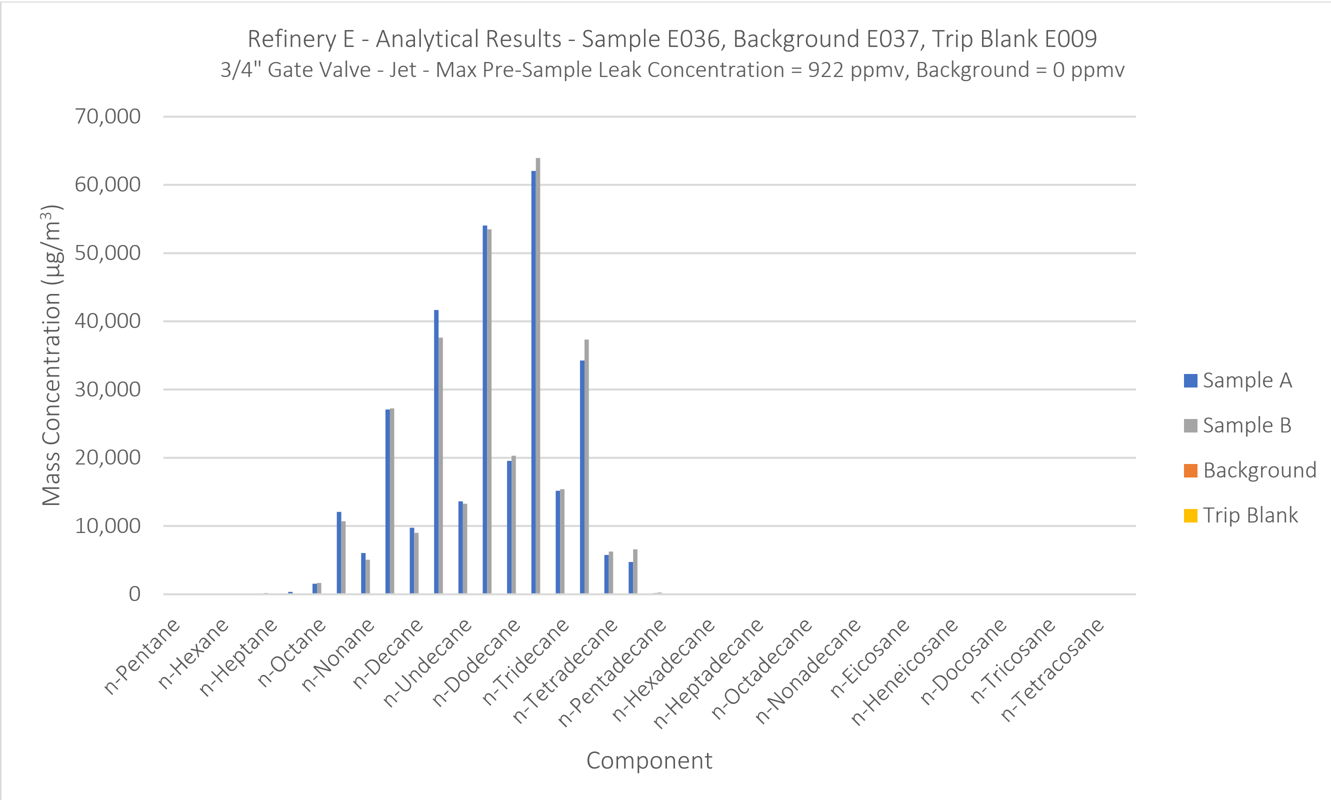


Figure B-3.150. Plot of Analytical Results for Sample E036 and Associated Background Sample

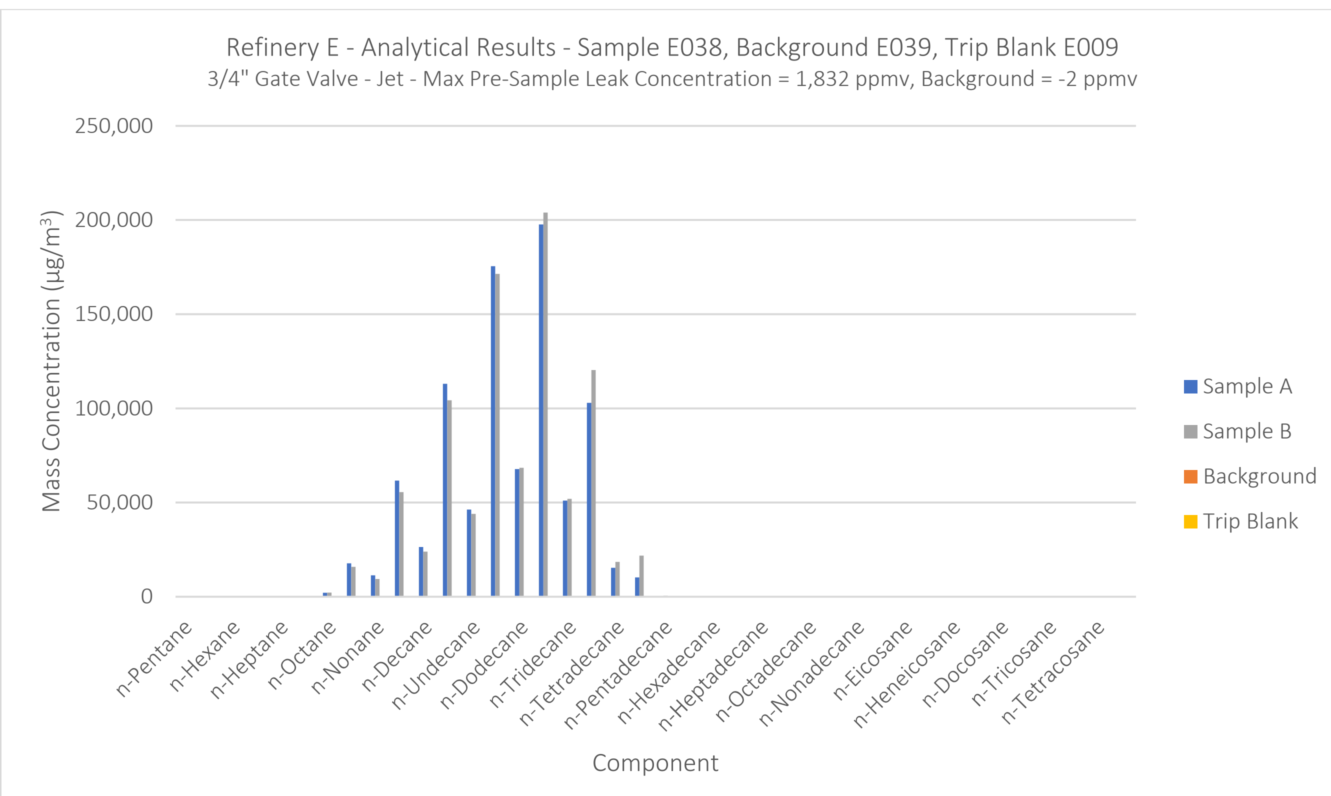


Figure B-3.151. Plot of Analytical Results for Sample E038 and Associated Background Sample

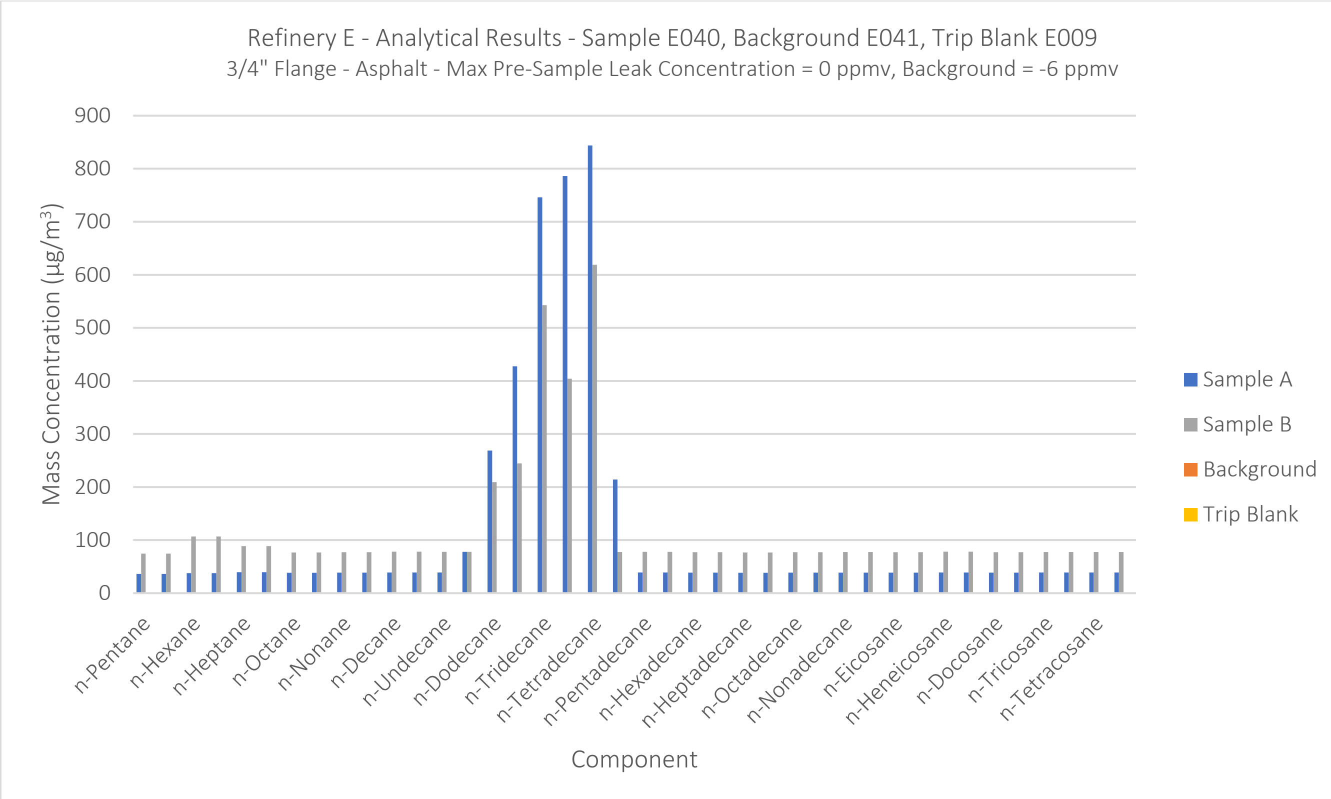


Figure B-3.152. Plot of Analytical Results for Sample E040 and Associated Background Sample

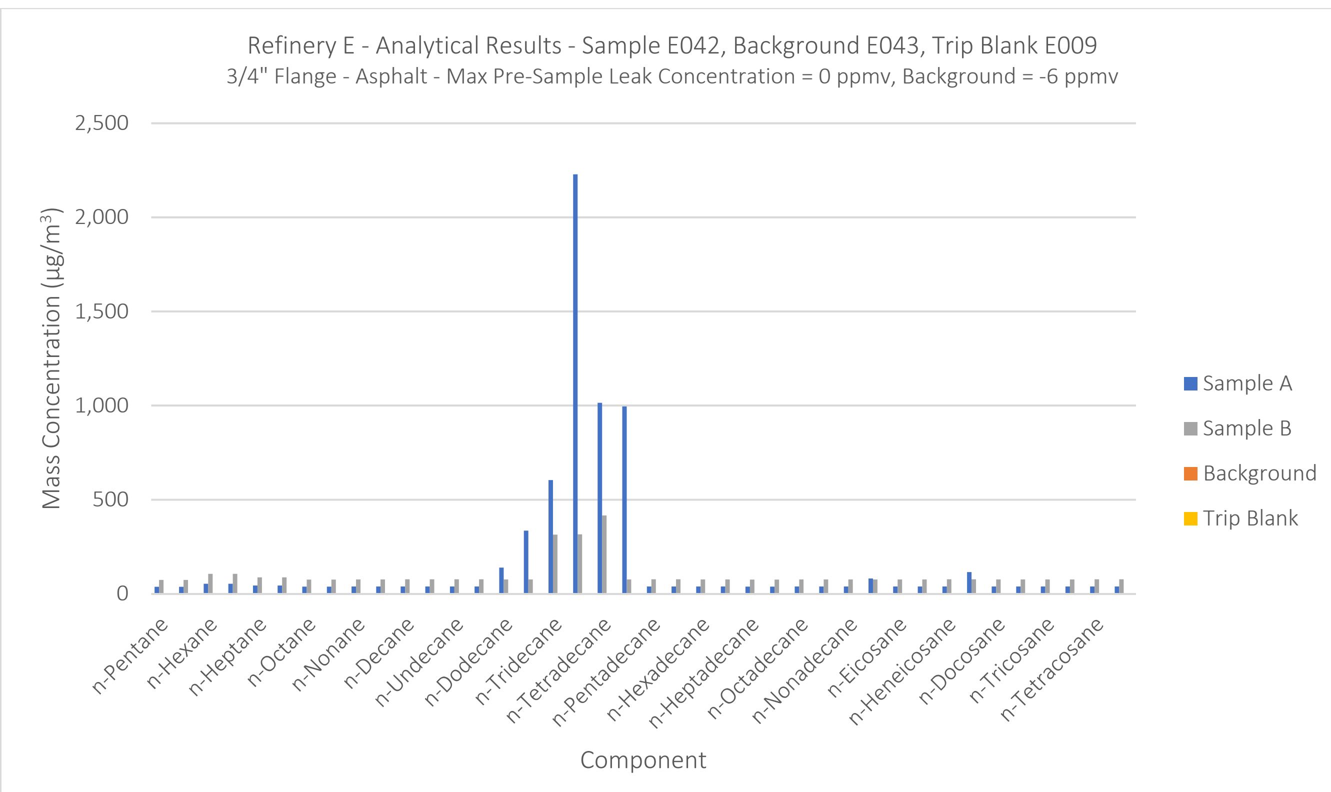


Figure B-3.153. Plot of Analytical Results for Sample E042 and Associated Background Sample

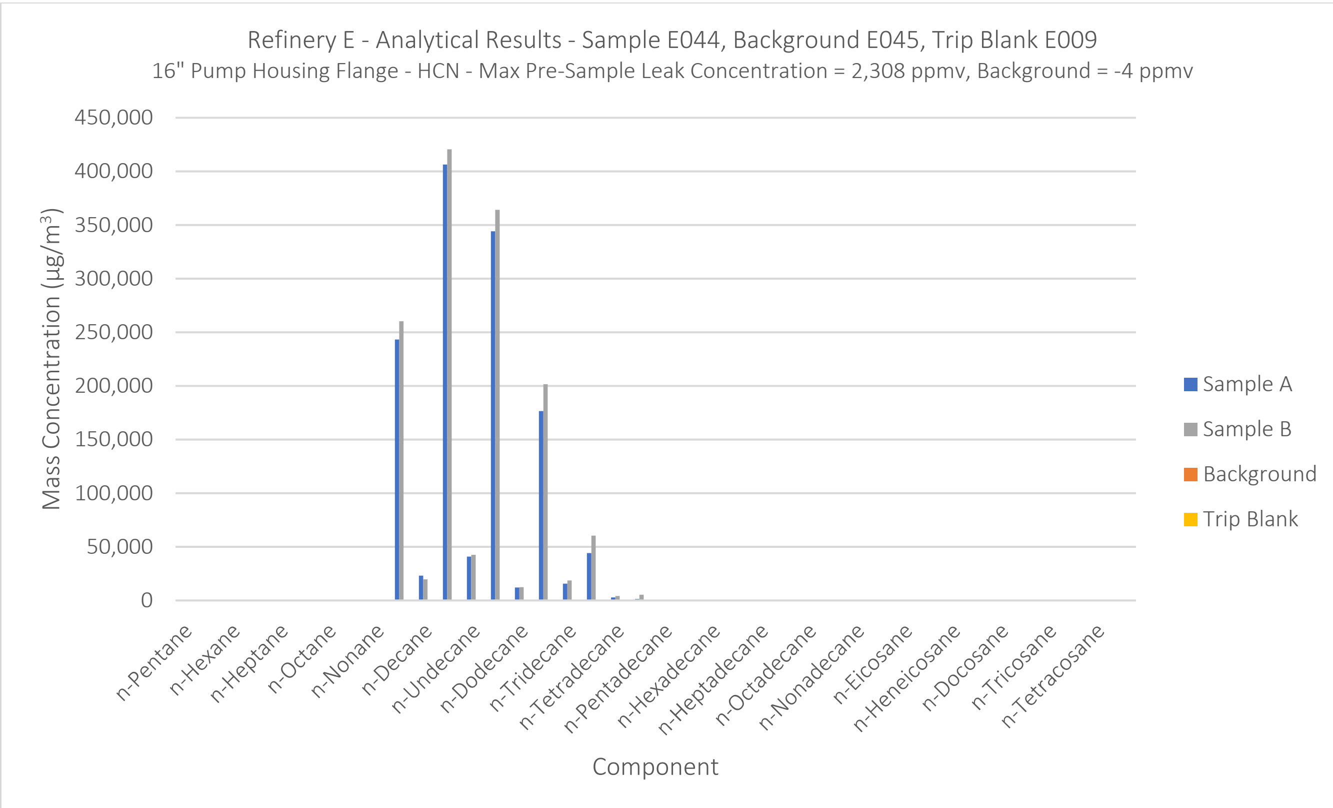


Figure B-3.154. Plot of Analytical Results for Sample E044 and Associated Background Sample

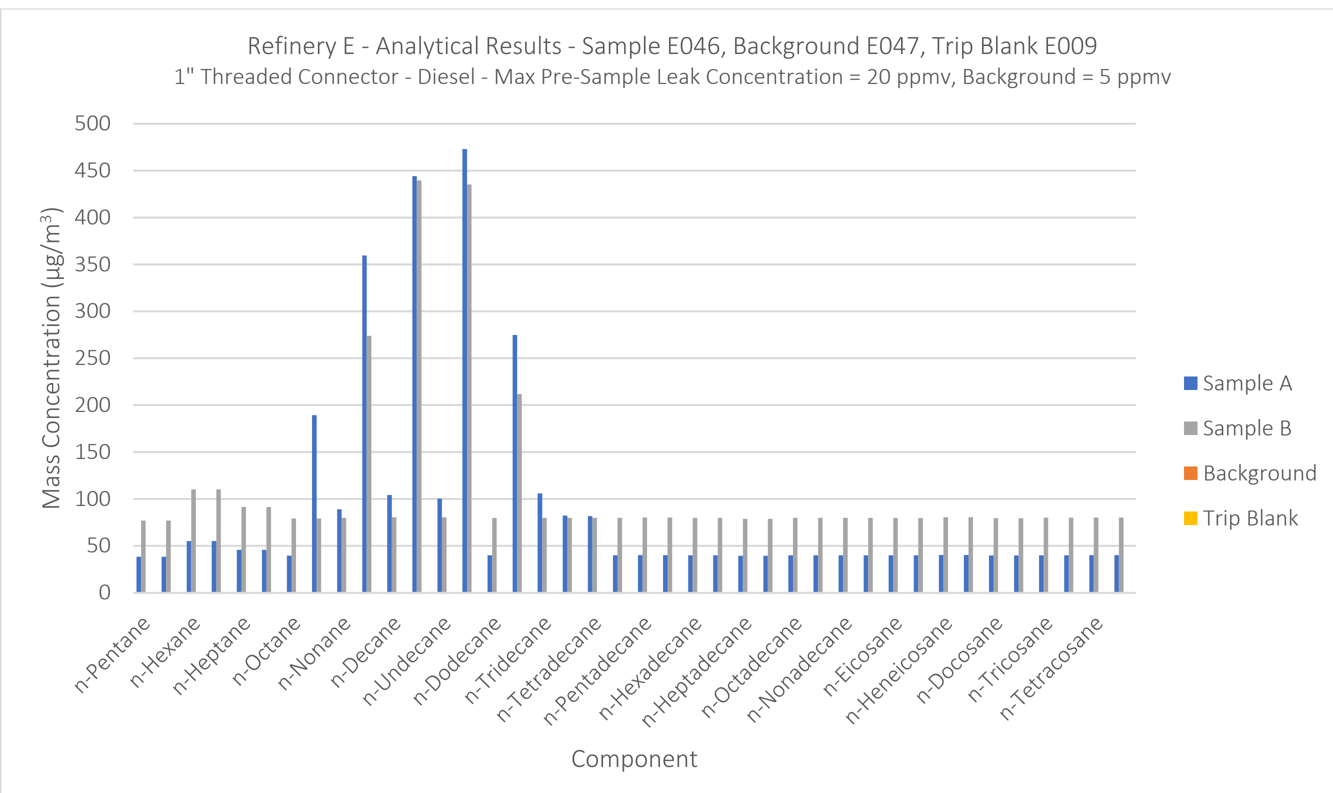


Figure B-3.155. Plot of Analytical Results for Sample E046 and Associated Background Sample

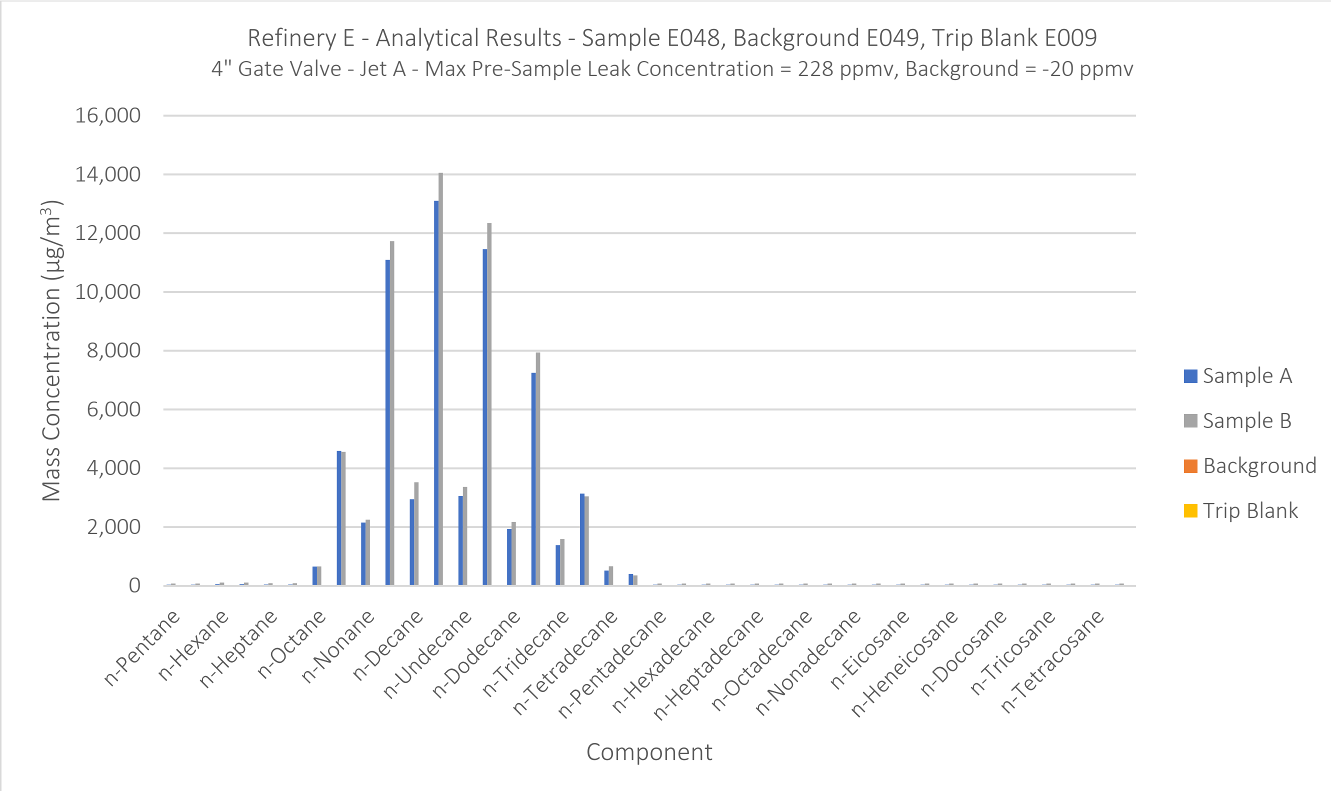


Figure B-3.156. Plot of Analytical Results for Sample E048 and Associated Background Sample

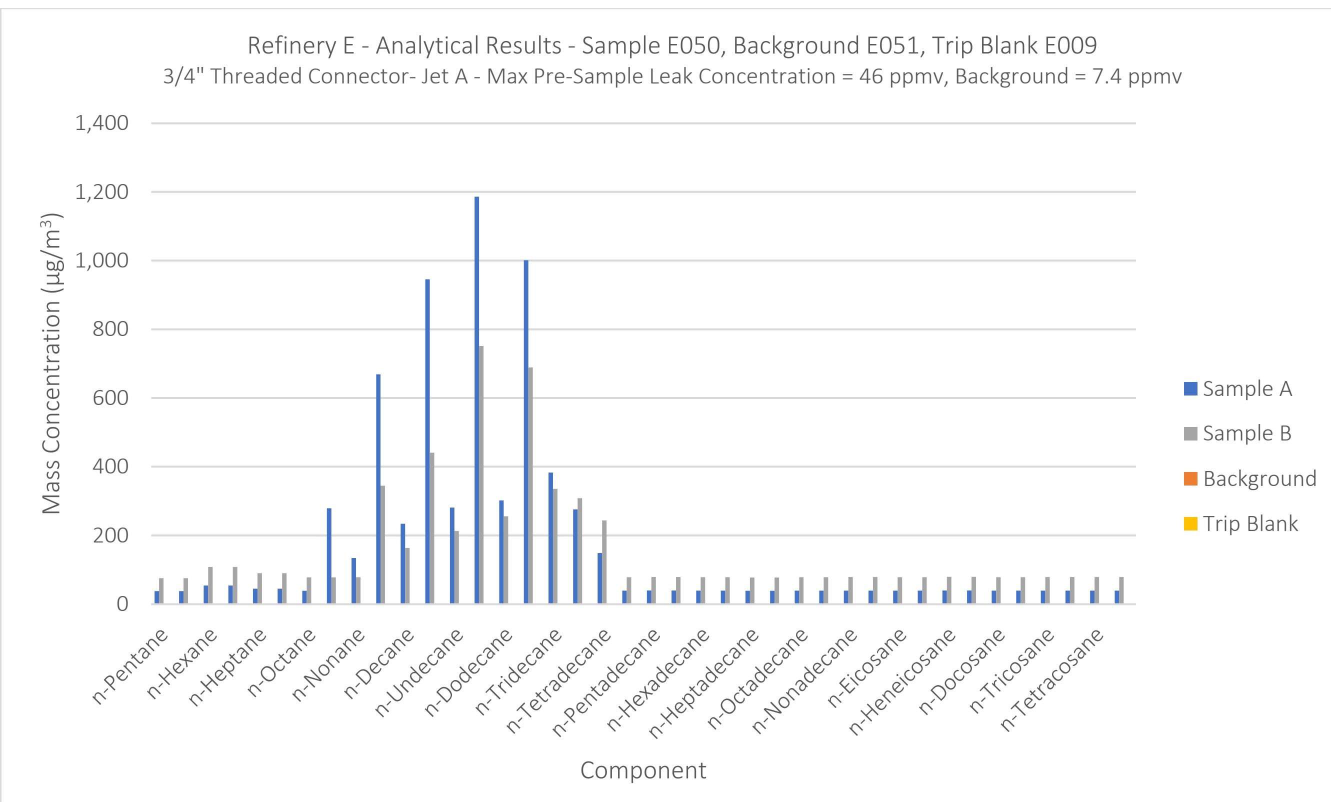


Figure B-3.157. Plot of Analytical Results for Sample E050 and Associated Background Sample

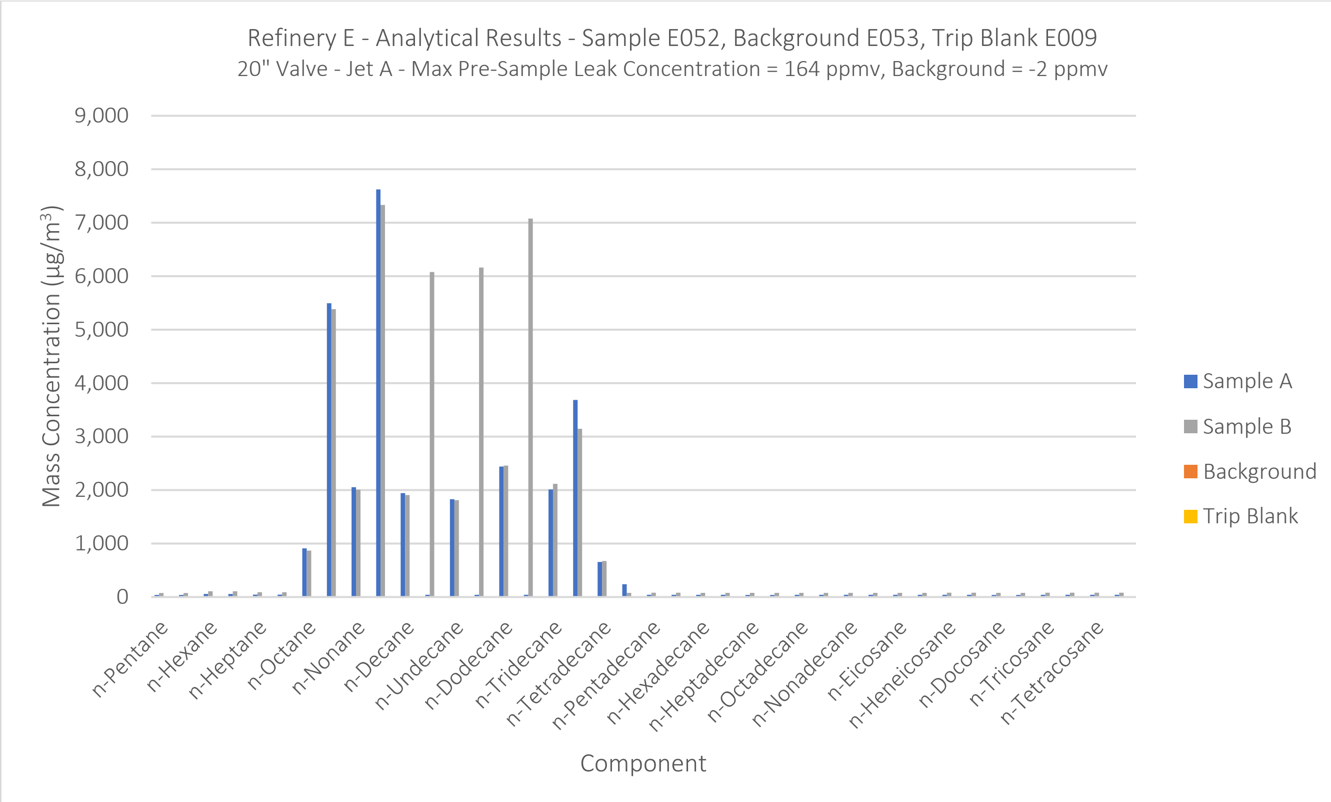


Figure B-3.158. Plot of Analytical Results for Sample E052 and Associated Background Sample

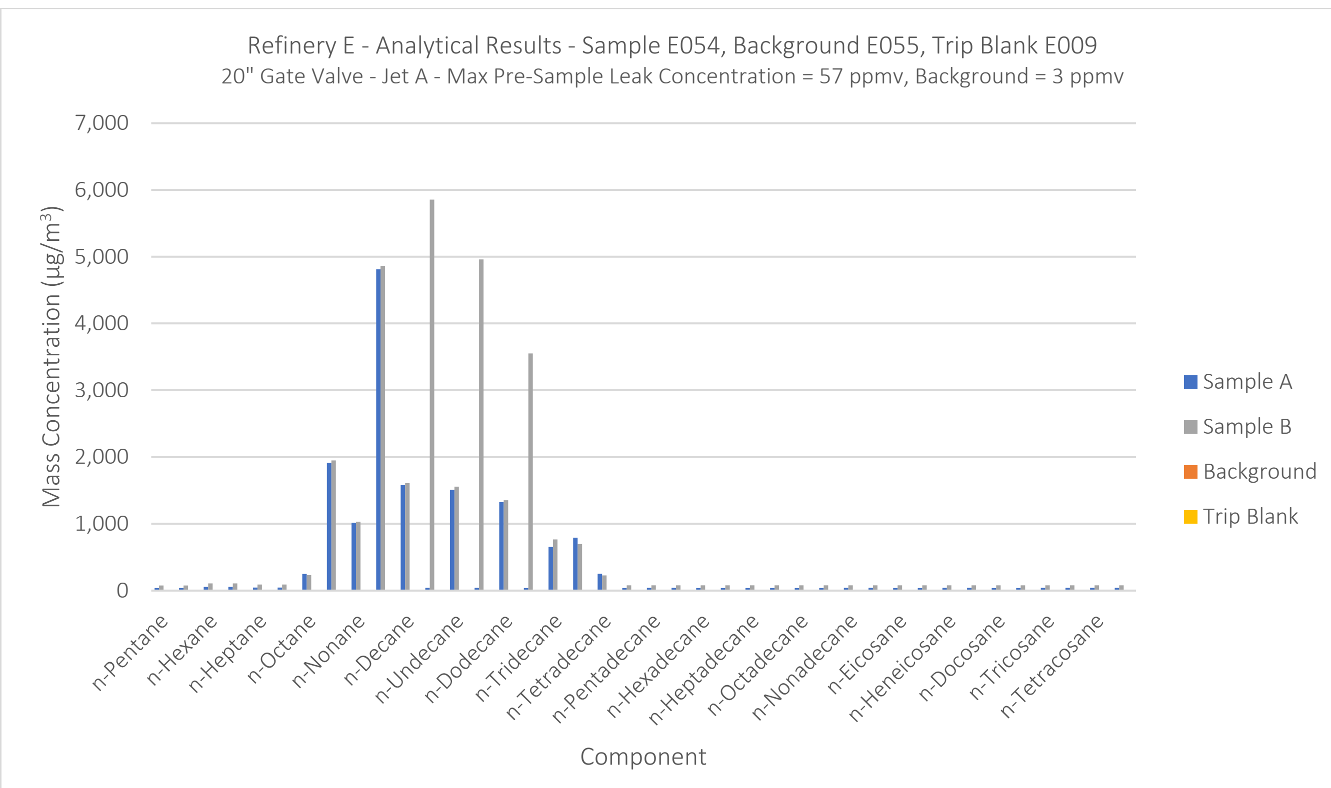


Figure B-3.159. Plot of Analytical Results for Sample E054 and Associated Background Sample

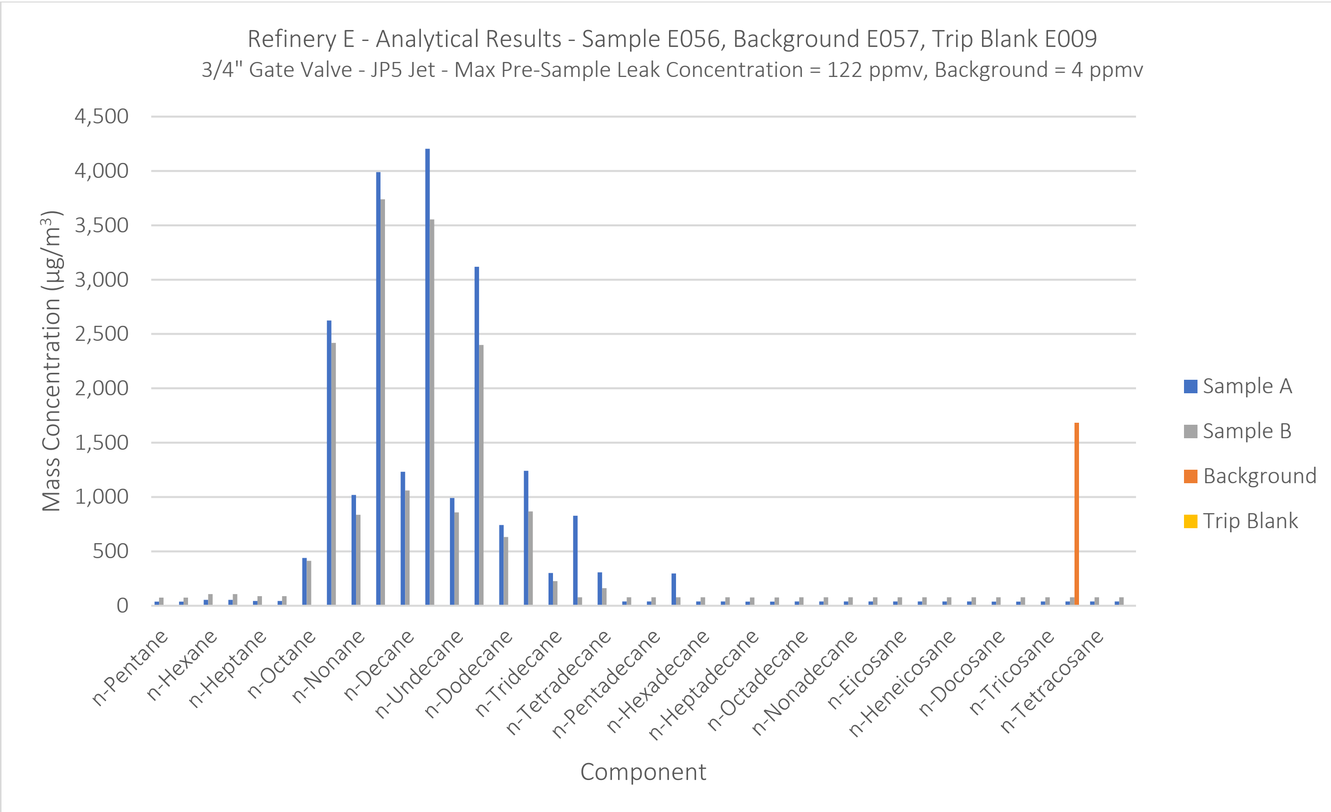


Figure B-3.160. Plot of Analytical Results for Sample E056 and Associated Background Sample

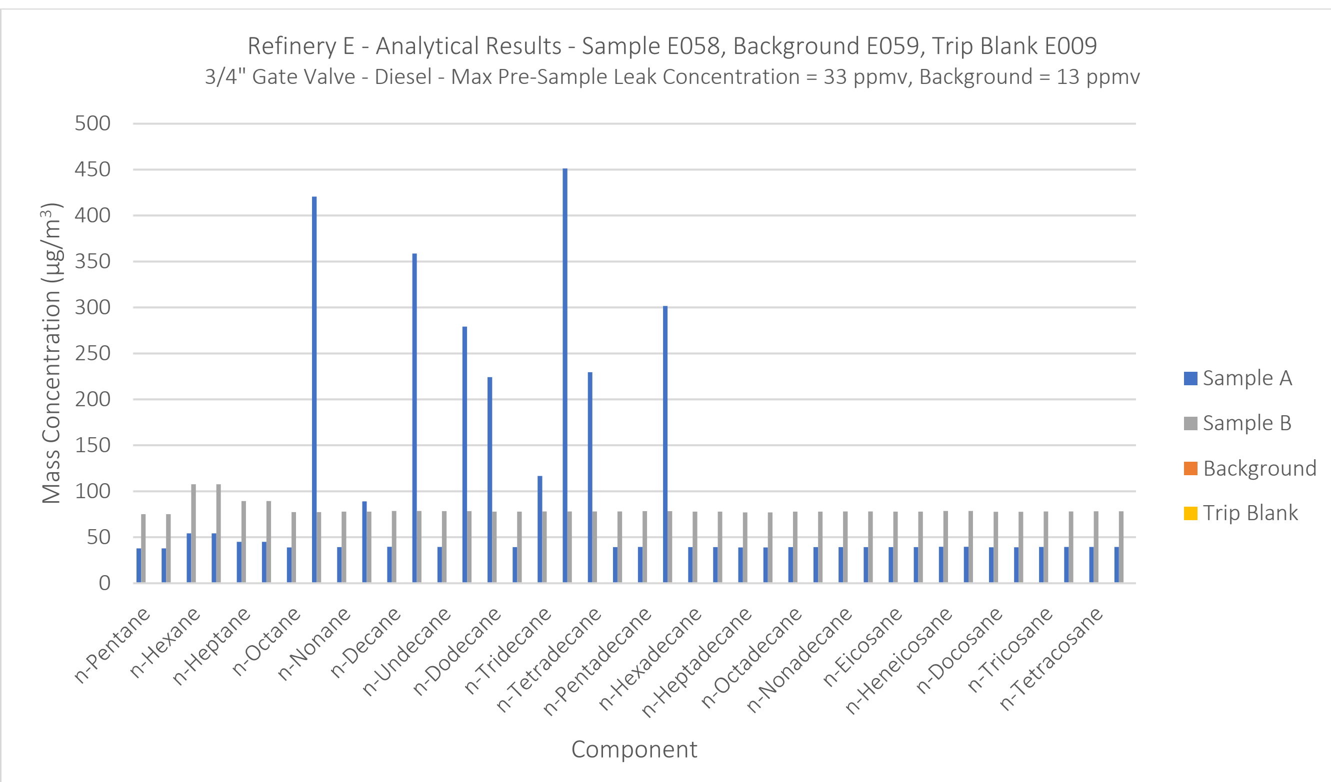


Figure B-3.161. Plot of Analytical Results for Sample E058 and Associated Background Sample

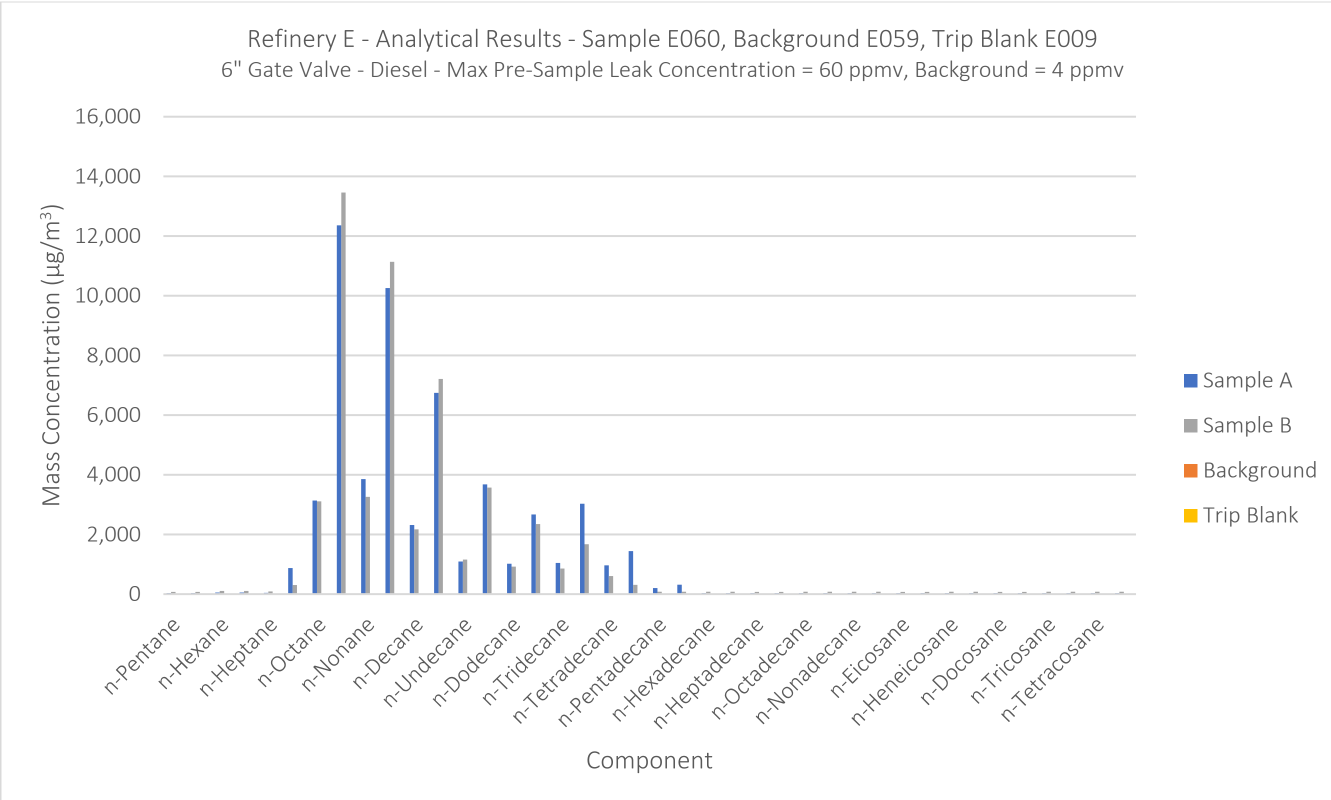


Figure B-3.162. Plot of Analytical Results for Sample E060 and Associated Background Sample

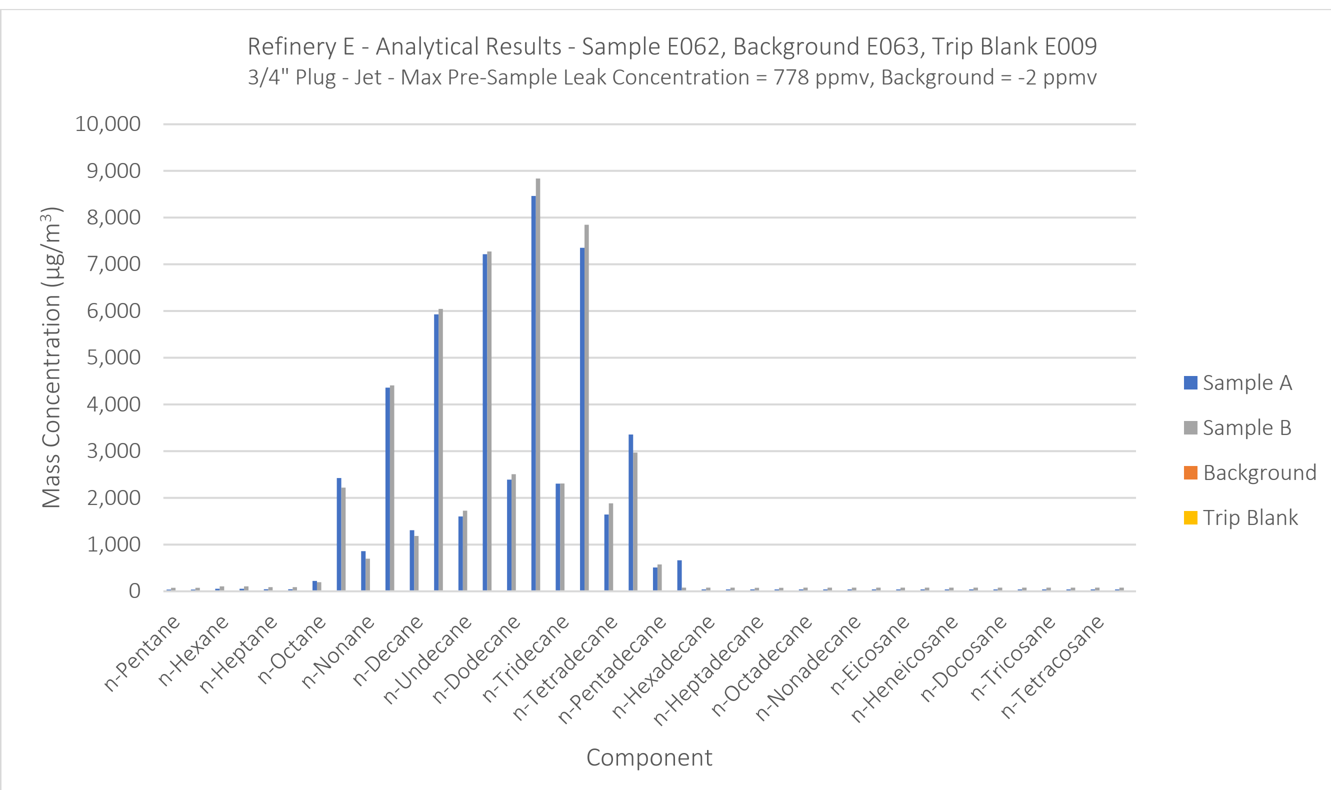


Figure B-3.163. Plot of Analytical Results for Sample E062 and Associated Background Sample

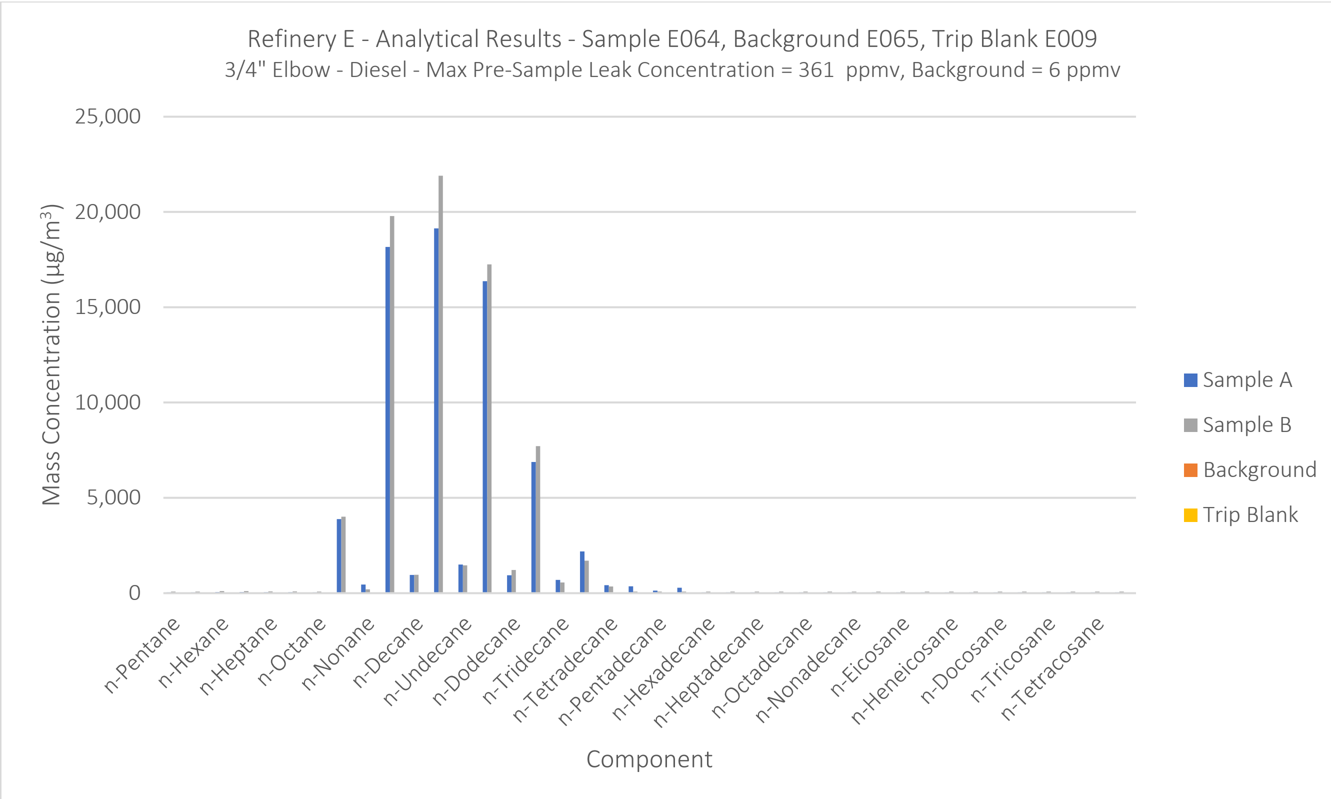


Figure B-3.164. Plot of Analytical Results for Sample E064 and Associated Background Sample

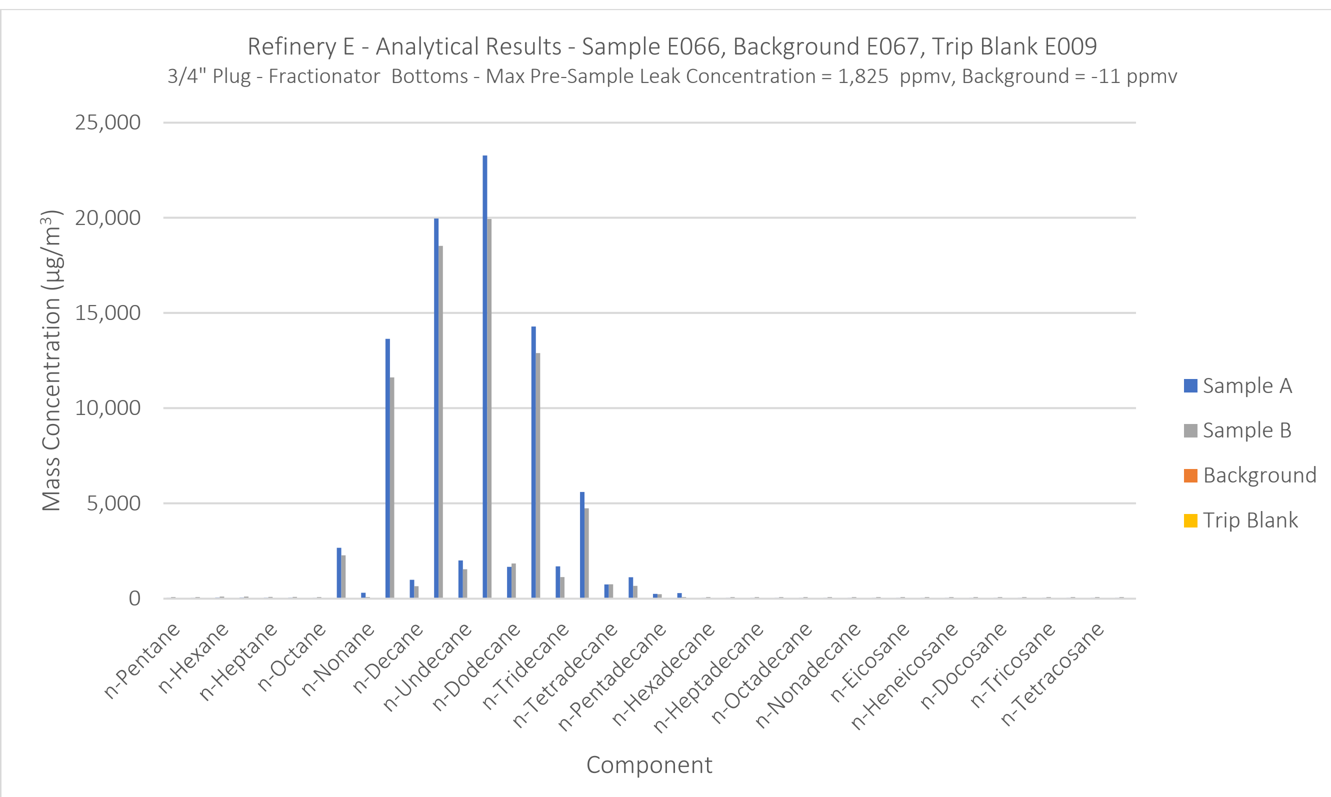


Figure B-3.165. Plot of Analytical Results for Sample E066 and Associated Background Sample

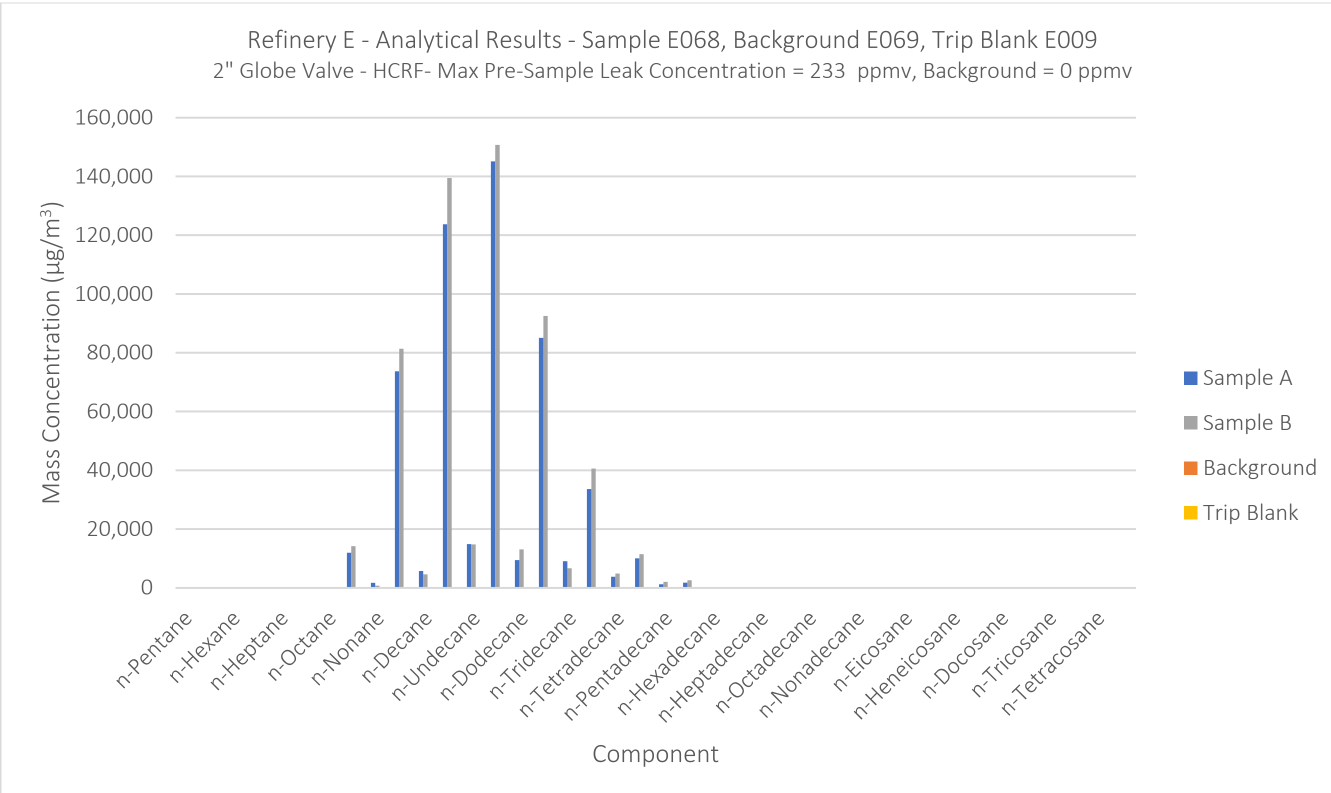


Figure B-3.166. Plot of Analytical Results for Sample E068 and Associated Background Sample

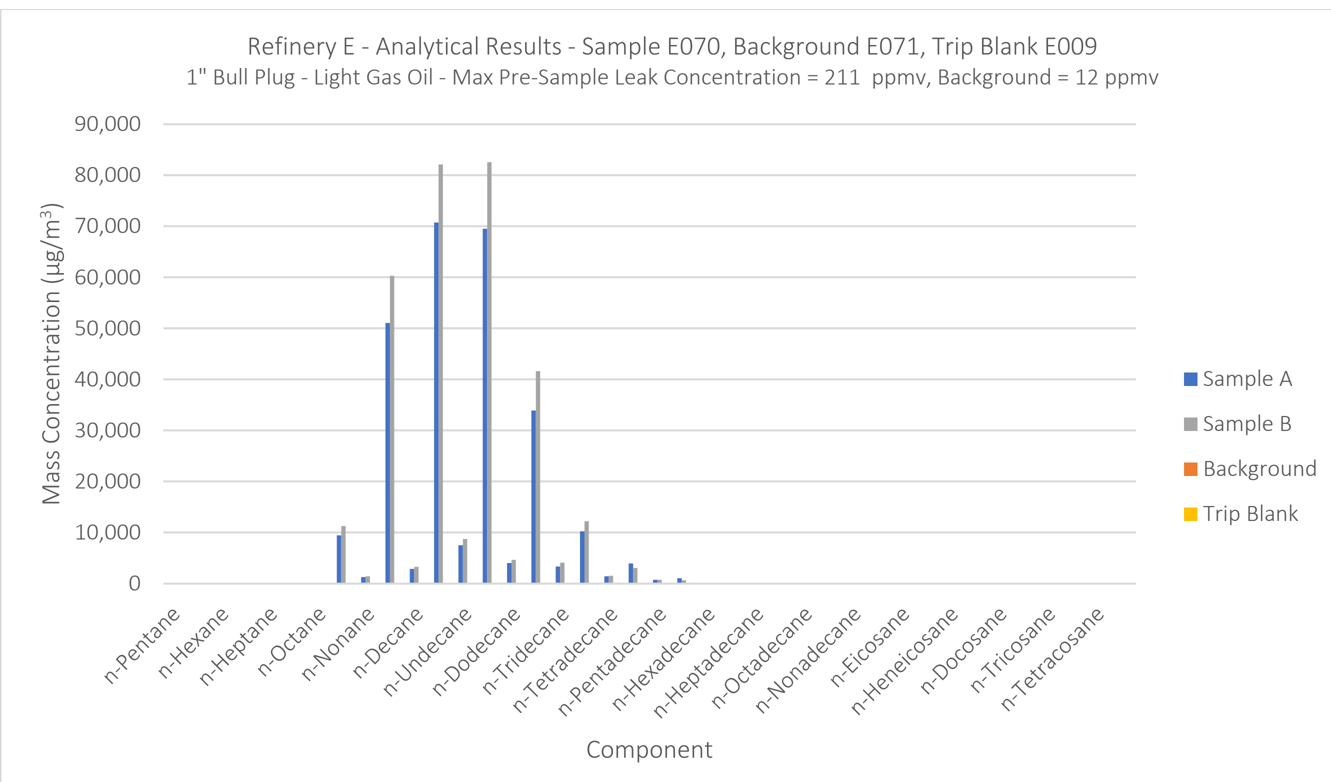


Figure B-3.167. Plot of Analytical Results for Sample E070 and Associated Background Sample

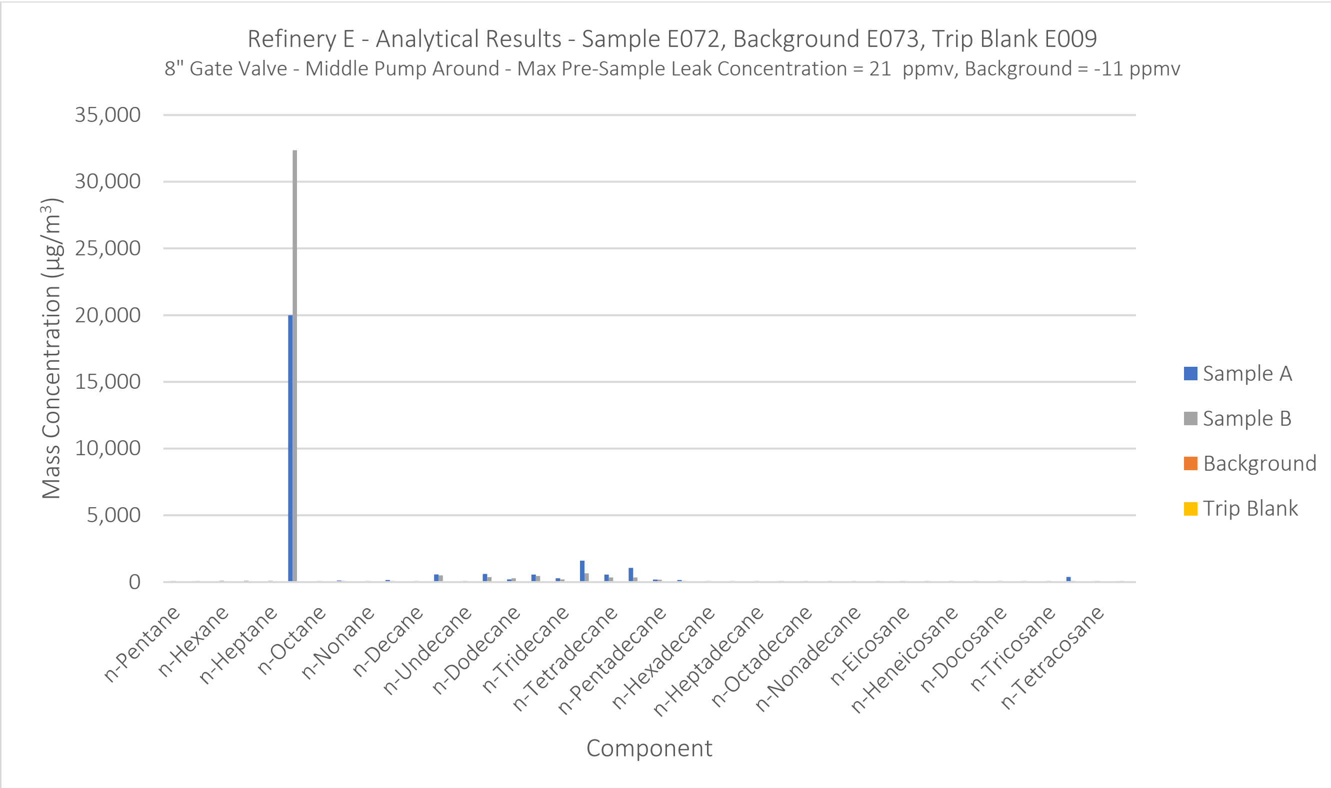


Figure B-3.168. *Plot of Analytical Results for Sample E072 and Associated Background Sample*

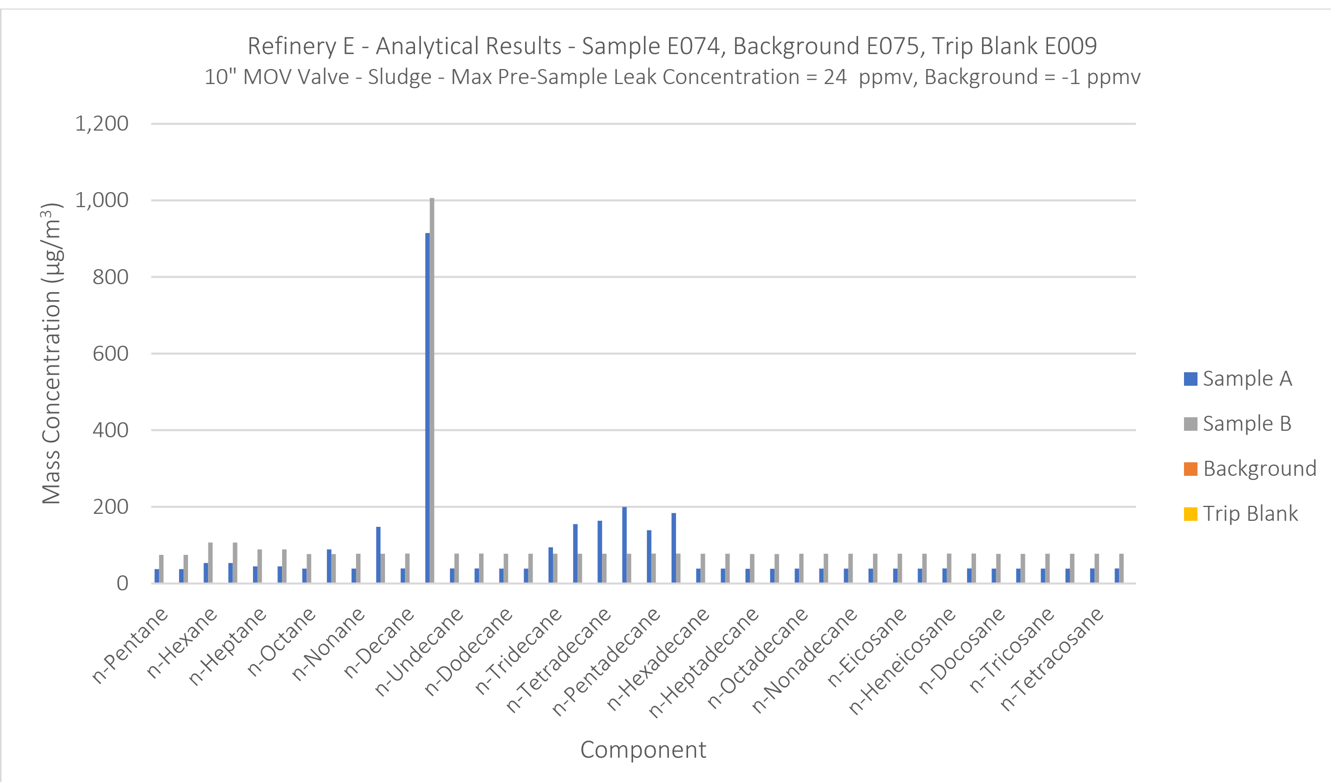


Figure B-3.169. *Plot of Analytical Results for Sample E074 and Associated Background Sample*

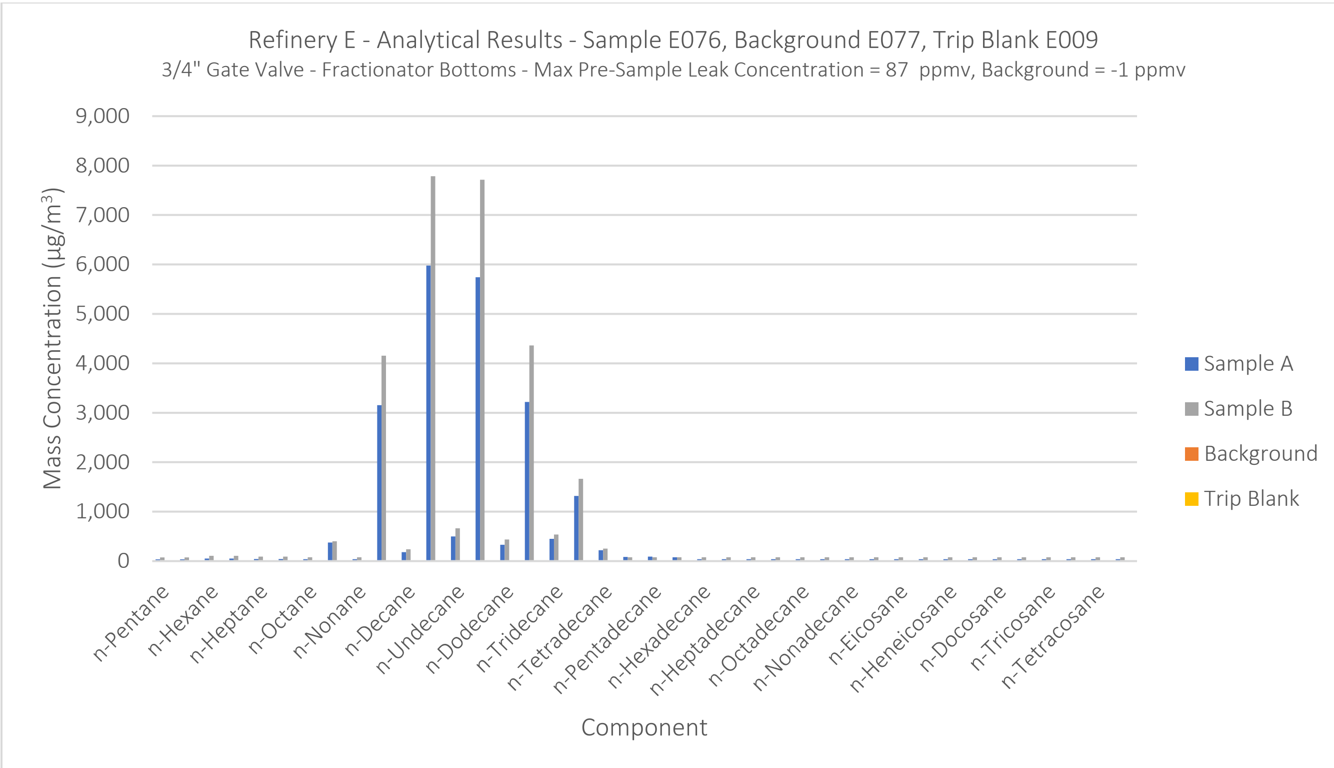


Figure B-3.170. Plot of Analytical Results for Sample E076 and Associated Background Sample

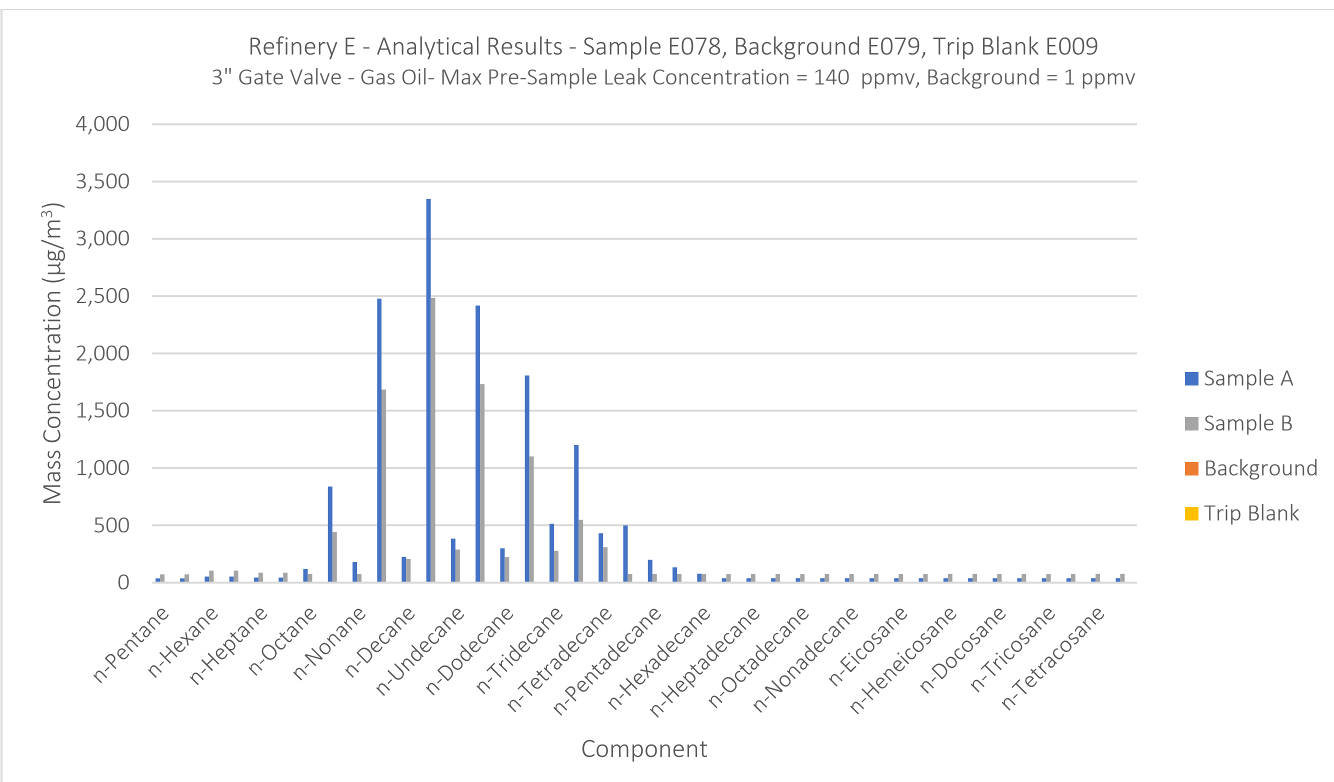


Figure B-3.171. Plot of Analytical Results for Sample E078 and Associated Background Sample

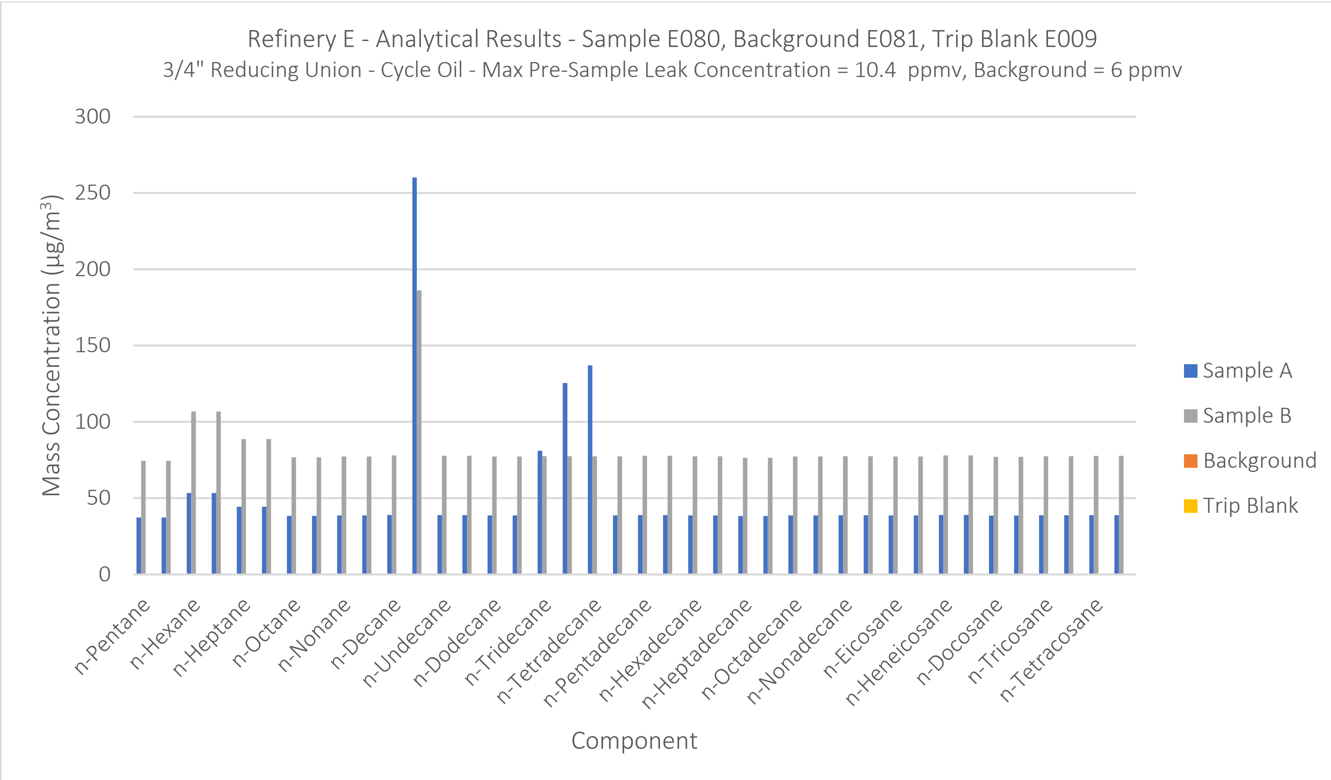


Figure B-3.172. Plot of Analytical Results for Sample E080 and Associated Background Sample

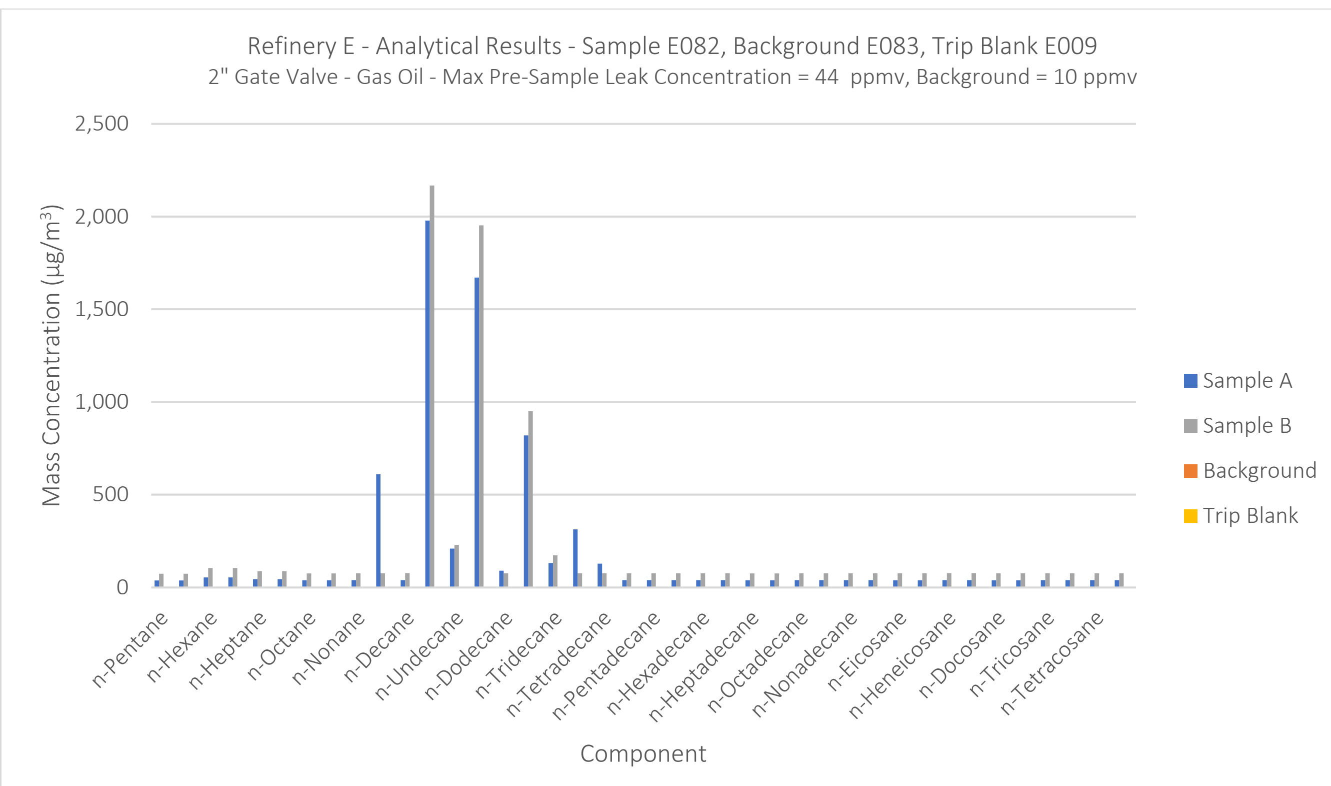


Figure B-3.173. Plot of Analytical Results for Sample E082 and Associated Background Sample

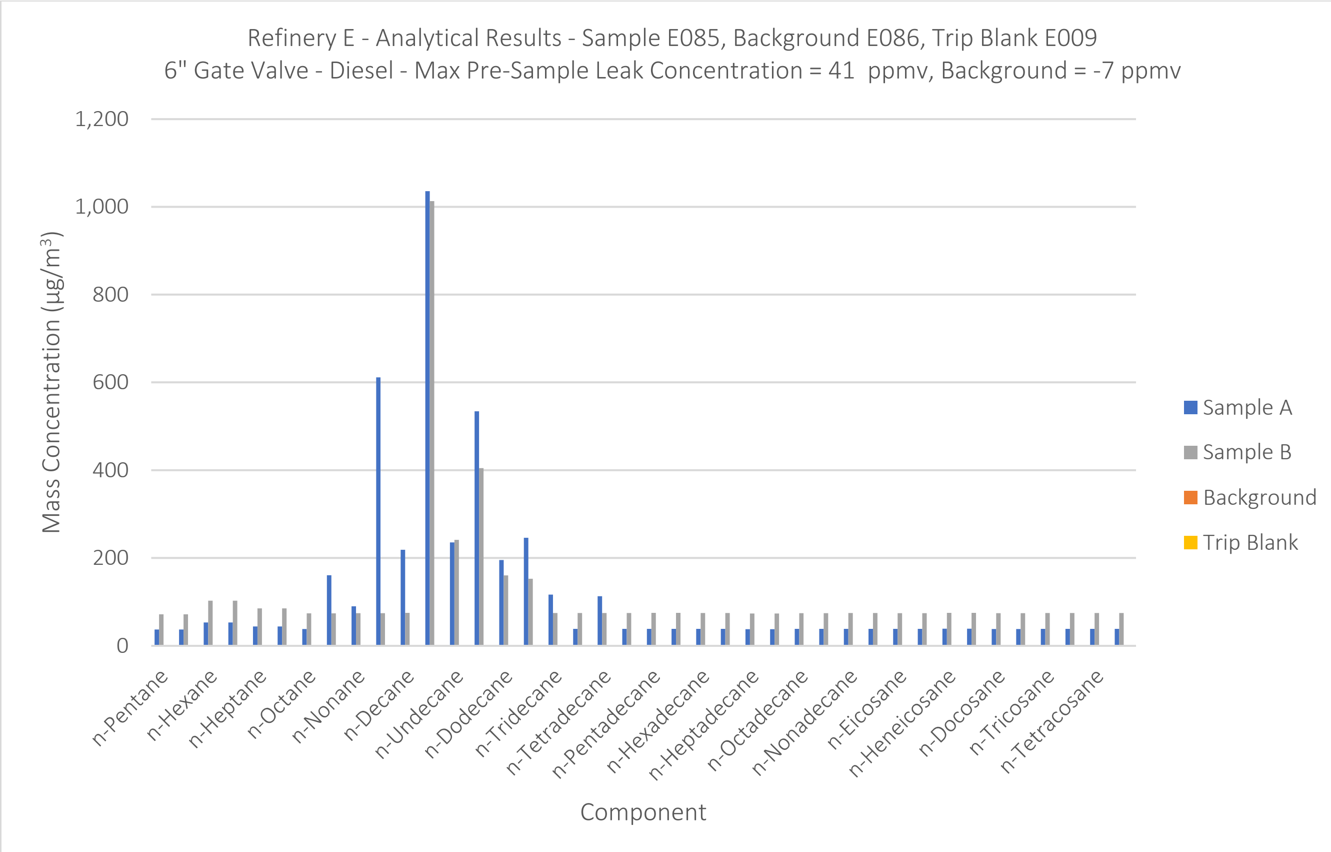


Figure B-3.174. Plot of Analytical Results for Sample E085 and Associated Background Sample

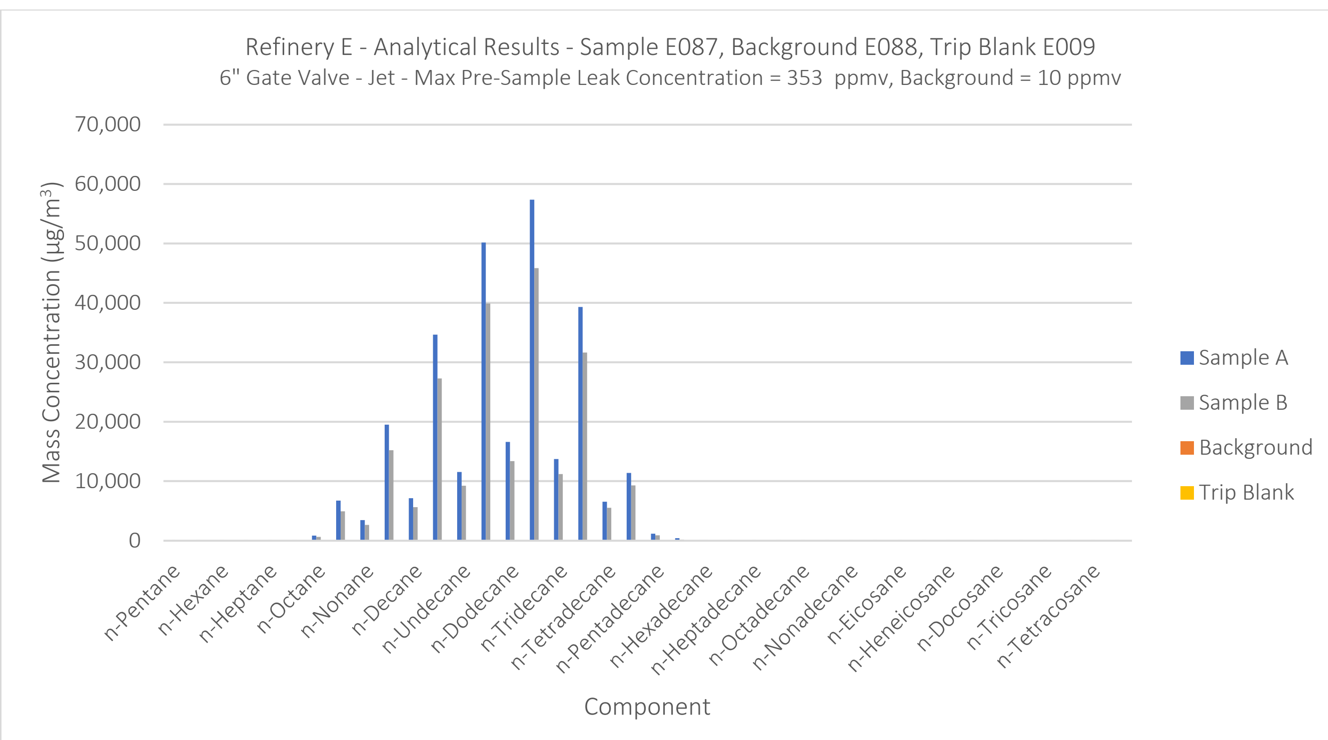


Figure B-3.175. Plot of Analytical Results for Sample E087 and Associated Background Sample

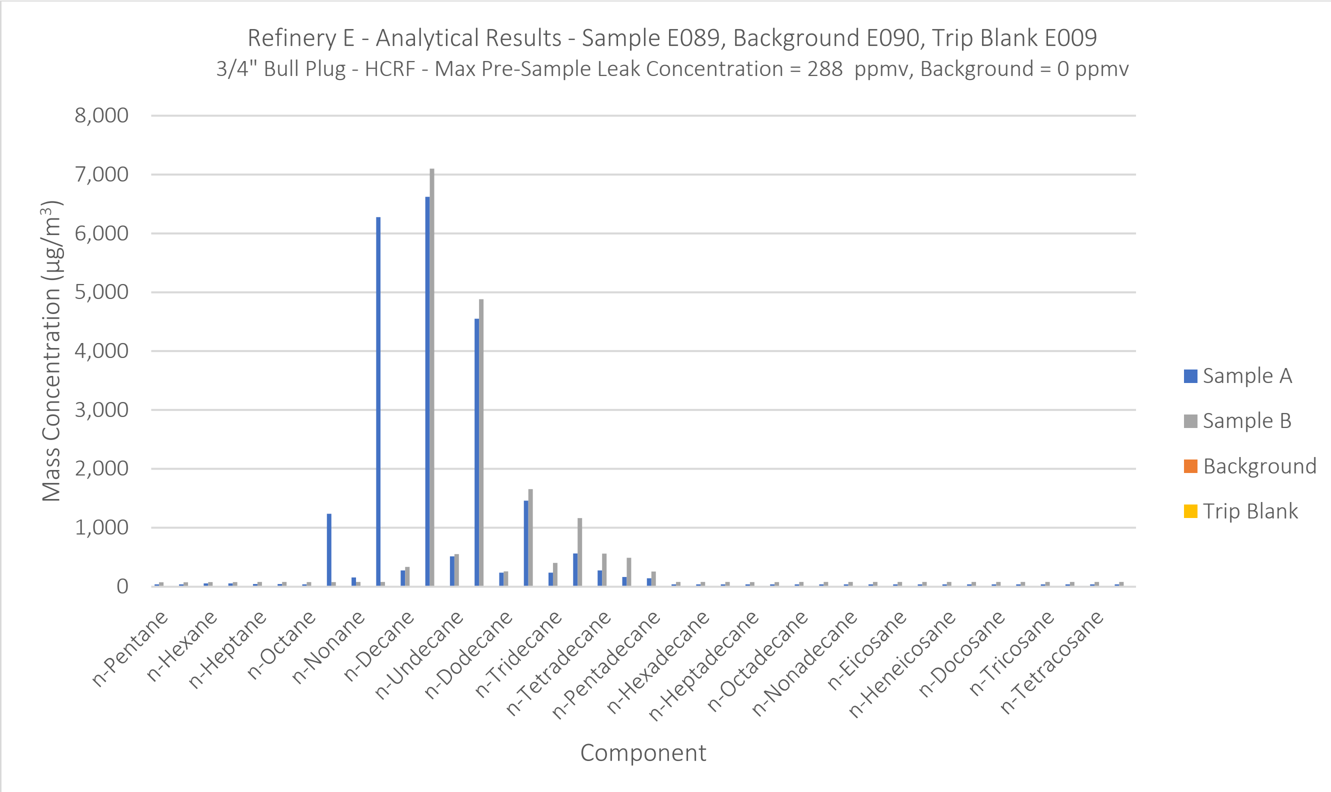


Figure B-3.176. Plot of Analytical Results for Sample E089 and Associated Background Sample

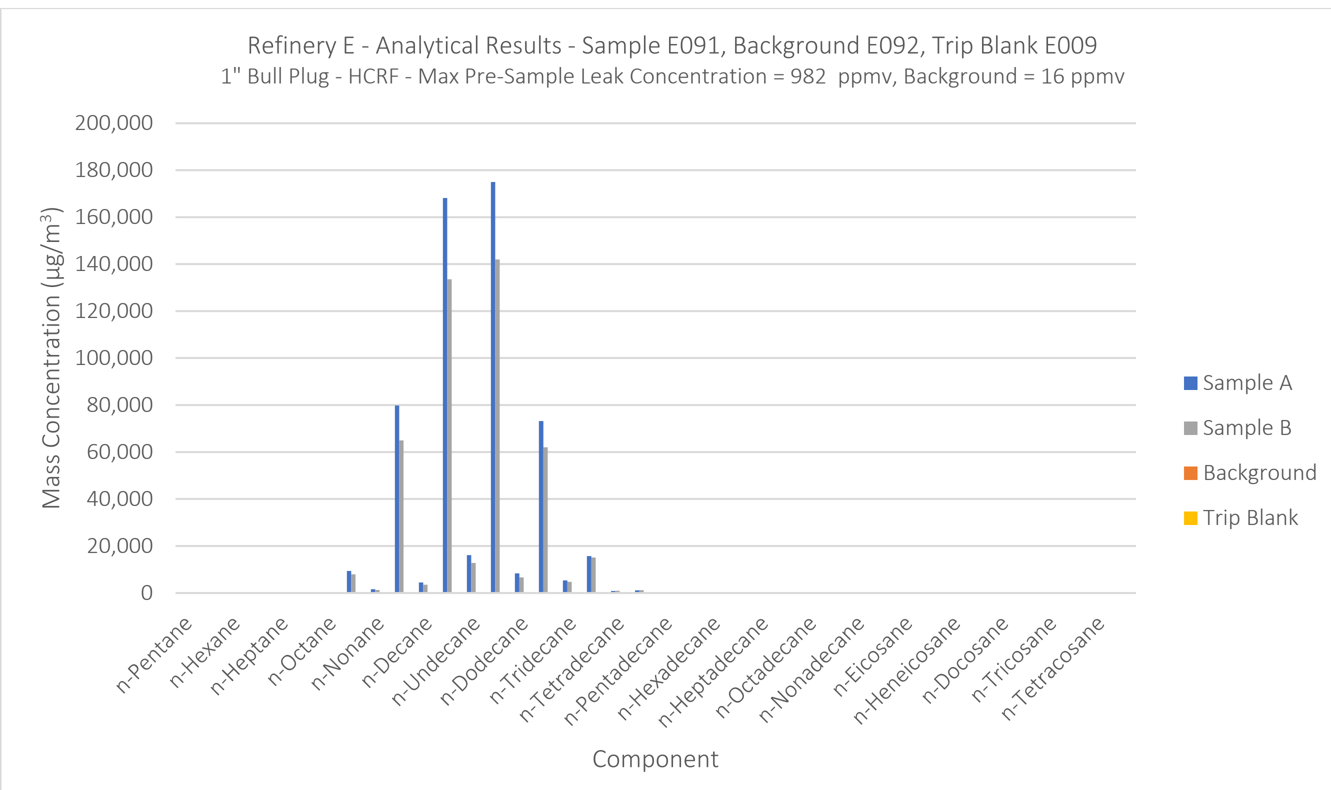


Figure B-3.177. Plot of Analytical Results for Sample E091 and Associated Background Sample

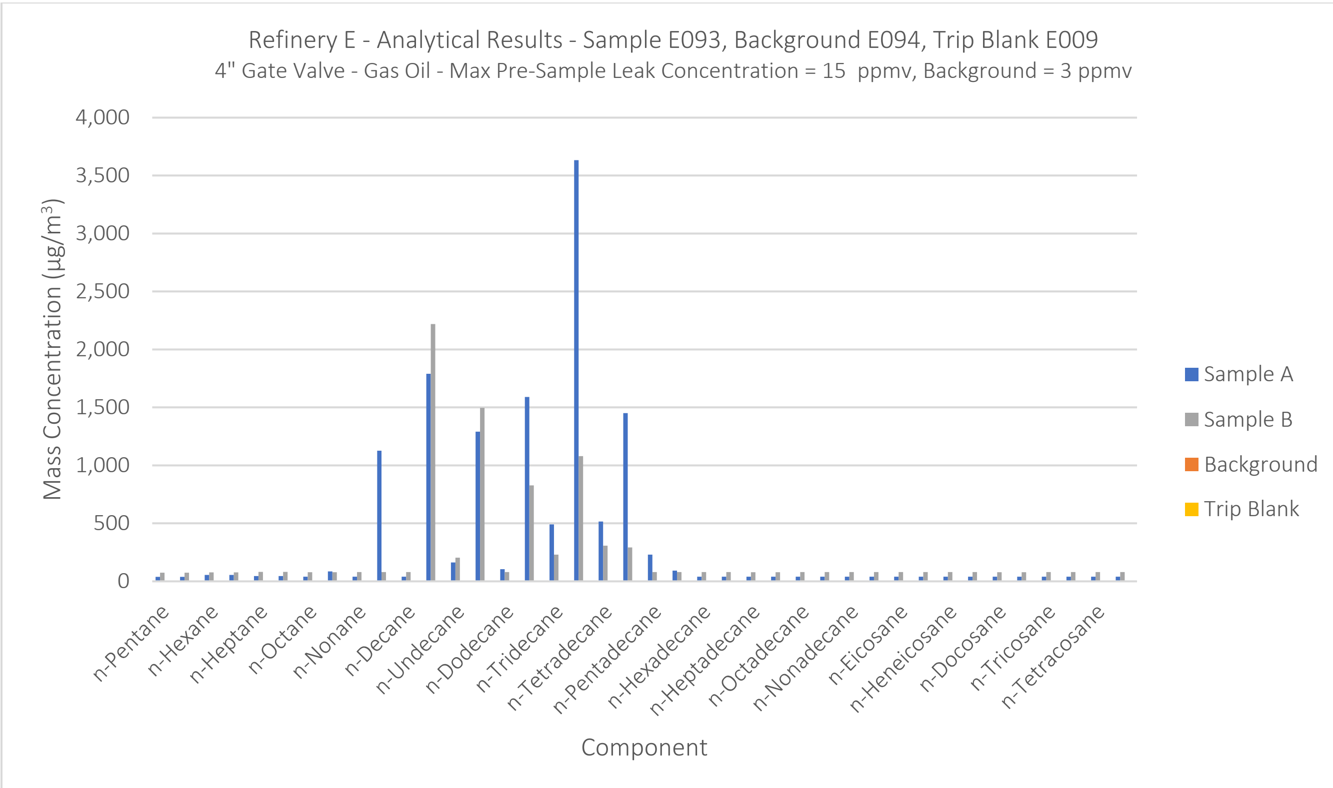


Figure B-3.178. *Plot of Analytical Results for Sample E093 and Associated Background Sample*

APPENDIX C
Quality Assurance and Quality Control Details

APPENDIX C-1
Quality Assurance and Quality Control Procedures

Screening

TVA Calibration and Drift Check Audit Form

Name: ____________ Facility: ____________________
Date: ____________ Calibration Techs: ____________________
Time: ____________ ____________________

Calibration

TVA # ____________
Start Time: ____________
End Time: ____________

(Please explain checkboxes marked "No" in notes section)

	Yes	No
Was zero gas* calibration performed?	☐	☐
Was 5-point calibration performed**? 10ppm ☐ 100ppm ☐ 500ppm ☐ 3000ppm ☐ 10,000ppm ☐	☐	☐
Was a span Check performed? 0ppm ☐ 10ppm ☐ 100ppm ☐ 500ppm ☐ 3000ppm ☐ 10,000ppm ☐	☐	☐
Were measured calibration values within 10% accuracy (25% for 10ppm)?	☐	☐
Was instrument deployed with same probe as calibrated?	☐	☐

* Zero gas has a specification of <0.2ppm hydrocarbon and valid expiration date? **Yes** ☐ **No** ☐

Calibration gases were used with the valid span, accuracy, and expiration date? **Yes ☐ **No** ☐

Drift Check

TVA # ____________
Start Time: ____________
End Time: ____________

(Please explain checkboxes marked "No" in notes section)

	Yes	No	N/A
Was a drift check performed using all calibration gases and zero gas? 0ppm ☐ 10ppm ☐ 100ppm ☐ 500ppm ☐ 3000ppm ☐ 10,000ppm ☐	☐	☐	
Was drift check measurement and calibration value calculation within the 10% accuracy specification?	☐	☐	
Was instrument drift checked with same probe as deployed?	☐	☐	
Were filters changed and was the probe cleaned?	☐	☐	
Was the instrument re-calibrated before being re-deployed?	☐	☐	☐

Notes/Comments:

HLS Field Audit Form

Date: **Facility:** **Auditor:**

	Yes	No
Did you observe the tech changing their background? (note: this should not be done)		
Did you observe them checking filters and/or cleaning their probe?		
Does the tech monitor each component per Method 21 and the HLS Protocol?		
Does the tech monitor every leak point on each component?		
Does the tech display proper monitoring pace?		
Does the tech watch the display of the handheld while monitoring, looking for deflections?		
Does the tech stay on readings for an adequate time period?		
If a leak is found does the tech process the leak and leak tag properly?		
Does the tech place the probe tip at the correct angle to the leak point to find maximum concentration?		
Does the tech fill out the data sheet correctly and legibly?		
Does the tech choose which components are to be screened correctly?		
Does the tech swap out TVA's as required by the protocol?		

Please explain any discrepancies for Air District follow up below:

Date: **Facility:** **Auditor:**

	Yes	No
Did you observe the tech changing their background? (note: this should not be done)		
Did you observe them checking filters and/or cleaning their probe?		
Does the tech monitor each component per Method 21 and the HLS Protocol?		
Does the tech monitor every leak point on each component?		
Does the tech display proper monitoring pace?		
Does the tech watch the display of the handheld while monitoring, looking for deflections?		
Does the tech stay on readings for an adequate time period?		
If a leak is found does the tech process the leak and leak tag properly?		
Does the tech place the probe tip at the correct angle to the leak point to find maximum concentration?		
Does the tech fill out the data sheet correctly and legibly?		
Does the tech choose which components are to be screened correctly?		
Does the tech swap out TVA's as required by the protocol?		

Please explain any discrepancies for Air District follow up below:

Mass Emissions Sampling

<table>
<tr><td>Refinery:

Contact:

TRICORD Test Team:</td><td>BAY AREA
AIR QUALITY MANAGEMENT DISTRICT
375 Beale Street, Suite 600
San Francisco, California
94105-2097
(415) 749-5000
HEAVY LIQUIDS STUDY
SOURCE TEST OBSERVATION</td><td>Date

Time:

BAAQMD
Observer:</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>TRICORD Data Sheet Number:</td><td>Component ID:</td><td>Unit ID:</td></tr>
<tr><td colspan="3"></td></tr>
</table>

Process:	Sketch of Sampling Site:
Sample Type:	
Deviations from Standard Methods:	
Equipment Information :	
Notes:	

ENTHALPY analytical, inc

Chain of Custody Record

Page 1 of ____

Special Handling:

- ☐ Standard Turn Around Time (10 business days)
- ☐ Rush Turn Around Time -- Date Needed_________
- All TATs Subject to Approval by Enthalpy Analytical, Inc.
- All Bag/Can Samples Disposed of 1 Month from Receipt.
- All Other Samples Disposed of 4 Months from Receipt.

Client Name:____________________
Project Manager:____________________
Report To:____________________

Project Number:____________________
Site Name:____________________
Location:____________________

PO#:____________________
Telephone#:____________________
Email:____________________

For spiked or duplicate samples: please provide sample volumes for recovery calculations. For Particulates: please provide tare weights and/or condensed water volumes.

Special Instructions:

A=Air 1=H2SO4 2=NaOH W=Water O=Other
X=XAD C=Charcoal SG=Silica Gel

G=Grab C=Composite Q=Quality Control O=Other

						Sample Containers							Analyses:								
Sample ID	Date	Time	Sample Volume	Type	Matrix	# of VOA Vials	# of Glass	# of Plastic	# of Bags	# of Canisters	# of Tubes	# Other									Notes:

Relinquished By:	Date:	Received By:	Date:	Time:	Sample Condition Upon Receipt:
					☐ Iced ☐ Ambient ☐ °C_______
					☐ Iced ☐ Ambient ☐ °C_______
					☐ Iced ☐ Ambient ☐ °C_______

800-1 Capitola Drive • Durham, NC 27713 • (919) 850-4392 • FAX (919) 850-9012 • www.enthalpy.com

APPENDIX C-2
Quality Control Results

Screening

Table C-2-1. *Summary of Drift Tests of Refinery A Field Screening Instruments*

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
1 (TVA # 13)	10	23	-13.4	-36.3	11.5	11.1	-18.2	-8.6
	100	23	-2.4	-8.1	4.0	3.5	-4.0	-0.9
	500	23	-1.7	-6.7	3.5	2.9	-2.9	-0.4
	3,000	23	-0.9	-6.3	5.6	3.1	-2.2	0.5
	10,000	23	-0.7	-8.8	5.1	3.5	-2.2	0.8
2 (TVA # 14)	10	3	-16.5	-25.4	0.0	14.3	-52.0	19.0
	100	3	-4.2	-9.4	4.2	7.3	-39.7	31.4
	500	3	-3.9	-8.3	2.6	5.7	-18.1	10.4
	3,000	3	-2.6	-6.2	3.3	5.2	-15.4	10.2
	10,000	3	-1.2	-4.0	2.8	3.6	-10.1	7.6
3 (TVA # 15)	10	17	-7.4	-32.4	100.0	29.2	-22.4	7.6
	100	17	-3.6	-10.8	5.6	4.4	-5.9	-1.4
	500	17	-3.0	-8.5	2.1	3.0	-4.5	-1.5
	3,000	17	-2.5	-6.6	1.4	2.5	-3.8	-1.3
	10,000	17	-1.9	-6.6	2.7	3.0	-3.4	-0.3
4 (TVA # 16)	10	20	-5.3	-38.6	41.7	16.3	-12.9	2.3
	100	20	2.2	-20.1	51.0	14.4	-4.5	9.0
	500	20	3.3	-20.0	55.8	15.3	-3.9	10.4
	3,000	20	2.6	-15.8	38.6	11.6	-2.8	8.1
	10,000	20	3.0	-16.5	34.0	10.9	-2.0	8.1
5 (TVA # 17)	10	2	-3.0	-10.0	4.0	9.9	-91.9	85.9
	100	2	-0.7	-4.3	2.9	5.1	-46.4	45.0
	500	2	-1.7	-5.2	1.9	5.0	-46.8	43.5
	3,000	2	-1.5	-4.8	1.9	4.7	-44.0	41.1
	10,000	2	-2.0	-4.7	0.7	3.8	-36.3	32.3
6 (TVA # 18)	10	15	-10.3	-21.5	-1.6	6.4	-13.8	-6.7
	100	15	-2.0	-7.6	9.1	4.4	-4.5	0.4
	500	15	-0.5	-6.2	10.5	4.5	-3.0	2.0
	3,000	15	-0.5	-5.1	8.4	3.8	-2.6	1.6
	10,000	15	-0.2	-5.3	9.2	4.3	-2.7	2.2
7 (TVA # 19)	10	77	-8.6	-47.7	38.5	13.7	-11.8	-5.5
	100	77	-2.8	-16.9	8.5	4.2	-3.7	-1.8
	500	77	-2.1	-17.3	7.8	4.1	-3.0	-1.1
	3,000	77	-1.9	-15.0	6.5	3.7	-2.7	-1.0
	10,000	77	-1.9	-14.4	3.5	3.6	-2.7	-1.1
8 (TVA # 20)	10	66	-9.9	-34.0	19.7	11.7	-12.7	-7.0
	100	66	-3.9	-15.6	9.0	4.2	-5.0	-2.9
	500	66	-2.8	-15.6	13.8	4.4	-3.9	-1.7

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
	3,000	66	-2.6	-15.8	12.0	4.2	-3.6	-1.5
	10,000	66	-3.4	-16.0	11.0	4.2	-4.4	-2.3
9 (TVA # 21)	10	31	-10.3	-28.2	13.9	12.0	-14.7	-5.9
	100	31	-2.5	-6.7	4.5	2.5	-3.4	-1.6
	500	31	-1.6	-5.6	5.5	2.7	-2.6	-0.6
	3,000	31	-2.0	-5.9	3.2	2.2	-2.8	-1.2
	10,000	31	-1.3	-4.7	2.4	1.9	-2.0	-0.6
10 (TVA # 22)	10	14	-7.7	-30.7	26.5	13.2	-15.3	-0.1
	100	14	-1.2	-7.4	4.6	3.2	-3.1	0.7
	500	14	0.0	-4.3	8.2	3.2	-1.9	1.9
	3,000	14	0.9	-4.8	10.0	4.3	-1.6	3.4
	10,000	14	-0.1	-3.8	3.1	1.8	-1.1	1.0
11 (TVA # 23)	10	8	-20.7	-34.0	-5.0	10.8	-29.7	-11.7
	100	8	-9.2	-14.5	-4.9	3.2	-11.9	-6.6
	500	8	-9.0	-12.6	-4.2	2.7	-11.3	-6.7
	3,000	8	-8.6	-12.1	-3.7	2.6	-10.7	-6.4
	10,000	8	-5.5	-7.9	-2.0	2.2	-7.4	-3.6
12 (TVA # 24)	10	15	-6.5	-26.2	25.4	16.2	-15.5	2.5
	100	15	-1.9	-24.8	20.7	12.6	-8.9	5.0
	500	15	-0.7	-23.5	21.4	11.9	-7.3	5.8
	3,000	15	-0.8	-21.2	21.9	10.7	-6.7	5.1
	10,000	15	-0.2	-17.7	16.0	9.3	-5.3	5.0
All	10	291	-9.5	-47.7	100.0	14.3	-11.1	-7.8
	100	291	-2.7	-24.8	51.0	6.2	-3.4	-2.0
	500	291	-1.8	-23.5	55.8	6.2	-2.5	-1.1
	3,000	291	-1.6	-21.2	38.6	5.4	-2.2	-1.0
	10,000	291	-1.6	-17.7	34.0	5.0	-2.1	-1.0

Table C-2-2. *Summary of Drift Tests of Refinery B Field Screening Instruments*

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
1 (TVA # 594)	10	2	-10.3	-16.0	-4.6	8.1	-82.7	62.1
	100	2	-4.0	-7.7	-0.2	5.3	-51.6	43.7
	500	2	-3.4	-7.1	0.4	5.3	-51.0	44.3
	3,000	2	-2.5	-6.3	1.3	5.4	-50.8	45.8
	10,000	2	-1.0	-3.7	1.7	3.8	-35.3	33.3
2 (TVA # 1208)	10	13	-6.3	-19.3	5.7	6.6	-10.3	-2.4
	100	13	-2.2	-6.6	2.5	2.9	-3.9	-0.4
	500	13	-1.6	-5.8	5.1	3.3	-3.5	0.4
	3,000	13	-1.8	-5.3	1.8	2.2	-3.2	-0.5
	10,000	13	-0.7	-3.4	2.4	2.0	-1.9	0.4
3 (TVA # 1510)	10	23	-6.8	-25.5	14.2	11.7	-11.8	-1.7
	100	23	-5.1	-15.3	3.3	4.6	-7.1	-3.1
	500	23	-4.9	-13.8	4.8	4.2	-6.7	-3.1
	3,000	23	-4.6	-12.4	4.4	3.4	-6.1	-3.1
	10,000	23	-2.9	-9.7	5.6	3.4	-4.4	-1.5
4 (TVA # 1514)	10	22	-6.3	-33.7	22.0	11.7	-11.5	-1.1
	100	22	-5.3	-12.5	-0.5	3.2	-6.7	-3.9
	500	22	-4.2	-10.2	-0.3	2.6	-5.3	-3.0
	3,000	22	-3.7	-12.5	-1.2	2.5	-4.9	-2.6
	10,000	22	-4.6	-10.9	-0.6	2.4	-5.6	-3.5
5 (TVA # 1379)	10	14	-5.9	-20.5	13.9	9.7	-11.6	-0.3
	100	14	-2.8	-10.4	2.1	3.2	-4.7	-1.0
	500	14	-2.4	-11.5	1.6	3.4	-4.3	-0.4
	3,000	14	-2.3	-9.1	1.3	2.8	-4.0	-0.7
	10,000	14	-0.6	-4.0	1.4	2.0	-1.7	0.5
6 (TVA # 1894)	10	1	0.4	0.4	0.4	N/A	N/A	N/A
	100	1	-2.3	-2.3	-2.3	N/A	N/A	N/A
	500	1	-2.4	-2.4	-2.4	N/A	N/A	N/A
	3,000	1	-2.3	-2.3	-2.3	N/A	N/A	N/A
	10,000	1	2.4	2.4	2.4	N/A	N/A	N/A
7 (TVA # 1900)	10	2	-13.1	-16.2	-9.9	4.5	-53.1	27.0
	100	2	-8.7	-10.8	-6.5	3.0	-36.0	18.7
	500	2	-5.9	-9.7	-2.1	5.4	-54.2	42.4
	3,000	2	-7.3	-11.0	-3.6	5.2	-54.3	39.7
	10,000	2	-3.1	-4.2	-2.0	1.6	-17.1	10.9
8 (TVA # 1827)	10	11	-11.4	-22.9	-2.6	8.1	-16.8	-6.0
	100	11	-1.8	-8.3	3.1	4.4	-4.7	1.2
	500	11	-0.7	-5.7	4.3	3.5	-3.0	1.6

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
	3,000	11	-7.3	-71.3	3.9	21.5	-21.7	7.1
	10,000	11	-2.5	-8.8	2.5	3.5	-4.9	-0.2
9 (TVA # 2515)	10	19	-8.6	-23.9	5.0	7.9	-12.4	-4.8
	100	19	-1.7	-7.9	9.5	4.9	-4.0	0.7
	500	19	0.6	-5.4	11.3	4.7	-1.7	2.8
	3,000	19	-0.1	-5.7	8.0	4.2	-2.2	1.9
	10,000	19	-1.3	-7.7	0.9	2.3	-2.3	-0.2
10 (TVA # 2540)	10	18	-8.2	-25.7	2.1	6.5	-11.5	-4.9
	100	18	-2.3	-11.7	4.0	4.6	-4.6	0.0
	500	18	-0.6	-10.1	5.1	3.5	-2.4	1.1
	3,000	18	-1.5	-9.0	3.2	3.1	-3.1	0.0
	10,000	18	-1.0	-6.4	0.3	1.8	-1.9	0.0
11 (TVA # 2590)	10	1	-11.6	-11.6	-11.6	N/A	N/A	N/A
	100	1	-5.7	-5.7	-5.7	N/A	N/A	N/A
	500	1	-2.6	-2.6	-2.6	N/A	N/A	N/A
	3,000	1	-3.0	-3.0	-3.0	N/A	N/A	N/A
	10,000	1	-1.1	-1.1	-1.1	N/A	N/A	N/A
12 (TVA # 1898)	10	10	-5.8	-20.1	8.7	9.7	-12.7	1.2
	100	10	-2.2	-9.3	5.9	4.6	-5.4	1.1
	500	10	-1.9	-8.7	3.1	3.5	-4.4	0.6
	3,000	10	-1.9	-8.2	2.8	3.2	-4.1	0.4
	10,000	10	-0.6	-1.7	1.3	0.9	-1.2	0.0
All	10	136	-7.4	-33.7	22.0	9.3	-9.0	-5.9
	100	136	-3.3	-15.3	9.5	4.3	-4.0	-2.6
	500	136	-2.3	-13.8	11.3	4.0	-2.9	-1.6
	3,000	136	-2.9	-71.3	8.0	6.9	-4.1	-1.8
	10,000	136	-2.0	-10.9	5.6	2.8	-2.4	-1.5

Table C-2-3. Summary of Drift Tests of Refinery C Field Screening Instruments

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
1 (TVA # 1556)	10	2	-3.9	-4.8	-2.9	1.3	-15.9	8.2
	100	2	-2.6	-5.1	0.0	3.6	-35.0	29.9
	500	2	-3.7	-7.7	0.3	5.7	-54.5	47.1
	3,000	2	-6.7	-7.1	-6.2	0.6	-12.4	-0.9
	10,000	2	-2.0	-3.8	-0.2	2.5	-24.9	20.9
2 (TVA # 1926)	10	3	0.5	-4.7	6.3	5.5	-13.2	14.2
	100	3	2.2	0.6	3.6	1.5	-1.6	5.9
	500	3	2.2	1.1	3.0	1.0	-0.2	4.6
	3,000	3	0.5	-0.2	1.0	0.6	-1.1	2.0
	10,000	3	-1.0	-1.3	-0.4	0.5	-2.2	0.3
3 (TVA # 1933)	10	1	-7.7	-7.7	-7.7	N/A	N/A	N/A
	100	1	-6.2	-6.2	-6.2	N/A	N/A	N/A
	500	1	-4.5	-4.5	-4.5	N/A	N/A	N/A
	3,000	1	-2.9	-2.9	-2.9	N/A	N/A	N/A
	10,000	1	1.7	1.7	1.7	N/A	N/A	N/A
4 (TVA # 1959)	10	2	-3.9	-5.4	-2.4	2.1	-23.0	15.2
	100	2	-1.8	-2.2	-1.3	0.6	-7.5	4.0
	500	2	-1.4	-1.9	-0.8	0.8	-8.3	5.6
	3,000	2	-2.1	-2.2	-2.0	0.1	-3.4	-0.8
	10,000	2	-1.3	-1.3	-1.2	0.1	-1.9	-0.6
5 (TVA # 1993)	10	14	-3.6	-19.0	19.0	9.9	-9.3	2.2
	100	14	-1.4	-8.5	8.5	5.3	-4.4	1.7
	500	14	-1.5	-7.2	9.0	4.6	-4.2	1.1
	3,000	14	-0.8	-7.0	7.1	4.8	-3.6	1.9
	10,000	14	-0.5	-5.7	8.3	3.7	-2.6	1.7
6 (TVA # 2161)	10	16	-5.2	-16.8	8.2	7.9	-9.4	-1.0
	100	16	-2.2	-8.9	11.7	6.1	-5.5	1.0
	500	16	-2.2	-9.8	12.6	6.5	-5.7	1.3
	3,000	16	-2.2	-7.5	7.8	4.3	-4.5	0.1
	10,000	16	-0.9	-6.4	11.7	5.1	-3.6	1.8
7 (TVA # 2314)	10	19	-4.9	-16.8	8.1	6.1	-7.8	-2.0
	100	19	-0.6	-9.7	10.4	5.3	-3.2	1.9
	500	19	0.5	-8.4	14.1	6.1	-2.5	3.4
	3,000	19	0.1	-7.6	14.0	5.7	-2.6	2.9
	10,000	19	0.7	-8.6	11.2	5.7	-2.1	3.4
8 (TVA # 2612)	10	14	-4.7	-20.0	9.4	8.9	-9.9	0.4
	100	14	-0.5	-11.1	8.8	5.9	-3.9	2.9
	500	14	-1.3	-8.9	6.9	4.5	-3.9	1.3

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
	3,000	14	-1.5	-11.1	7.9	5.5	-4.6	1.7
	10,000	14	-1.1	-9.9	7.3	4.5	-3.7	1.5
9 (TVA # 2635)	10	14	-1.6	-15.2	22.1	11.2	-8.1	4.8
	100	14	-1.8	-9.5	8.1	5.9	-5.2	1.6
	500	14	-2.1	-7.9	8.3	5.6	-5.3	1.2
	3,000	14	-1.3	-8.8	7.8	4.9	-4.1	1.5
	10,000	14	-2.8	-16.2	10.7	7.0	-6.9	1.2
10 (TVA # 2954)	10	16	-9.1	-19.6	24.0	10.7	-14.8	-3.4
	100	16	-2.8	-7.9	4.4	3.3	-4.6	-1.0
	500	16	-2.7	-6.7	5.0	3.0	-4.3	-1.1
	3,000	16	-1.6	-6.9	9.3	3.8	-3.6	0.5
	10,000	16	-1.9	-5.9	3.2	2.3	-3.2	-0.7
11 (TVA # 3308)	10	2	-7.2	-7.5	-6.9	0.4	-11.0	-3.4
	100	2	-5.0	-5.4	-4.6	0.6	-10.1	0.1
	500	2	-4.5	-5.5	-3.5	1.4	-17.2	8.2
	3,000	2	-6.0	-7.7	-4.3	2.4	-27.6	15.6
	10,000	2	-2.5	-4.4	-0.6	2.7	-26.6	21.6
All	10	103	-4.8	-20.0	24.0	8.8	-6.6	-3.1
	100	103	-1.6	-11.1	11.7	5.1	-2.6	-0.6
	500	103	-1.5	-9.8	14.1	5.1	-2.5	-0.5
	3,000	103	-1.4	-11.1	14.0	4.7	-2.3	-0.4
	10,000	103	-1.0	-16.2	11.7	4.7	-2.0	-0.1

Table C-2-4. Summary of Drift Tests of Refinery D Field Screening Instruments

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
1 (TVA # 33)	10	7	-5.5	-22.0	13.9	13.0	-17.6	6.5
	100	7	-1.5	-7.8	5.9	4.4	-5.5	2.6
	500	7	71.3	-7.9	513.0	194.8	-108.8	251.5
	3,000	7	7.0	-7.1	51.9	20.3	-11.7	25.8
	10,000	7	-0.7	-5.3	2.3	2.4	-2.9	1.5
2 (TVA # 85)	10	4	-3.4	-14.3	19.4	15.6	-28.2	21.4
	100	4	0.9	-4.4	6.0	4.2	-5.9	7.6
	500	4	1.8	1.4	2.0	0.3	1.4	2.2
	3,000	4	5.0	-0.8	11.5	5.1	-3.1	13.1
	10,000	4	0.1	-1.0	0.7	0.8	-1.2	1.3
3 (TVA # 140)	10	8	0.0	-14.4	12.6	11.2	-9.4	9.3
	100	8	-0.6	-7.7	5.9	4.8	-4.6	3.4
	500	8	0.3	-6.7	9.3	5.0	-3.9	4.5
	3,000	8	2.5	-5.9	12.3	6.3	-2.7	7.8
	10,000	8	0.3	-5.1	9.1	4.1	-3.2	3.7
4 (TVA # 289)	10	20	7.1	-16.7	56.4	21.1	-2.8	17.0
	100	20	0.0	-4.4	9.7	3.4	-1.6	1.6
	500	20	-0.3	-3.4	6.7	2.4	-1.5	0.8
	3,000	20	2.1	-5.5	32.5	8.3	-1.8	6.0
	10,000	20	-0.7	-3.0	2.6	1.3	-1.3	0.0
5 (TVA # 367)	10	1	-1.1	-1.1	-1.1	N/A	N/A	N/A
	100	1	-9.7	-9.7	-9.7	N/A	N/A	N/A
	500	1	-12.3	-12.3	-12.3	N/A	N/A	N/A
	3,000	1	-12.2	-12.2	-12.2	N/A	N/A	N/A
	10,000	1	-5.0	-5.0	-5.0	N/A	N/A	N/A
6 (TVA # 372)	10	1	14.1	14.1	14.1	N/A	N/A	N/A
	100	1	4.0	4.0	4.0	N/A	N/A	N/A
	500	1	-0.9	-0.9	-0.9	N/A	N/A	N/A
	3,000	1	0.8	0.8	0.8	N/A	N/A	N/A
	10,000	1	3.5	3.5	3.5	N/A	N/A	N/A
7 (TVA # 553)	10	21	-0.3	-22.9	43.8	16.7	-7.9	7.3
	100	21	-1.6	-9.4	5.2	3.3	-3.1	-0.1
	500	21	-0.9	-7.6	7.0	3.7	-2.6	0.8
	3,000	21	0.2	-11.0	24.6	8.3	-3.5	4.0
	10,000	21	-0.7	-5.9	9.0	3.5	-2.3	0.9
8 (TVA # 2005)	10	24	-6.9	-23.6	16.8	8.3	-10.4	-3.4
	100	24	-3.1	-8.8	8.6	4.0	-4.9	-1.4
	500	24	-2.6	-7.5	7.4	3.4	-4.0	-1.1

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
	3,000	24	-2.2	-12.6	9.4	5.2	-4.4	0.0
	10,000	24	-2.6	-24.3	9.0	5.5	-4.9	-0.3
9 (TVA # 2021)	10	21	-8.5	-33.0	13.6	11.2	-13.5	-3.4
	100	21	-4.4	-9.5	2.3	3.1	-5.8	-2.9
	500	21	-3.4	-6.5	0.2	2.0	-4.3	-2.5
	3,000	21	-3.0	-6.9	2.3	2.3	-4.0	-1.9
	10,000	21	-0.5	-6.8	2.4	2.4	-1.6	0.6
10 (TVA # 10)	10	20	-2.7	-20.9	31.9	13.0	-8.8	3.3
	100	20	-3.6	-7.7	2.7	2.4	-4.7	-2.5
	500	20	-2.3	-6.3	11.0	3.7	-4.1	-0.6
	3,000	20	-1.1	-5.8	12.1	5.0	-3.4	1.2
	10,000	20	-1.1	-5.2	5.0	2.3	-2.2	0.0
All	10	127	-2.4	-33.0	56.4	14.8	-5.0	0.2
	100	127	-2.3	-9.7	9.7	3.8	-3.0	-1.6
	500	127	2.3	-12.3	513.0	45.8	-5.8	10.3
	3,000	127	-0.1	-12.6	51.9	7.8	-1.5	1.3
	10,000	127	-1.0	-24.3	9.1	3.4	-1.6	-0.4

Table C-2-5. Summary of Drift Tests of Refinery E Field Screening Instruments

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
1 (TVA # 636)	10	26	-13.5	-29.3	5.3	9.1	-17.1	-9.8
	100	26	-4.0	-13.0	3.7	4.4	-5.8	-2.2
	500	26	-3.8	-10.6	3.8	4.0	-5.4	-2.2
	3,000	26	-3.1	-11.4	3.7	4.3	-4.8	-1.3
	10,000	26	-1.8	-7.3	2.6	2.9	-3.0	-0.6
2 (TVA # 637)	10	1	-21.8	-21.8	-21.8	N/A	N/A	N/A
	100	1	-13.2	-13.2	-13.2	N/A	N/A	N/A
	500	1	-13.5	-13.5	-13.5	N/A	N/A	N/A
	3,000	1	-7.7	-7.7	-7.7	N/A	N/A	N/A
	10,000	1	-0.5	-0.5	-0.5	N/A	N/A	N/A
3 (TVA # 638)	10	14	-11.1	-21.7	9.7	9.2	-16.4	-5.8
	100	14	-6.1	-13.5	-1.0	3.4	-8.0	-4.1
	500	14	-5.0	-10.3	4.1	4.5	-7.6	-2.3
	3,000	14	-6.0	-19.6	3.3	6.3	-9.6	-2.4
	10,000	14	-2.5	-7.3	1.9	2.6	-4.0	-0.9
4 (TVA # 640)	10	20	-14.8	-34.2	4.4	10.0	-19.5	-10.1
	100	20	-5.4	-19.2	5.0	6.0	-8.2	-2.6
	500	20	-4.8	-17.6	6.3	5.5	-7.4	-2.2
	3,000	20	-4.4	-20.2	5.6	6.5	-7.4	-1.3
	10,000	20	-3.5	-16.5	5.9	5.0	-5.9	-1.2
5 (TVA # 641)	10	7	-5.1	-18.4	16.2	12.3	-16.5	6.3
	100	7	-8.2	-11.5	-2.4	3.7	-11.6	-4.8
	500	7	-5.5	-9.4	-1.5	3.0	-8.2	-2.7
	3,000	7	-11.8	-39.1	-0.5	12.6	-23.5	-0.2
	10,000	7	-5.3	-9.5	-3.1	2.2	-7.4	-3.2
6 (TVA # 645)	10	8	-15.3	-22.6	-3.5	6.6	-20.8	-9.7
	100	8	-6.5	-12.6	-0.6	4.5	-10.3	-2.8
	500	8	-4.8	-9.5	-1.7	2.6	-7.0	-2.6
	3,000	8	-5.2	-9.7	0.1	3.4	-8.1	-2.4
	10,000	8	-3.4	-9.2	1.3	3.8	-6.6	-0.2
7 (TVA # 1881)	10	18	-14.2	-28.0	4.0	8.2	-18.3	-10.1
	100	18	-4.2	-14.4	7.7	5.6	-6.9	-1.4
	500	18	-5.1	-11.7	1.3	3.9	-7.1	-3.2
	3,000	18	-4.3	-10.0	9.0	4.5	-6.6	-2.1
	10,000	18	-3.2	-10.1	3.3	4.0	-5.2	-1.2
All	10	94	-13.2	-34.2	16.2	9.4	-15.1	-11.2
	100	94	-5.3	-19.2	7.7	5.0	-6.3	-4.3
	500	94	-4.7	-17.6	6.3	4.3	-5.6	-3.9

Instrument	Standard (ppmv)	Number of Checks	Average Percent Difference	Minimum Percent Difference	Maximum Percent Difference	Standard Deviation of Percent Difference	95 % Confidence Interval	
							Lower	Upper
	3,000	94	-4.9	-39.1	9.0	6.2	-6.2	-3.6
	10,000	94	-2.9	-16.5	5.9	3.7	-3.7	-2.2

Mass Emissions Sampling

Table C-2-6. Summary of Sample Train Recovery Results

			Quality Control Bag 1						Quality Control Bag 2													
QC Type	Date	TVA ID	TVA Conc (ppmv)	Methane Molar Mass (kg/mol)	Dry Gas Meter (DGM) Reading (liters/min)	DGM Pressure (mm Hg)	DGM Temp (deg. C)	Emission Rate (kg/hour)	TVA Conc (ppmv)	Methane Molar Mass (kg/mol)	DGM Reading (liters/min)	DGM Pressure (mm Hg)	DGM Temp (deg. C)	Emission Rate (kg/hour)	Avg Emission Rate (kg/hour)	Difference in Bags Emission Rate (%)	QC Gas Conc (ppmv)	Gas Flow Rate (liters/min)	Temperature at Bubble Meter (deg C)	Pressure at Bubble Meter (mm Hg)	Theoretical Emission Rate (kg/hour)	Percentage Recovery (%)
Pre-Test QC High	18-Feb-17	2385	6452	16.04	7.69	755.3	20	1.98E-03	6580	16.04	7.79	755.2865	20	2.04E-03	2.01E-03	-3.2%	9951	4.355	20.0	759.21	1.73E-03	115.9%
Pre-Test QC High	21-Feb-17	9509	4850	16.04	8.22	761.6	16	1.62E-03	4937	16.04	8.33	761.3825	16	1.68E-03	1.65E-03	-3.1%	9973	4.078	18.2	765.30	1.65E-03	100.1%
Pre-Test QC Low	21-Feb-17	9509	840	16.04	8.22	761.9	15	2.82E-04	839	16.04	8.22	761.8905	15	2.82E-04	2.82E-04	0.1%	9973	0.654	20.7	765.81	2.62E-04	107.4%
Post-Test High	15-Mar-17	9509	6310	16.04	7.89	759.0	19	2.00E-03	6450	16.04	7.79	759.0291	19	2.02E-03	2.01E-03	-0.9%	9973	4.845	19.8	762.76	1.94E-03	103.5%
Pre-Test QC Low	15-Mar-17	9509	852	16.04	7.89	758.8	19	2.70E-04	837	16.04	7.89	758.8425	19	2.65E-04	2.68E-04	1.8%	9973	0.636	19.8	762.76	2.55E-04	105.1%
Pre-Test QC Low	18-Jul-17	2385	690	16.04	7.89	755.1	20	2.17E-04	708	16.04	7.89	755.0998	20	2.22E-04	2.20E-04	-2.5%	9951	0.465	19.8	759.21	1.85E-04	118.7%
Post-Test High	28-Jul-17	2385	6430	16.04	6.98	754.0	20	1.78E-03	6450	16.04	6.90	753.9751	20	1.77E-03	1.77E-03	0.8%	9951	4.310	24.4	757.43	1.68E-03	105.4%
Post-Test QC Low	28-Jul-17	2385	695	16.04	7.06	753.9	20	1.95E-04	700	16.04	6.98	753.8817	20	1.94E-04	1.94E-04	0.5%	9951	0.460	23.1	757.43	1.81E-04	107.6%
Pre-Test QC High	20-Mar-18	37887	6080	16.04	7.89	756.3	17	1.93E-03	6155	16.04	7.89	756.3025	17	1.96E-03	1.95E-03	-1.2%	9997	4.400	17.1	760.22	1.78E-03	109.5%
Pre-Test QC Low	20-Mar-18	37887	813	16.04	8.00	756.3	17	2.62E-04	804	16.04	7.79	756.3025	17	2.53E-04	2.57E-04	3.8%	9997	0.577	17.1	760.22	2.33E-04	110.5%
Post-Test High	17-Apr-18	37887	6320	16.04	6.98	764.5	19	1.78E-03	6500	16.04	6.90	764.5497	19	1.81E-03	1.80E-03	-1.6%	9997	4.440	18.9	768.10	1.80E-03	99.8%
Post-Test QC Low	17-Apr-18	37887	822	16.04	7.14	764.5	19	2.37E-04	844	16.04	7.06	764.5497	19	2.41E-04	2.39E-04	-1.4%	9997	0.591	19.2	768.10	2.39E-04	99.9%
Post-Test High	10-May-18	37887	7105	16.04	6.67	756.6	18	1.90E-03	7122	16.04	6.67	756.6084	18	1.90E-03	1.90E-03	-0.2%	9997	4.410	18.3	759.97	1.77E-03	107.2%
Post-Test QC Low	10-May-18	37887	584	16.04	6.67	756.6	18	1.56E-04	590	16.04	6.67	756.6084	18	1.58E-04	1.57E-04	-1.0%	9997	0.387	18.3	759.97	1.56E-04	100.8%
Post-Test High	18-Jul-18	37887	6712	16.04	7.14	756.4	21	1.90E-03	6734	16.04	7.06	756.4217	21	1.89E-03	1.90E-03	0.9%	9970	4.645	23.3	759.97	1.83E-03	103.5%
Post-Test QC Low	18-Jul-18	37887	735	16.04	7.32	756.2	21	2.13E-04	702	16.04	7.14	756.2351	21	1.99E-04	2.06E-04	7.3%	9970	0.500	21.7	759.97	1.98E-04	104.0%
Post-Test QC Low	2-Oct-18	F.33	705	16.04	7.23	752.9	21	2.01E-04	720	16.04	7.06	752.9331	21	2.01E-04	2.01E-04	0.3%	9970	0.480	21.1	756.67	1.90E-04	105.9%
Post-Test QC Low	11-Oct-18	3536	728	16.04	7.23	754.2	18	2.10E-04	725	16.04	7.23	754.2031	18	2.09E-04	2.10E-04	0.4%	9970	0.468	19.1	757.94	1.87E-04	112.5%
Post-Test High	11-Oct-18	3536	6247	16.04	7.32	754.2	18	1.83E-03	6381	16.04	7.23	754.2031	18	1.84E-03	1.84E-03	-0.9%	9970	4.290	19.3	757.94	1.71E-03	107.3%
Post-Test High	30-Nov-18	F.33	7166	16.04	6.67	758.4	16	1.93E-03	7241	16.04	6.59	758.3864	16	1.93E-03	1.93E-03	0.1%	9970	4.035	17.2	761.75	1.63E-03	118.8%
Post-Test QC Low	30-Nov-18	3536	652	16.04	6.67	758.4	16	1.76E-04	664	16.04	6.52	758.3864	16	1.75E-04	1.76E-04	0.4%	9970	0.425	17.2	761.75	1.72E-04	102.4%

Table C-2-7. Summary of Field Spike Recovery Sample Results

Refinery	Sample	Spike	Percentage Recovery (%) by Compound (by carbon number)																				Minimum	Maximum
			C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}		
A	A004		119	164	183	165	147	196	528	350	219	83	-4	105	107	115	90	113	112	112	109	105	-4	528
A	A005		80	102	99	108	111	85	177	73	-34	-112	-142	57	86	94	94	96	92	89	84	80	-142	177
A	A006		92	85	115	119	120	120	110	110	118	141	107	93	99	100	95	93	90	87	82	78	78	141
A	A007		91	85	101	125	163	355	195	-70	39	-101	-17	63	89	97	94	95	91	105	82	78	-101	355
A	A015		89	96	70	109	-2	-279	-284	-210	-177	-25	100	129	100	99	94	91	88	84	79	75	-284	129
A	A012	*Low*	99	115	118	129	133	135	135	145	144	140	124	122	118	115	112	108	104	101	96	91	91	145
A	A015	*High*	102	118	114	126	118	114	114	173	215	273	138	125	121	119	116	113	109	106	101	97	97	273
A	A020	*High*	92	107	106	128	134	137	143	157	310	526	153	126	123	121	117	115	111	108	103	98	92	526
A	A029	*Low*	106	116	122	136	152	145	137	126	129	149	143	135	132	129	125	122	119	115	111	106	106	152
A	A032	*Low*	107	123	125	130	140	141	136	134	138	153	136	131	127	124	120	117	113	109	104	99	99	153
A	A035	*High*	105	119	109	113	114	90	36	-45	-99	160	90	119	115	112	109	108	106	103	100	95	-99	160
A	A084	*Low*	85	143	185	108	113	119	119	119	117	115	114	110	107	105	102	99	96	92	88	83	83	185
B	B009		83	103	113	125	133	137	136	133	135	138	128	95	120	118	115	115	111	110	103	99	83	138
B	B014		90	105	115	133	136	140	140	140	136	135	132	131	129	126	123	120	116	112	107	103	90	140
B	B025		91	105	114	123	104	106	128	135	125	121	119	123	121	121	117	115	111	108	103	99	91	135
B	B035		107	118	126	116	114	114	111	110	111	109	107	102	99	95	91	86	82	77	71	66	66	126
B	B038		105	113	121	115	115	115	113	111	111	109	108	105	102	99	95	92	87	83	78	73	73	121
B	B051		104	110	116	133	135	130	127	128	138	136	135	135	132	130	127	124	120	117	113	110	104	138
C	C003	*Low*	103	110	120	128	130	131	132	132	134	132	129	123	120	117	113	110	107	103	98	94	94	134
C	C015	*Low*	81	84	88	133	138	165	301	153	154	141	139	133	130	128	124	121	117	114	108	103	81	301
C	C024	*Low*	75	83	85	132	136	142	141	141	141	139	137	130	126	123	119	116	112	108	103	98	75	142
C	C039	*Low*	94	101	105	138	144	148	148	148	148	145	142	135	131	128	124	121	116	113	107	103	94	148
C	C042	*Low*	108	122	130	135	141	151	160	146	147	144	141	133	130	127	123	120	116	111	107	102	102	160
C	C051	*Low*	105	117	128	135	155	156	146	153	139	136	132	124	120	117	113	110	107	103	98	94	94	156
D	D014	*High*	125	129	125	137	98	28	93	107	108	116	114	113	111	109	107	105	102	99	95	91	28	137
D	D031	*Low*	110	117	129	125	124	126	125	125	125	123	121	118	114	111	106	102	97	92	88	83	83	129
D	D042	*High*	112	108	116	111	129	67	64	138	299	212	145	122	117	115	111	109	106	102	98	94	64	299
D	D049	*High*	95	102	107	126	125	114	107	129	122	113	117	121	120	118	115	112	109	105	101	98	95	129
D	D054	*Low*	108	96	99	159	130	132	131	124	130	127	125	117	105	116	115	111	107	104	100	95	95	159
D	D057	*Low*	95	114	129	124	126	128	126	126	126	124	124	123	120	118	114	111	108	105	103	99	95	129
D	D072	*High*	90	112	119	63	81	90	100	100	97	98	96	94	91	89	85	81	76	72	67	62	62	119
Minimum			75	83	70	63	-2	-279	-284	-210	-177	-112	-142	57	86	89	85	81	76	72	67	62	-284	119
Maximum			125	164	185	165	163	355	528	350	310	526	153	135	132	130	127	124	120	117	113	110	106	528

Laboratory

Table C-2-8. Summary of Laboratory Control Sample Results

Refinery Samples	Laboratory Control Sample	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}	C_{25}	C_{26}	C_{27}	C_{28}	C_{29}	C_{30}	Min	Max
District Samples 1 & 2	gcprep1563 #CT-LCS1	118	121	123	114	115	116	116	115	114	113	112	110	107	105	102	99	96	93	89	85	81	76	71	67	61	56	56	123
District Samples 1 & 2	gcprep1563 #CT-LCS2	117	120	122	112	114	114	114	113	112	111	110	108	106	103	101	98	96	92	88	85	81	76	71	67	62	56	56	122
District Samples 1 & 2	gcprep1563 #XAD2-LCS1	87	114	121	111	113	116	114	117	114	116	115	115	114	115	115	115	115	115	115	115	116	116	116	116	117	117	87	121
District Samples 1 & 2	gcprep1563 #XAD2-LCS2	ND	ND	ND	101	108	113	113	116	113	115	114	114	113	113	113	113	114	114	114	114	115	115	115	116	117	117	101	117
District Samples 1 & 2	gcprep1563 #XAD2-LCS3	69	93	107	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	69	107
District Samples 3 - 8	gcprep1643 #XAD2-LCS1	71	120	147	100	101	102	102	103	103	104	104	104	104	104	104	105	105	106	106	106	106	107	107	108	109	110	71	147
District Samples 3 - 8	gcprep1643 #XAD2-LCS2	93	107	101	100	101	102	103	104	104	105	105	105	105	105	105	106	106	107	107	107	107	107	108	108	109	110	93	110
District Samples 3 - 8	gcprep1643 #CT-LCS1	108	113	115	111	110	110	110	109	108	107	105	104	102	99	97	94	91	88	85	81	78	73	69	65	60	56	56	115
District Samples 3 - 8	gcprep1643 #CT-LCS2	103	108	110	109	109	109	109	109	107	106	104	102	99	96	93	90	86	83	79	75	71	67	62	58	54	49	49	110
A001 to A0017	gcprep1650 #LCS1-CT	102	121	131	111	111	111	112	110	108	107	105	103	100	98	95	92	88	85	81	78	N/M	N/M	N/M	N/M	N/M	N/M	78	131
A001 to A0017	gcprep1650 #LCS1-XAD2	77	106	106	109	110	110	111	111	111	111	111	110	110	110	110	110	110	110	110	110	N/M	N/M	N/M	N/M	N/M	N/M	77	111
A001 to A0017	gcprep1650 #LCS2-CT	111	118	122	111	110	111	111	110	108	107	105	102	99	97	93	90	86	83	78	75	N/M	N/M	N/M	N/M	N/M	N/M	75	122
A001 to A0017	gcprep1650 #LCS2-XAD2	76	106	104	107	108	109	110	111	110	111	111	111	111	111	110	111	110	111	111	111	N/M	N/M	N/M	N/M	N/M	N/M	76	111
A018 - A035	gcprep1674 #LCS1-CT	99	106	109	120	123	123	123	122	120	120	118	116	113	111	108	105	101	98	94	90	N/M	N/M	N/M	N/M	N/M	N/M	90	123
A018 - A035	gcprep1674 #LCS2-CT	84	108	115	126	129	129	128	128	126	125	124	121	119	116	113	110	106	103	98	94	N/M	N/M	N/M	N/M	N/M	N/M	84	129
A018 - A035	gcprep1674 #LCS1-XAD2	92	100	101	110	114	114	114	114	113	114	114	114	114	114	114	114	114	115	115	115	N/M	N/M	N/M	N/M	N/M	N/M	92	115
A018 - A035	gcprep1674 #LCS2-XAD2	28	123	158	171	183	187	189	190	189	189	189	189	189	189	189	190	190	191	191	191	N/M	N/M	N/M	N/M	N/M	N/M	28	191
B01 - B028	gcprep1907 #HIGH-LCS1-TubeSpk	99	109	109	109	102	103	101	109	110	110	108	107	105	103	100	98	96	93	90	87	N/M	N/M	N/M	N/M	N/M	N/M	87	110
B01 - B028	gcprep1896 #LOW-LCS1-CT	94	101	106	108	108	109	107	107	107	106	105	104	103	101	99	97	95	92	89	86	N/M	N/M	N/M	N/M	N/M	N/M	86	109
B01 - B028	gcprep1896 #LOW-LCS2-CT	93	101	106	112	112	113	111	111	111	110	109	108	106	104	102	99	97	94	90	87	N/M	N/M	N/M	N/M	N/M	N/M	87	113
B029 - B040	gcprep2285 #LCS-Low	112	127	144	154	163	146	137	139	136	139	145	162	159	157	153	150	146	142	138	133	N/M	N/M	N/M	N/M	N/M	N/M	112	163
B041 - B046	gcprep2312 #LCS-CT-Low	83	86	88	110	111	115	117	117	118	116	114	107	105	103	100	98	95	93	89	85	N/M	N/M	N/M	N/M	N/M	N/M	83	118
B047 - B063	gcprep2313 #LCS-Med	100	103	109	114	116	121	119	121	118	114	107	105	102	100	96	93	90	86	82	78	N/M	N/M	N/M	N/M	N/M	N/M	78	121
B064 - B069	gcprep2315 #LCS-Low	100	104	108	113	112	113	112	112	113	112	110	105	103	101	99	96	93	90	87	83	N/M	N/M	N/M	N/M	N/M	N/M	83	113
C001 - C010	gcprep2328 # LCS-Low	102	107	110	114	114	116	116	116	117	115	113	108	106	104	101	98	95	93	89	85	N/M	N/M	N/M	N/M	N/M	N/M	85	117
C011 - C032	gcprep2339 #LCS-Low-1	72	72	74	120	120	126	127	127	128	125	122	113	109	106	102	99	94	90	85	81	N/M	N/M	N/M	N/M	N/M	N/M	72	128
C011 - C032	gcprep2339 #LCS-Low-2	73	74	76	121	122	126	125	126	126	124	122	115	111	109	104	102	96	93	87	82	N/M	N/M	N/M	N/M	N/M	N/M	73	126
C033 - C046	gcprep2377 #LCS-1	85	89	92	118	119	123	124	124	125	122	120	112	110	107	104	102	98	95	91	87	N/M	N/M	N/M	N/M	N/M	N/M	85	125
C033 - C046	gcprep2377 #LCS-2	85	89	92	116	117	120	120	120	120	118	117	111	109	107	104	102	99	96	92	88	N/M	N/M	N/M	N/M	N/M	N/M	85	120
C047 - C055	gcprep2402 #LCS-Low	86	107	123	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	75	N/M	N/M	N/M	N/M	N/M	N/M	86	123
C047 - C055	gcprep2419 #LCS-Low	BL	BL	BL	110	109	109	107	107	106	105	104	102	99	97	94	92	89	85	80	BL	N/M	N/M	N/M	N/M	N/M	N/M	75	110
C056 - C065	gcprep2414 #LCS Low	71	99	127	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL	75	N/M	N/M	N/M	N/M	N/M	N/M	71	127
C056 - C065	gcprep2419 #LCS-Low	BL	BL	BL	110	109	109	107	107	106	105	104	102	99	97	94	92	89	85	80	87	N/M	N/M	N/M	N/M	N/M	N/M	75	110
D01 - D028	gcprep2239 #LCS-High-1	110	107	116	111	121	121	120	112	110	111	109	108	106	105	102	100	97	94	91	91	N/M	N/M	N/M	N/M	N/M	N/M	87	121
D01 - D028	gcprep2239 #LCS-Low-1	110	105	119	117	117	119	117	117	117	116	115	112	110	109	107	105	102	99	95	75	N/M	N/M	N/M	N/M	N/M	N/M	91	119
D01 - D028	gcprep2239 #LCS-Med-1	108	108	120	122	122	123	121	122	122	120	118	117	115	113	111	109	106	103	98	94	N/M	N/M	N/M	N/M	N/M	N/M	94	123
D01 - D028	gcprep2249 #LCS-Med-2	99	98	109	117	116	117	113	114	117	115	112	110	109	107	104	102	99	96	93	90	N/M	N/M	N/M	N/M	N/M	N/M	90	117
D029 - D044	gcprep2257 #LCS-High-2	102	99	107	115	118	118	116	116	113	113	111	109	107	105	102	100	97	94	90	87	N/M	N/M	N/M	N/M	N/M	N/M	87	118
D029 - D044	gcprep2257 #LCS-Low-2	98	107	117	110	110	111	110	109	110	108	107	104	101	98	95	91	87	83	79	76	N/M	N/M	N/M	N/M	N/M	N/M	76	117
D045 - D061	gcprep2269 #LCS-High-2-RE	95	97	105	109	113	114	113	110	108	106	105	103	102	100	97	95	93	90	87	84	N/M	N/M	N/M	N/M	N/M	N/M	84	114
D045 - D061	gcprep2269 #LCS-Low-1-RE	90	98	111	111	110	112	112	111	113	111	109	105	103	101	98	96	93	90	87	83	N/M	N/M	N/M	N/M	N/M	N/M	83	113
D062 - D069	gcprep2274 #LCS-Med	102	108	112	116	116	118	116	118	118	116	113	112	110	108	105	103	100	98	96	94	N/M	N/M	N/M	N/M	N/M	N/M	94	118

Refinery Samples	Laboratory Control Sample	C_5	C_6	C_7	C_8	C_9	C_{10}	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C	C_{20}	C_{21}	C_{22}	C_{23}	C_{24}	C_{25}	C_{26}	C_{27}	C_{28}	C_{29}	C_{30}	Min	Max
D070 - D084	gcprep2643 #LCS1-High	98	108	110	117	125	138	143	143	143	131	125	124	121	118	115	110	105	100	95	89	N/M	N/M	N/M	N/M	N/M	N/M	89	143
D070 - D084	gcprep2643 #LCS2-High	104	111	111	126	134	133	137	138	138	124	122	121	119	117	114	110	106	101	96	90	N/M	N/M	N/M	N/M	N/M	N/M	90	138
D085 - D090	gcprep2656 #LCS-Low	105	111	113	110	112	114	114	115	116	116	114	111	109	107	103	101	97	94	91	88	N/M	N/M	N/M	N/M	N/M	N/M	88	116
E001 - E020	gcprep2465 #LCS-Low	98	104	106	113	113	114	112	112	112	111	110	107	105	103	100	97	94	91	87	83	N/M	N/M	N/M	N/M	N/M	N/M	83	114
E001 - E020	gcprep2465 #LCS-High	98	106	107	113	110	110	109	111	114	112	111	109	107	105	102	100	97	93	90	85	N/M	N/M	N/M	N/M	N/M	N/M	85	114
E021 - E041	gcprep2501 #LCS-Low	106	115	112	115	117	118	117	116	116	114	113	110	109	107	104	102	100	97	94	91	N/M	N/M	N/M	N/M	N/M	N/M	91	118
E021 - E041	gcprep2501 #LCS-High	102	112	107	123	128	130	128	128	124	120	118	117	117	113	111	108	105	101	97	93	N/M	N/M	N/M	N/M	N/M	N/M	93	130
E042 - E055	gcprep2518 #LCS-MED	95	108	103	118	120	123	122	123	124	119	114	111	109	107	103	99	95	90	84	79	N/M	N/M	N/M	N/M	N/M	N/M	79	124
E056 - E072	gcprep2568 #LCS1-Med	104	113	114	117	120	121	120	119	120	119	116	114	112	110	107	104	101	98	94	91	N/M	N/M	N/M	N/M	N/M	N/M	91	121
E056 - E072	gcprep2568 #LCS2-Med	106	116	114	121	125	126	125	125	126	127	126	124	122	120	116	112	108	103	98	93	N/M	N/M	N/M	N/M	N/M	N/M	93	127
E072 - E094	gcprep2620 #LCS-Low	98	115	119	110	110	110	109	108	108	106	104	100	96	93	89	85	80	75	69	64	N/M	N/M	N/M	N/M	N/M	N/M	64	119
E072 - E094	gcprep2620 #LCS-High	107	112	109	110	113	117	120	118	117	104	102	99	97	94	91	87	83	79	75	70	N/M	N/M	N/M	N/M	N/M	N/M	70	120
	Minimum	71	72	74	109	109	109	107	107	106	104	102	99	96	93	89	85	80	75	69	64	71	67	62	58	54	49	64	143
	Maximum	110	116	127	126	134	138	143	143	143	131	126	124	122	120	116	112	108	103	98	94	116	116	116	116	117	117		

APPENDIX D
Statistical Analyses of Emissions Data

APPENDIX D-1
Statistical Analyses

I. Background

In April 1980, the United States Environmental Protection Agency (EPA) published a report that detailed the results of a study (1980 EPA Study) into the average emission rate of organic compounds from equipment leaks of components handling different streams including components in heavy liquid service.

The 1980 EPA Study screened a sample of components for equipment leaks and then measured mass emissions from a subset (those that had leaks greater than 200 ppmv). From the measured emissions, the 1980 EPA Study derived "correlation equations," i.e., regression equations, to estimate mass emissions from screening values. These equations were then used to estimate emissions from all components that had screening values above 200 ppmv but whose mass emissions were not measured. Components with leaks below 200 ppmv were assumed to have negligible emissions and treated as zero. Once emissions for all study components were estimated, average emissions per component (kg/hour/component) were developed by component type and stream service (gas, light liquid, heavy liquid).

The statistical analyses used in the 1980 EPA Study is outlined in Section 6.0 of Appendix C of the *Assessment of Atmospheric Emissions from Petroleum Refining: Volume 4. Appendices C, D, and E.* April 1980.

In 1993, the Western States Petroleum Association (WSPA) and the American Petroleum Institute (API) carried out a study (1993 Refinery Study) to develop new correlation equations for estimating emissions from components routinely inspected for leaks using portable hydrocarbon leak detectors.

Data from the 1993 Refinery Study was reviewed, and revised correlation equations were derived and published by the CAPCOA in *California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities*, dated February 1999.

The 1993 Refinery Study did not develop revised average emission factors for components not screened in a routine leak monitoring program. Therefore, the average emission factors listed in the 1999 CAPCOA document for estimating emissions from non-monitored components are the same as those developed in the 1980 EPA Study.

In collaboration with the Western States Petroleum Association (WSPA) and the five Bay Area petroleum refineries, the Air District undertook a study (Heavy Liquids Study) of the emissions from equipment leaks at components in heavy liquid service at the five Bay Area petroleum refineries.

This appendix discusses some of the statistical analyses conducted for the Heavy Liquids Study and the rationale for the approach used in the analyses.

II. Introduction

The Heavy Liquids Study (or "Study") acquired study data both through *screening* -- measuring organic compound concentrations of equipment leaks from components (pumps, connectors, and valves) and through *bagging* -- measuring mass emissions of organic compounds of a subset of the field screened components. As such, data from the Heavy Liquids Study comprised two data sets: 1) field screening, and 2) bagging. Approximately 10,000 components were screened while less than 200 components were bagged.

In the body of the Heavy Liquids Study report, a component that was bagged is referred to as to as a sample. However, in the context of this appendix, “sample” has the meaning of a statistical sample while “bagged component” or “bag” is used to refer to a component whose emissions was measured through bagging.

As leaks from less than 200 components in the Study had mass emissions measured, mass emissions from most Study components must be estimated from data collected during the field screening. Most of the field screening data that was collected included external temperatures of the components, component type, component size, process unit, component elevation in addition to leak concentration measurements.

From the bagged data, a relationship between two or more covariates may be modeled using regression analysis to estimate mass emissions from components that were screened but not sampled. If the relationship is modeled perfectly (i.e., the model exactly predicts the observed values) and only relies on one variable, then it will have the following form:

$Y = B_0 + B_1X$ [General Regression Equation (where relationship is exact)]

where B_0 and B_1 are parameters

However, if the model is not exact, it will have an error term as follows:

$Y_i = B_0 + B_1X_i + e_i$ [General Regression Equation (where relationship is approximated empirically)]

where B_0 and B_1 are estimated parameters, i = 1, 2, …n=number of bags.

The regression covariates are in effect being calibrated to supplied data (e.g., measurements of bagged samples). If the regression is not exact, there are two terms in the resulting equation: the estimated or predicted term ($B_0 + B_1Xi$ in the above equation) and the error term, e_i. The first term can be thought of as the calibrated measurement.

The error term represents the difference between the approximated value and the actual value and can be thought of as the measurement error. The difference between the approximated value and the observed value is termed a residual, which is an estimate of the actual error.

Study data was examined to derive both the predicted term as well as the error term to estimate emissions from Study components and then to extrapolate estimated emissions from the Study sample to derive average emissions.

Statistical Software and Programs

Study data was analyzed using two standard software programs, Microsoft Excel and Minitab® 17, as well as software programs written in the R language.

Minitab ® 17 is a statistical software package developed by Minitab, LLC that includes built-in programs for employing standard statistical analyses such as regression analysis. The figure below shows an available menu of program options for different types of regression analyses under the “Stat” or statistics selection.

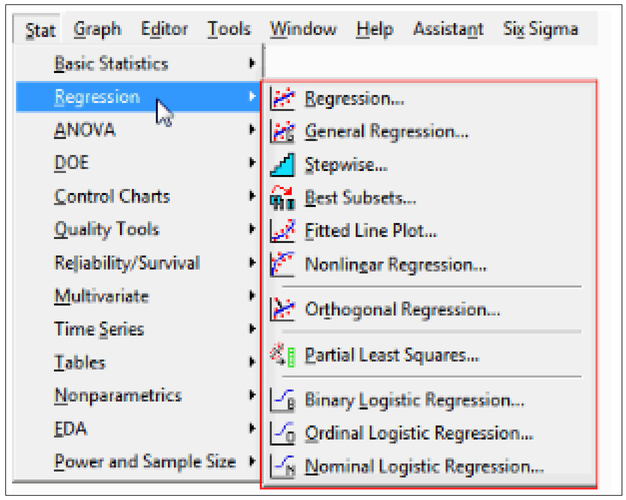


Figure II.1. Minitab 17 menu options for regression analyses

Many of the plots and figures in this appendix were developed in Minitab.

The R programming language is an open-source language that was developed for statistical analyses. Multiple programs and functions were developed for the Study. These programs are included in Appendix D-2.

III. Predicted Term (Regression Analysis)

As part of the Study, each component that was bagged had several variables that were identified and recorded either at the time of screening or at the time of bagging. These variables were either continuous (temperature, pressure, screening value, etc.), discrete (size), or categorical (petroleum refinery, component type, etc.).

The recorded variables included:

- Component Leak Concentration Measurement
- Petroleum Refinery
- Process Unit/Area Category
- Component Type
- Component Sub-Type
- Component Size
- Refinery Stream
- Generalized Stream Service
- Vibration
- Elevation
- Operating Temperature
- Operating Pressure
- Screening Time
- Screening Pace
- Monitor (Air District/Third-Party)
- Screener
- Screening Instrument
- Ambient Temperature
- Ambient Windspeed/Direction

Most variables were determined and recorded directly in the field. However, screening pace was estimated using two other variables: component size (line diameter) and screening time (time spent screening a component).

i. Choice of Data

The data used in any regression analysis not only dictates the choice of regression model that is best suited but also whether any results are meaningful.

Some variables were determined and recorded multiple times for each component. Others were recorded only once at the beginning or end of a screening period.

III.i.1. Dependent Variable (Mass Emissions)

Mass emissions measured from bagging of components was treated as the dependent variable. However, there were several alternatives for computing regression equations using bagged data related to inclusion or exclusion of repeated measurements of the same component (though over different time periods) and inclusion or exclusion of measurements from different parties: the Air District and a third-party (Tricord).

III.i.1.1. Method Detection Limit

A compound may be present at small levels but because of limitations of laboratory equipment and analytical processes may not be detected. The minimum value at which a compound may be detected and reported with 99 percent confidence is termed either the limit of detection (LOD) or the method detection limit (MDL). There are several ways to treat values that are below the MDL.

Prior to initiating the Heavy Liquids Study, a protocol developed for carrying out the study required reporting values at LOD if measured emissions did not exceed the LOD.

However, the method that is often used in emissions inventories is to treat those values as one-half of the MDL unless it can be demonstrated that a particular compound is not expected to be present.

Assuming compounds measured below the LOD as being emitted at the LOD may overestimate emissions. However, assuming such compounds are zero may underestimate emissions. Therefore, unless a compound is not expected to be present in a particular stream, any compounds that were measured below the MDL from a component leak are treated as being emitted at one-half the MDL.

Because ambient atmosphere is not expected to contain C_5 to C_{30} hydrocarbon compounds, the assumption of one-half the MDL is not applied to background measurements.

III.i.1.2. Background Influence

Mass emissions were measured from components using a modified version of the vacuum method outlined in Section 4.2.1 of EPA's *Protocol for Equipment Leak Emission Estimates*, dated November 1995. Specific modifications are discussed in the body of this report in the Methodology Section.

With the vacuum method, a component is enclosed in a tent material and placed under a vacuum. If there is a leak in the enclosure, it may be possible for ambient air to enter. Any hydrocarbons existing in the ambient air could therefore introduce a bias to measured results.

To account for this, the ambient background within selected process units where components were bagged was also tested and had mass emissions measured using the same bagging train and laboratory methods.

Measured results from background were subtracted from measured results of components on a per compound basis (C_5 to C_{24}). The resulting total net mass emissions were used in the regression analysis.

III.i.1.3. Primary and Replicate Bag Results

Components that were bagged had both a primary measurement and replicate measurement taken. Replicate measurements at Refinery A and some at Refinery B were taken sequentially after primary measurements. For the rest, primary and replicate measurements were taken in parallel at the same time.

A comparison of primary measurements with replicate measurements is shown in Figure III.i.1.3.1.

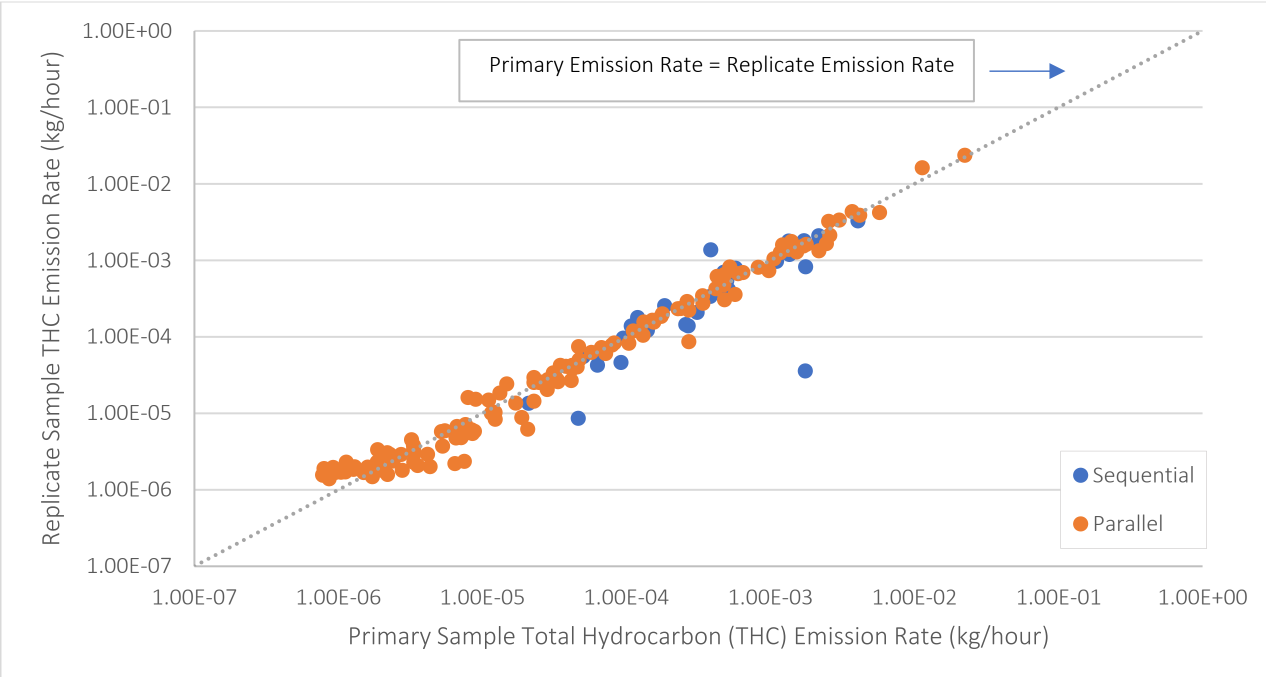


Figure III.i.1.3.1. Primary versus replicate sample results for both sequential and parallel replicate sampling

Except for one point that appears to be an outlier, primary and replicate samples fall within a narrow band. The point that appears to be an outlier represents primary and replicate measurements taken sequentially where approximately 75 minutes elapsed between the primary measurement and replicate measurement.

The field bagging sheet for this component (measurement A09) did not note any anomalies during either primary or replicate measurements. The laboratory report where results of both measurements were provided did not note anything that may explain a difference between the primary and replicate measurements.

Because of the elapsed time, operational changes cannot be ruled out as the cause of the difference between the primary and replicate measurements.

Comparing the percent difference of primary and replicate measurements from the average of both does not indicate any obvious systemic bias as shown in Figure III.i.1.3.2.

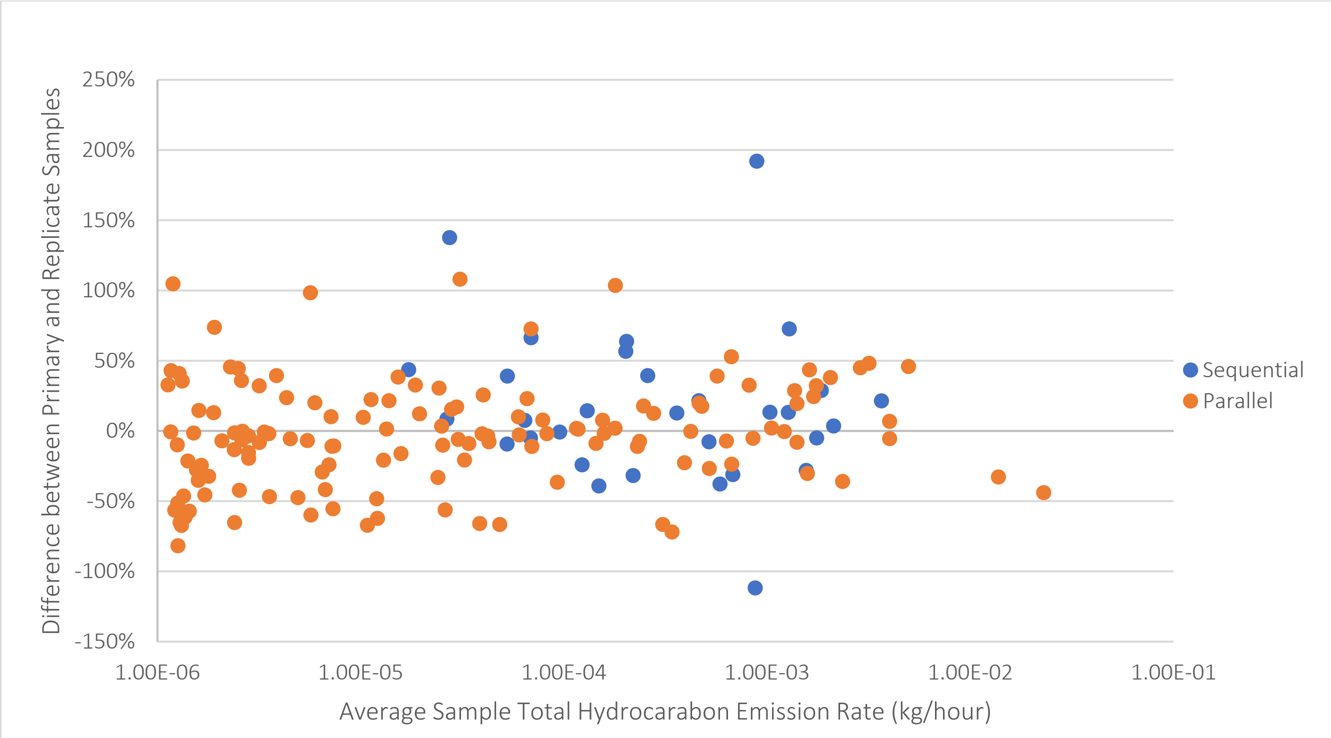


Figure III.i.1.3.2. Average of primary and replicate sample results versus percent differences of primary and replicate samples.

The impact of using either the primary, replicate, or mean of both primary and replicate bag results is discussed in Section VIII.ii. Impact of Bag Measurement Error on Leakage Analysis.

III.i.1.4. Repeated Bagging Results

There were 11 components where repeated measurements were taken (not including replicate measurements). One component (A-1050) was measured four times (each with a primary and replicate measurement) with three and four days in between measurements.

The following figure plots the average of the primary and replicate measurements for each repeated pair against each other.

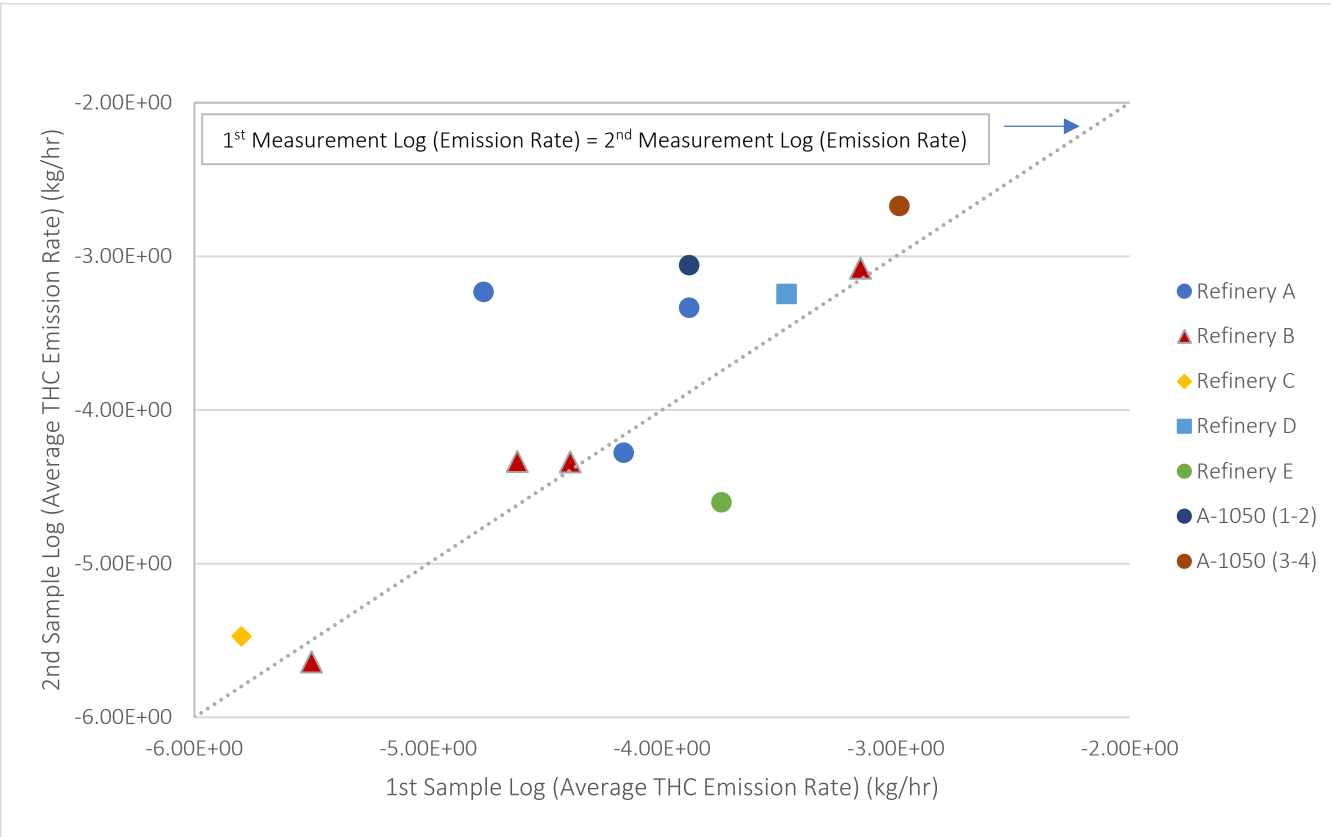


Figure III.i.1.4.1. Comparison of results of repeated measurements

Unlike primary and replicate measurements, there appears to be a trend with repeated measurements: in most cases, the measured emissions of repeated measurements were higher in subsequent measurements. Some of this could be attributed to operational changes. However, the potential impact of bagging on a leak cannot be ruled out.

Unlike repeated screening where disturbance of a leak is minimal, the physical act of bagging a component may have an impact on a leak.

Alternatively, each component that was bagged presented its own challenges to bagging (enclosing and affixing tent materials, space requirements, etc.). As the same personnel were used in bagging components, the ability to bag and measure emissions from the same component may have improved with repeated attempts. If so, the difference in emissions from subsequent measurements could also be attributed to improvements in bagging technique.

III.i.2. Independent Variables

Several recorded variables were evaluated as possible independent variables for regression equations.

III.i.2.1 Screening Value

Both the 1980 EPA Study and the 1993 Refinery Study found relationships between the screening measurement (screening value) and emissions measured through bagging.

Components that were bagged in the Heavy Liquids Study had multiple screening values recorded: during field screening (field screening values), before bagging (pre-bag screening values), and after bagging (post-bag screening values).

In addition, measurements of ambient (background) concentrations near screened or bagged components were recorded during field screening and bagging.

The 1980 EPA Study determined that the logarithms of measured component leak concentrations were highly correlated with the logs of measured component mass emissions, and derived regression equations with the logarithm of leak concentration as the sole covariate.

Through scatterplots, a preliminary review of data in the Heavy Liquids Study indicated, similarly to the 1980 EPA study, that this logarithmic form meets the standard regression assumption of constant variance[1] as well as having a high correlation.

The 1980 EPA Study developed regression equations for each component type that used either the field screening value or the pre-bag screening value as an independent variable. For estimating emissions from valves and pump seals, using pre-bag screening value resulted in equations with greater correlation coefficients (0.78 and 0.68)[2]. In the case of flanges, the regression equation using the field screening value was found to have a greater correlation coefficient (0.74)[2].

Both the field screening value or the pre-bag screening value should represent as found conditions as they were measured either in the initial field screening with minimal interference of the component or prior to preparing a component for bagging, also with minimal interference of the component.

However, post-test screening values may be impacted by preparing the component or the bagging test itself.

A visual examination of the screening values prior to bagging (pre-bag or pre-test) and after bagging (post-test) shows a directional trend as provided in the following figures.

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[1] This is the assumption that the error variance is constant, independent of the magnitude of the covariate(s).

[2] See Table C6-1 of *Assessment of Atmospheric Emissions from Petroleum Refining: Volume 4. Appendices C, D, and E.* April 1980.

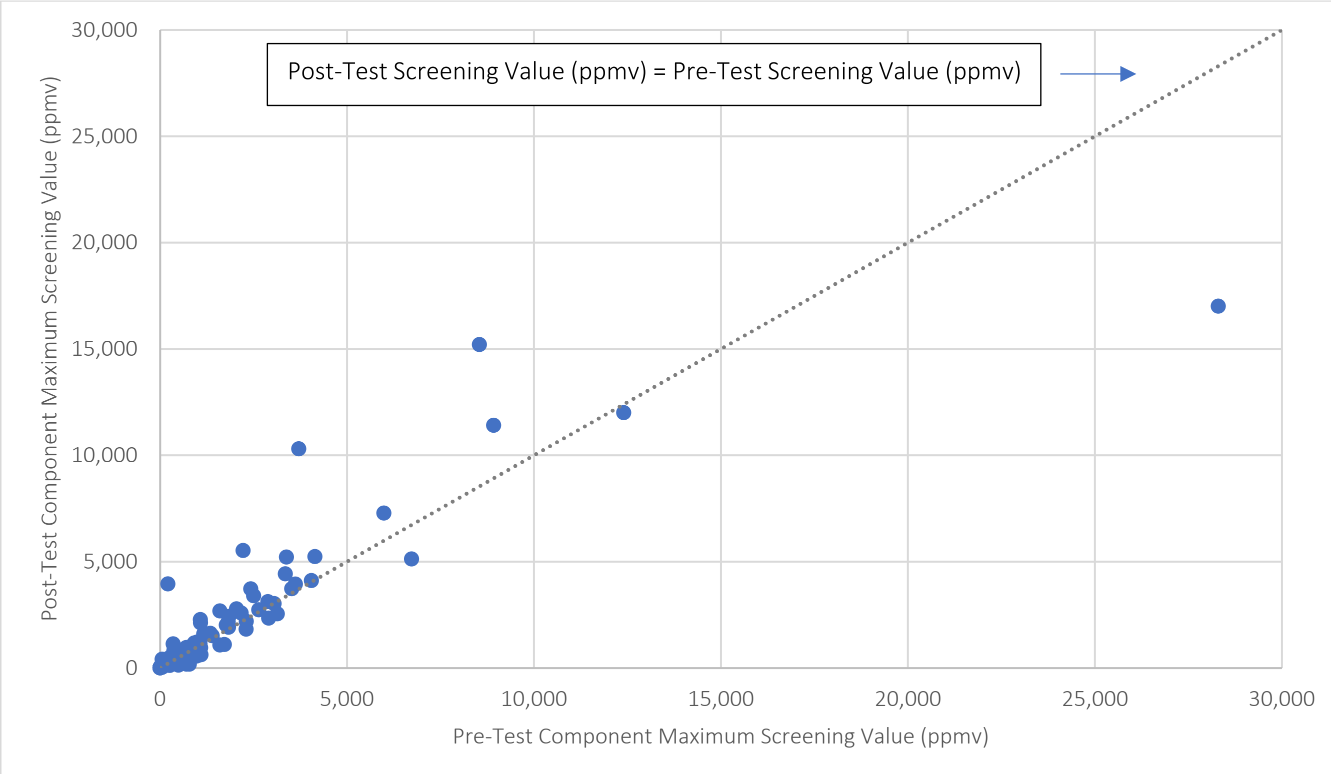

Figure III.i.2.1. Comparison of Pre-test and Post-Test Screening Values (full range)

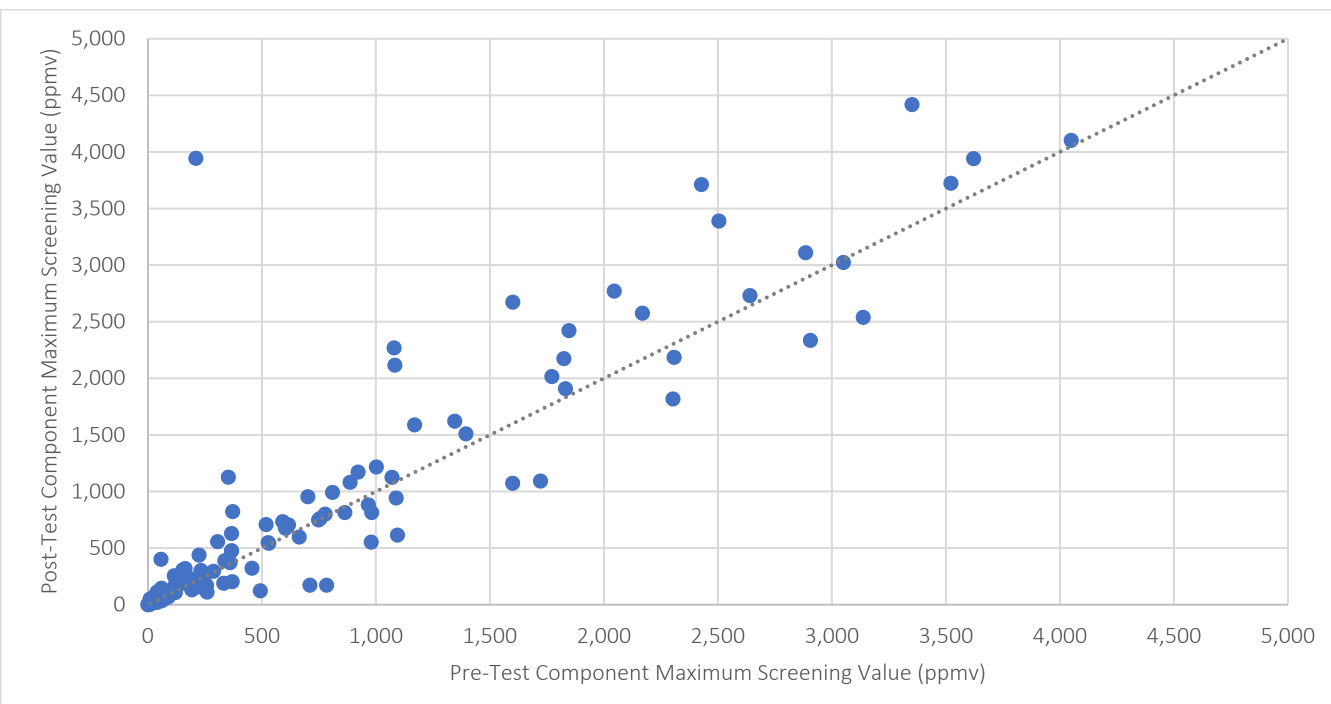

Figure III.i.2.2. Comparison of Pre-Test and Post-Test Screening Values (0 ppm to 5,000 ppm screening values)

As shown in Figure III.i.2.1 and Figure III.i.2.2, the post-test screening values do not match the pre-test screening values and in most cases, the measured post-test screening values were higher than the pre-test screening values. However, the difference between post-test and pre-test screening values are not uniform (expected if there were a systematic bias). Differences between the two measurements may be attributed to process operational changes or to bagging. Therefore, post-test screening values were not used in the analysis.

Regarding field screening values or pre-bag screening values, there were several reasons for using pre-bag screening values.

There were five components that were not included in the field screening portion of the Study and therefore, would be excluded from the regression analysis if field screening values were used.

Pre-bag screening values were taken at the same time or at a minimum the same day as bagging whereas field screening values were measured in some cases almost a year prior to bagging. Because of the elapsed time between when field screening values and bagging occurred, it was likely that the mass emissions may have changed.

Comparing the pre-bag screening values with the field screening values (see Figure III.i.2.3) indicated that emissions from components selected for bagging may have changed since field screening.

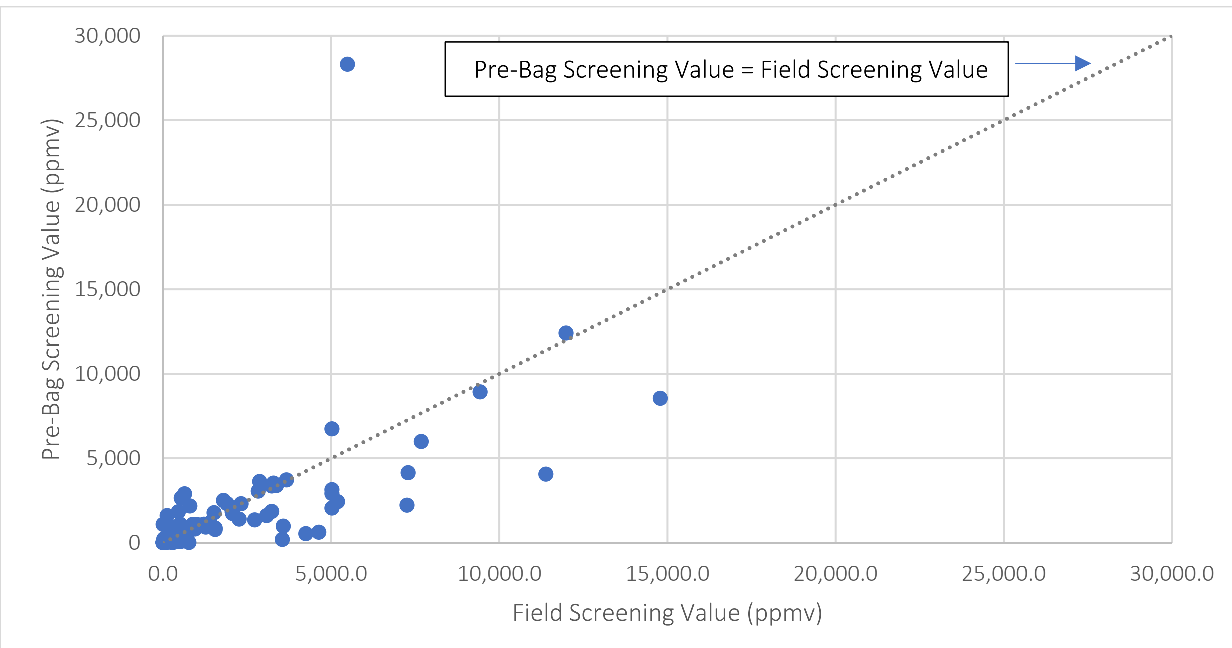

Figure III.i.2.3. Comparison of Pre-Bag Screening Values with Field Screening Values

Because some components may be excluded from the analysis and the likelihood that mass emissions may have differed from the time of field screening and bagging, pre-bag screening values were chosen for the analysis.

In addition, the 1980 EPA Study used the maximum screening values recorded and did not account for background influences on measured screening values. The 1980 EPA Study assumed that components with screening values less than 200 ppmv were negligible. Unless a nearby component were leaking, it is not likely that measuring the ambient background would result in a screening value above 200 ppmv. The regression equations developed in the 1980 EPA Study were for estimating emissions with screening values of 200 ppmv or greater.

However, the 1993 Refinery Study developed correlation equations that used component screening values corrected for the background (subtracting a background screening measurement from a component's maximum screening value, a net screening value).

Per EPA Method 21, followed in leak and inspection programs, measurements of the ambient atmosphere around a component should be taken by randomly moving an instrument probe upwind and downwind of a component at one to two meters from the component or closer (but not closer than 25 centimeters) if there is interference from a nearby leaking component.

Since mass emissions attributed to the ambient atmosphere are subtracted from measured emissions from a component, any ambient concentrations should be subtracted from a component's measured screening value.

In addition to correcting for background, using the net screening value rather than the maximum screen value also solves an issue with negative screening values. When screening instruments are calibrated, field personnel introduce zero air (gas with a known maximum amount of hydrocarbon content) and let the instrument analyze this gas. After a reaching certain point, field personnel will program the instrument to treat the detection reading as zero ppmv. However, if this process occurs too quickly, the "zero" value may be set higher than what the instrument would read if left to continue analyzing the gas. In these cases, an instrument will provide a reading of a negative number when measuring gas with very low hydrocarbon content.

The form of a regression model can be suggested through a visually inspection of a plot (see Figure III.i.2.4) of the bagged values against net screening values.

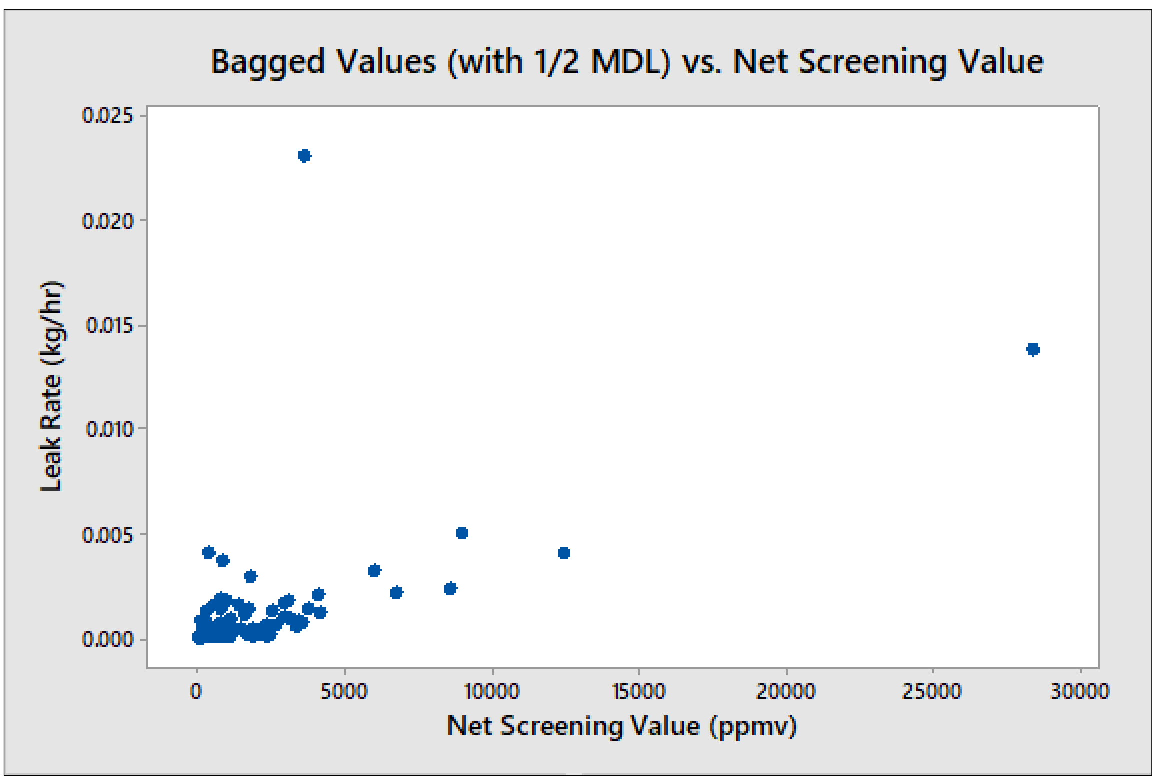

Figure III.i.2.4. Bagged Values versus Net Screening Values

Figure III.i.2.4 shows that the screening value and leak rate (bagged emissions) are both skewed, and in addition appear to vary in proportion to magnitude (the measurement error appears largely multiplicative). Thus, a model of the form:

$B = aS^bE$,

was considered.

Where a and b are coefficients to be estimated, B is the bagged measurement, S is the net screening value, and E represents the error – the part of the bagged measurements not estimable by S alone.

This is a classic model that is linear on the log scale. As with the 1980 EPA Study and the 1993 Refinery Study, the logarithm of the screening value is used in the equation, which creates an additive model on the log scale. The logarithm of base 10 is used as in the previous studies. However, using a different logarithm scale would not change the regression goodness of fit.

However, many components had field screening values at background concentrations so the net screening value would be zero. The logarithm of zero is undefined. This was not a concern for the 1980 EPA Study as the regression equations were developed and used for components with screening values of 200 ppmv or greater. The 1993 Refinery Study developed separate emission factors ("default zero" emission factors) for components that had net screening values of zero and correlation equations were only used for components with a net screening value of 1 ppmv or greater.

In addition, a logarithm transform can give too much weight to small values.

A solution to both issues is to add a small constant, k_a. The smallest non-zero screening value was 1 ppmv and is used as an initial constant value.

However, because the value of k_a is arbitrary, other values were considered. The best correlation of occurred with k_a equal to 10.

The following plots show the result of adding a k_a value of 1 and of 10 to the net screening value when compared against the logarithm of bag measured leak rates.

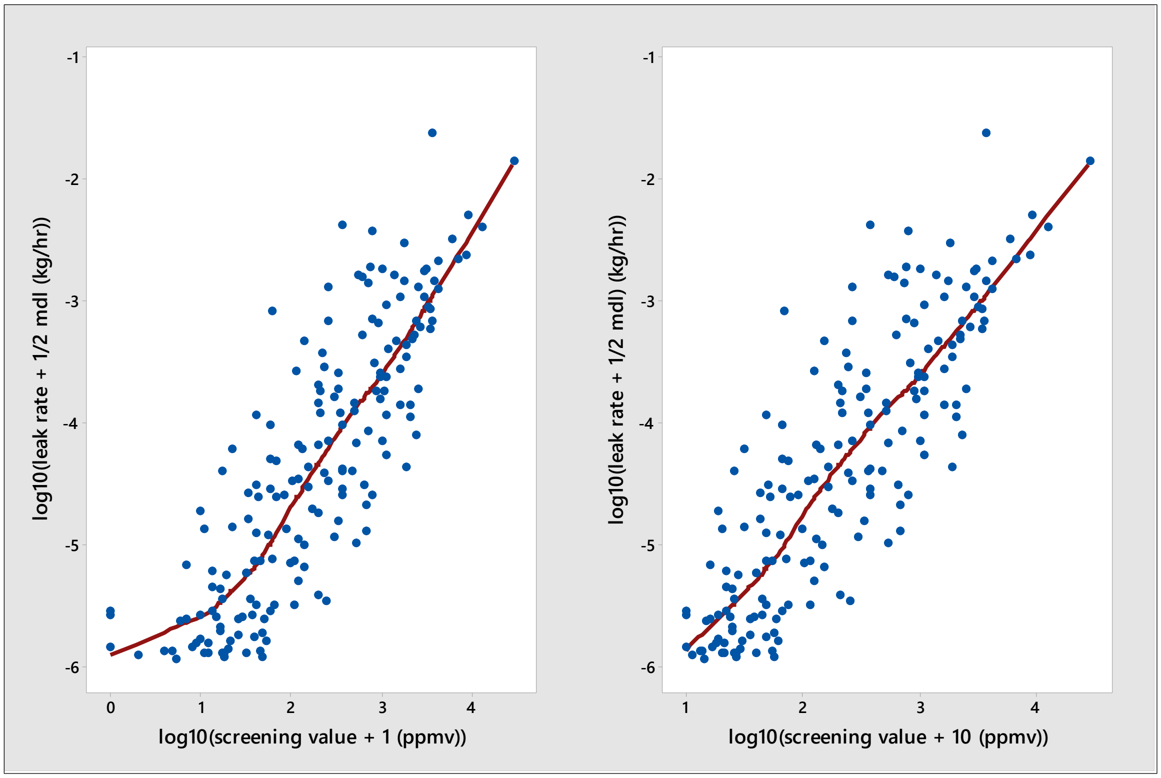

Figure III.i.2.5. Impact of Adding Constant Value (k_a) to Net Screening Value

A smooth curve is drawn showing that the relationship is roughly linear except for small values of S. Note that the smooth curve in the right-hand plot is nearly straight.

Another issue is whether the transformations have corrected the problem of the variation around the regression line increasing with magnitude. Splitting the residuals above and below the median prediction, the ratio of the variance of those above to those below is 1.3. An F-test for equal variances does not reject equality, so the transformation of the leak rate has resulted in an approximately constant variance.

Therefore, an initial model of the form $y = \log_{10}$ (leak rate) and $x_1 = \log_{10}$ (SV + 10) was selected.

III.i.2.1.1 An alternative method for zero net screening values

An alternative to adding a constant to the screening value is to limit the regressions to screening values above a threshold, as was done in the 1980 EPA study. Here the model $y = \log_{10}$ (leak rate) and $x_1' = \log_{10}$ (SV) for SV > 10 ppb was selected, with the estimated leak rate for SV ≤ 10 ppb estimated by the mean of the corresponding bagged values.

In selecting other variables for inclusion in the regression, the model with x_1 was used. In the analysis of leak rates, both models with x_1 and with x_1' were fit, for comparison.

III.i.2.2 Exclusion of observations with screening values ≥ 10,000 ppmv (Pegged values)

Because the highest calibration for screening monitors was 10,000 ppmv, screening values greater than this were not considered reliable to use as regression predictors. Estimation of leakage rates for these components (whose screening values from hereon will be termed pegged values) is discussed below.

III.i.2.1.3 Regression Model Development

Regression Model 1: Basic Model $\log_{10}$(leak rate) versus $\log_{10}$(screening value)

Using the variables y and x_1 as above, a simple linear regression fit yielded:

$y = -7.055 + 1.169\ x_1$. The adjusted R^2 was 72.2%, and the regression standard deviation was 0.58.

III.i.2.2 Temperature

Temperature (of either the component or the stream material) may impact leaks and resulting emission rates in several ways. Components often employ a sealing material where component parts are joined together including sealing gaskets or packing materials. Thermal expansion or contraction of these materials may impact emission rates. In addition, the temperature of process stream material impacts the vapor pressure of the material.

Temperatures were measured when the components were screened (operating temperature) and again right before bagging (bagging temperature).

To understand whether including temperature as an independent variable would improve the regression model, temperature was plotted against the logarithm of the bag measured leak rate as well as the residuals from Model 1 predicted emissions.

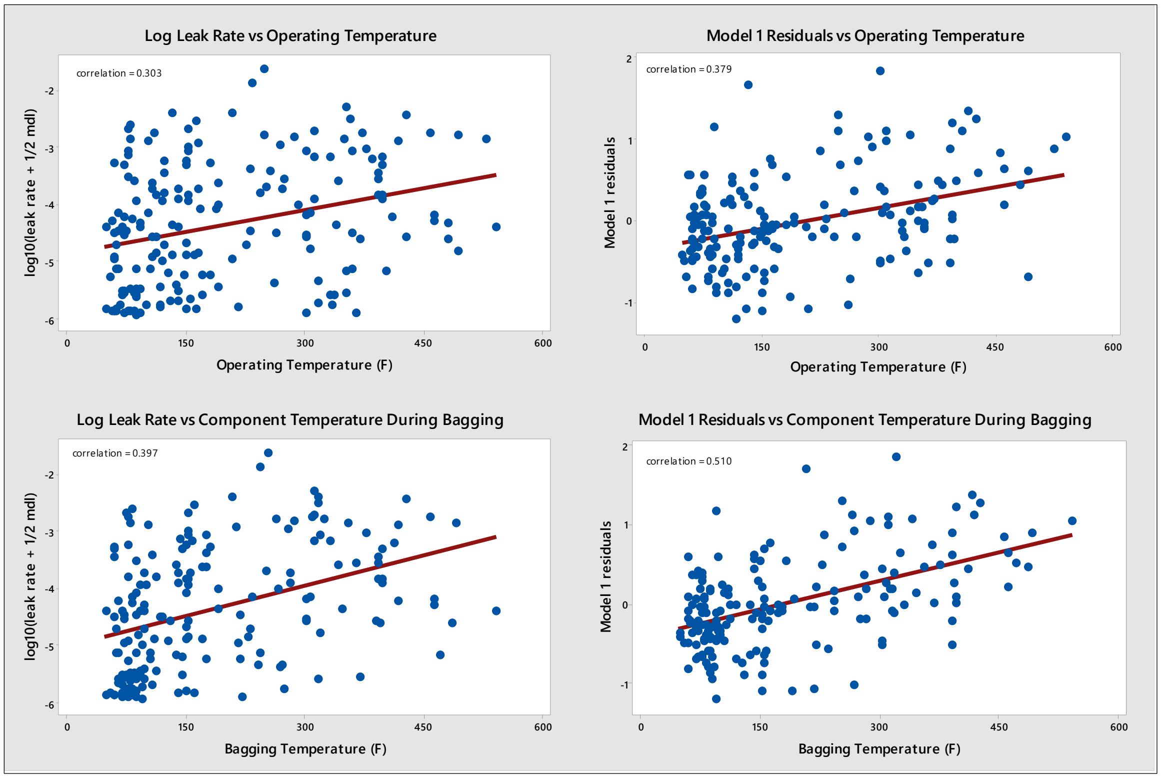

Figure III.i.2.6. Temperature Compared with Measured Leak Rates and Model 1 Residuals

The first column of Figure III.i.2.6 shows plots of log leak rate vs the original temperatures and the pre-bag temperatures. There is a significant correlation for both, with the bagging temperature having a somewhat higher correlation, 0.397 versus 0.303 for the original.

The second column of Figure III.i.2.6 shows the residuals from a regression of log (leak rate) on log(screening), that is, the residuals from Model 1. First note that the correlations are actually higher than the corresponding correlations in the first column. Because of this, temperature appears to add to the prediction based on log screening value. Second, the correlation with the bagging temperatures is again higher than for the original temperatures. This is expected for the same reason that the correlation to pre-bag screening value would be higher than the field screening value: condition or operational changes. The temperature of a component or stream material may differ between the field screening and bagging.

From a visual inspection of the lower right-hand panel of Figure III.i.2.6, the relationship of the residuals to bagging temperature appears roughly linear, so it was chosen as a second covariate below.

Regression Model 2.

Letting x_2 = pre-bag temperature, the regression $y = a + b_1x_1 + b_2x_2$ was fit:

$y = -7.379 + 1.102\ x_1 + 0.00257x_2$. The adjusted R^2 was 80.3% and the regression standard deviation was 0.49.

Both x_1 and x_2 are highly significant. The positive coefficient for temperature indicates that for a given screening value, higher leakage rates are predicted if the component temperature is higher.

Regression Model 3.

As with previous studies, determining whether regression equations differed by component was considered. Figure III.i.2.7 shows that the relation of y to x_1 is quite similar between connectors and valves, less so compared with pumps.

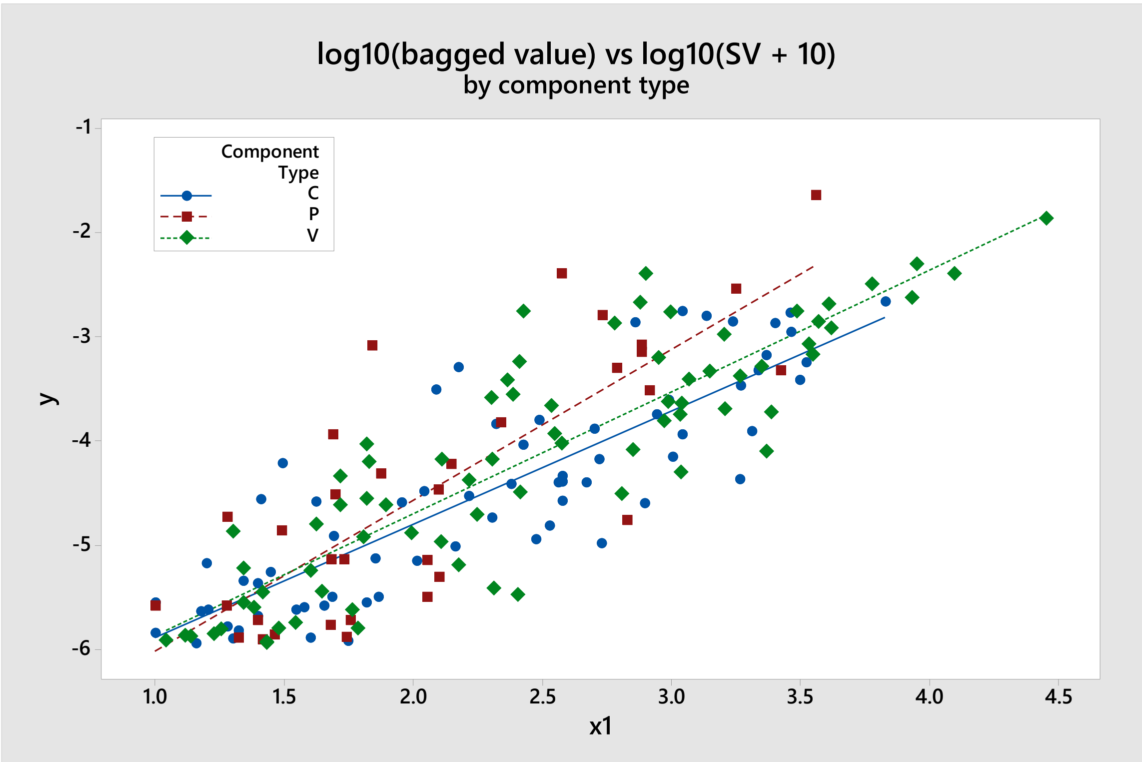

Figure III.i.2.7. Log 10 of leak rate vs log 10 screening value + 10. Regression lines by component also shown.

Model 2 was fit excluding pumps. The fit was y = -7.407 + 1.08 x_1 + 0.0026 x_2, with an adjusted R^2 of 85.1% and a regression sigma of 0.41. To test whether the regression equations were different for connectors and valves, a second model with separate slopes and intercepts was fit. Neither the slopes nor the intercept were statistically significant. An F-test comparing this model and the previous yielded a p-value of 0.45. (F = (sse2-sse1)/3 /mse1, where sse2 is the sum of squared errors from the second model and sse1 is the sum of squared errors from the model with the same slopes and intercept for connectors and valves, so the regression equations are not statistically different. A second issue is whether the uncertainties differed. Fitting connectors and valves separately, the mse's were 0.159 with 66 degrees of freedom and 0.185 with 71 degrees of freedom. F = mse_c/mse_v = 1.16. $P(F_{66,71} > 1.16) = 0.27$, that is, no evidence that the regression sigmas differ. Hence, connectors and valves were assumed to have the same regression model.

The relationship with pumps was then examined. Model 2 was fit including pumps, pooling connectors and valves, but with a separate slope and intercept for pumps.

The differences in the slopes for both x_1 and x_2 were borderline significant, p-values of 0.048 and 0.075. But an F-test revealed that the relationship is quite different. F = (sse2-sse1)/3 / mse1 = 8.18. $P(F_{3,170} > 8.18) = 0$ to five significant digits.

Fitting pumps separately from connectors and valves yields a second difference. For pumps, the MSE equals 0.403 with 30 degrees of freedom. The MSE for the regression with connectors and valves was 0.172 with 140 degrees of freedom. An F-test shows these uncertainties are substantially different: $P(F_{30,140} > 0.403/0.172=2.34) = 0.0005$. Therefore, there is greater uncertainty in the estimation of pump leakage than for connectors and valves. This is also reflected in the adjusted R^2 values, 72.9% for pumps compared with 85.1% for connectors and valves. Thus, separate regressions were fit for pumps and for valves and connectors. The results for Model 3 were:

Valves and Connectors:

$y = -7.407 + 1.083\, x_1 + 0.00261\, x_2$

Term	Coefficient	SE Coeff	t-value	p-value
Intercept	7.407	0.113	-65.4	< 0.0001
x_1	1.083	0.0429	25.3	< 0.0001
x_2	0.00261	0.000273	9.6	< 0.0001

Regression sigma = 0.415
Adjusted R^2 = 85.1%

Pumps

$y = -7.865 + 1.343\, x_1 + 0.00448\, x_2$

Term	Coefficient	SE Coeff	t-value	p-value
Intercept	7.865	0.381	-20.6	< 0.0001
x_1	1.343	0.168	8.0	< 0.0001
x_2	0.00448	0.00137	3.3	0.003

Regression sigma = 0.634
Adjusted R^2 = 72.9%

III.i.2.3 Size for Connectors

Previous studies had suggested that there may be a significant difference in connector emission rates when accounting for size.

This analysis looks at whether including a size variable improves the fit of the regression of y = $\log_{10}$(bagged value) on x_1 = $\log_{10}$(screening value + 10) and x_2 = temperature.

Figure III.i.2.8 shows the relationship between connector size and y=$\log_{10}$(bagged value). A horizontal line shows the mean of y as well as a smoother. The bagged values for the largest sized connectors are above the average.

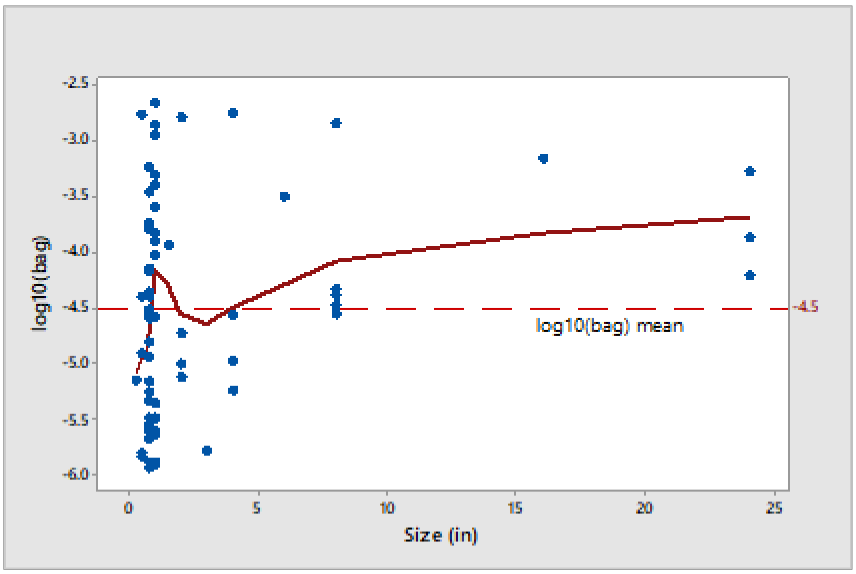

Figure III.i.2.8. Plot of Logarithm of Connector Bagged Sample Results Against Connector Size (Diameter)

The regression of y on x_1 and x_2 limited to the 69 samples of bagged connectors yielded:

y = -7.275 + 1.017*x_1 + 0.0025*x_2, with an adjusted R^2 of 83.6%.

Figure III.i.2.9 shows the residuals from the regression above versus connector size (diameter).

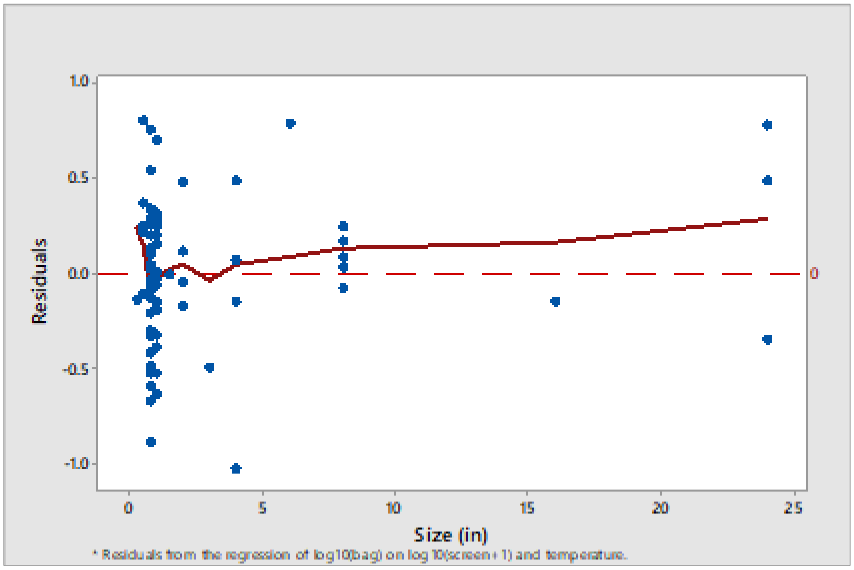

Figure III.i.2.9. Plot of Residuals Against Connector Size (Diameter)

There does appear to be some increase in bagged value even after adjusting for leak rate and temperature.

To test the strength of this relationship, a break-point term was added to the regression: $x_3 = 0$ if Size < z and 1 if Size is > z.

The sizes were in discrete steps as shown in **Table III.i.2-1**. Because of this, the value of z could be chosen as the midpoint between the steps.

Table III.i.2-1. Sizes of Connector Bagged Samples

Size (inches)	Count of Connector Bagged Samples
0.25	1
0.5	5
0.75	26
1	17
1.5	1
2	4
3	1
4	4
6	1
8	5
16	1
24	3

A regression was conducted with a model of $y = b_0 + b_1{*}x_1 + b_2{*}x_2 + b_3{*}x_3$

Regressions were done for every midpoint from z = (0.25 + 0.5)/2 = 0.375 to z = (16 + 24)/2 = 20.

The following table lists the results.

Table III.i.2-2. Break-Point Regression Coefficients and Uncertainties

Break-Point z between Sizes		Regression Results				
Lower Bound	Upper Bound	Size Variable (x_3) coefficient	Std Error	t-Value	p-Value	Adjusted R^2
0.25	0.50	0.147	0.407	0.363	0.718	83.1
0.50	0.75	-0.263	0.174	-1.508	0.132	83.7
0.75	1.0	0.060	0.111	0.542	0.589	83.2
1.0	1.5	0.098	0.117	0.835	0.407	83.3
1.5	2.0	0.105	0.121	0.872	0.387	83.3
2	3	0.096	0.138	0.696	0.489	83.2
3	4	0.159	0.139	1.146	0.256	83.4
4	6	0.282	0.149	1.893	0.063	84.0
6	8	0.178	0.155	1.142	0.258	83.4
8	16	0.235	0.223	1.053	0.296	83.4
16	24	0.369	0.253	1.460	0.149	83.6

From the results, only the breakpoint between 4 inches and 6 inches was close to being statistically significant.

The adjusted R^2 increased a small amount, from 83.6% to 84.0%. Even this small increase may overstate the true effect, since this value was selected as the best among 11 break-points. Therefore, size was not included in the regression equations.

III.i.2.4 Other Continuous Variables

Including other continuous variables into Model 3 was explored by plotting the continuous variables against the residuals from the model, along with adding the variables to Model 3.

Below is a scatterplot for bagging dwell time (the time it took to reach maximum screening value), screening speed (or screening pace), and operating pressure.

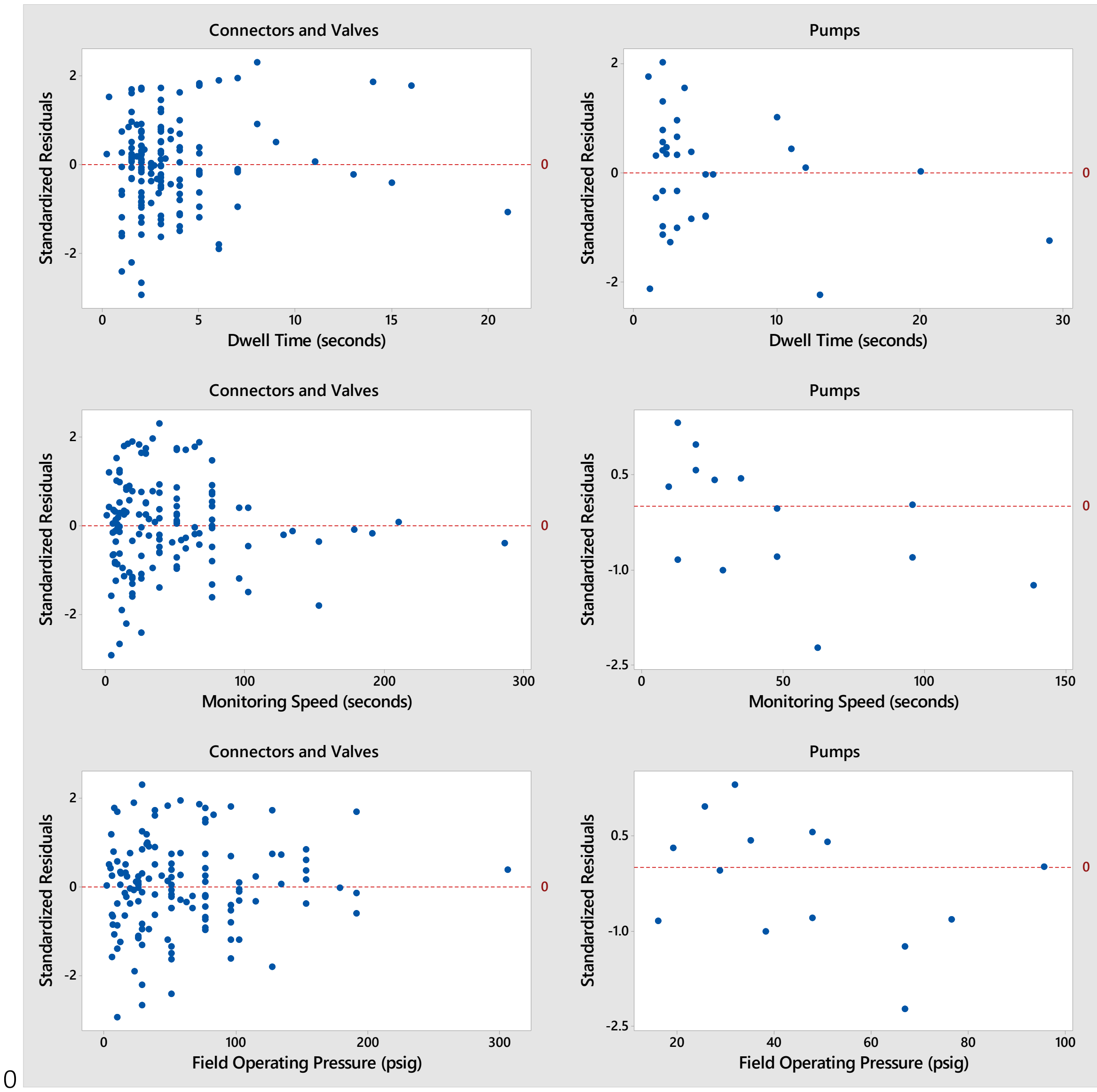

Figure III.i.2.10. Scatterplots of Other Continuous Variables Against Model Residuals

Table III.i.2-3. Coefficients of Variables Added to Model 3

Variable	Connectors and Valves				Pumps			
	n	coeff	s.e.	p-value	n	coeff	s.e.	p-value
Dwell Time	142	0.0166	0.0125	0.189	33	-0.030	0.020	0.143
Monitoring Speed	141	-0.00030	0.0008	0.72	14	-0.0075	0.0045	0.130
Field Operating Pressure	137	0.00086	0.00075	0.25	14	-0.013	0.008	0.145

From , there is little apparent correlation between Model 3 residuals and dwell time, screening speed or operating pressure; Table III.i.2.10 shows that none of these variables were statistically significant when added to Model 3. So these variables were not included in the model.

Other Categorical Variables

Apart from component type, the potential impact of other categorical variables on the regression model was explored.

Process Stream Service

Bagged components were handling different process streams (asphalt, diesel, gas oil, etc.). Stream service terms were added to Model 3 for connectors and valves. Although the adjusted R^2 increased slightly, by 0.3%, to 85.4%, the terms did not improve the fit significantly.

Figure III.i.2.11 shows the coefficients from Model 3 fitted without an intercept. That is, these coefficients are the intercepts for each of the stream services fit with common slopes for x_1 and x_2. Error bars representing one standard error and number of observations per service are also shown. Although the coefficients represent a range on the original scale of a factor of 8, $1x10^{-8}$ to $10^{-7.1}$=$7.9x10^{-8}$, the differences are not statistically significant.

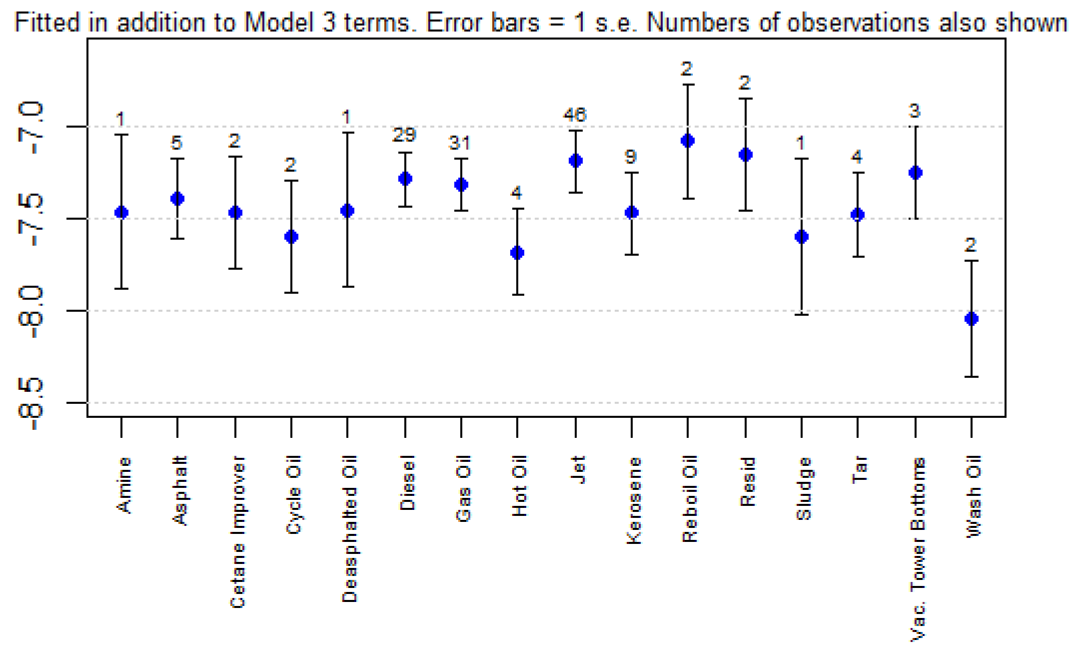

Figure III.i.2.11. Stream Service Coefficients

To test for interactions with screening value or temperature, data was limited to those streams with at least five observations to avoid overfitting. Figure III.i.2.11 shows $\log_{10}$(leak rate) versus $\log_{10}$(screening value) (y vs. x_1) by stream service, along with individual regression lines. Adding interaction terms between streaming service and x_1 did not improve the fit.

Adding interactions with bagging temperature (x_2) did, however. The adjusted R^2 increased from 83.4% to 84.2%. Asphalt was less sensitive to temperature than the other streams. Nevertheless, because the improvement in fit was marginal, stream service interactions were not added to the model.

For pumps, adding 9 different streams to Model 3 results in 12 independent variables with only 33 observations, with only 1 observation for some streams, so there is serious risk of overfitting. Although there is a substantial increase in goodness of fit, it is unclear whether the statistical inference that the stream services are substantially different is legitimate. Therefore, streaming service was not added to the pumps model.

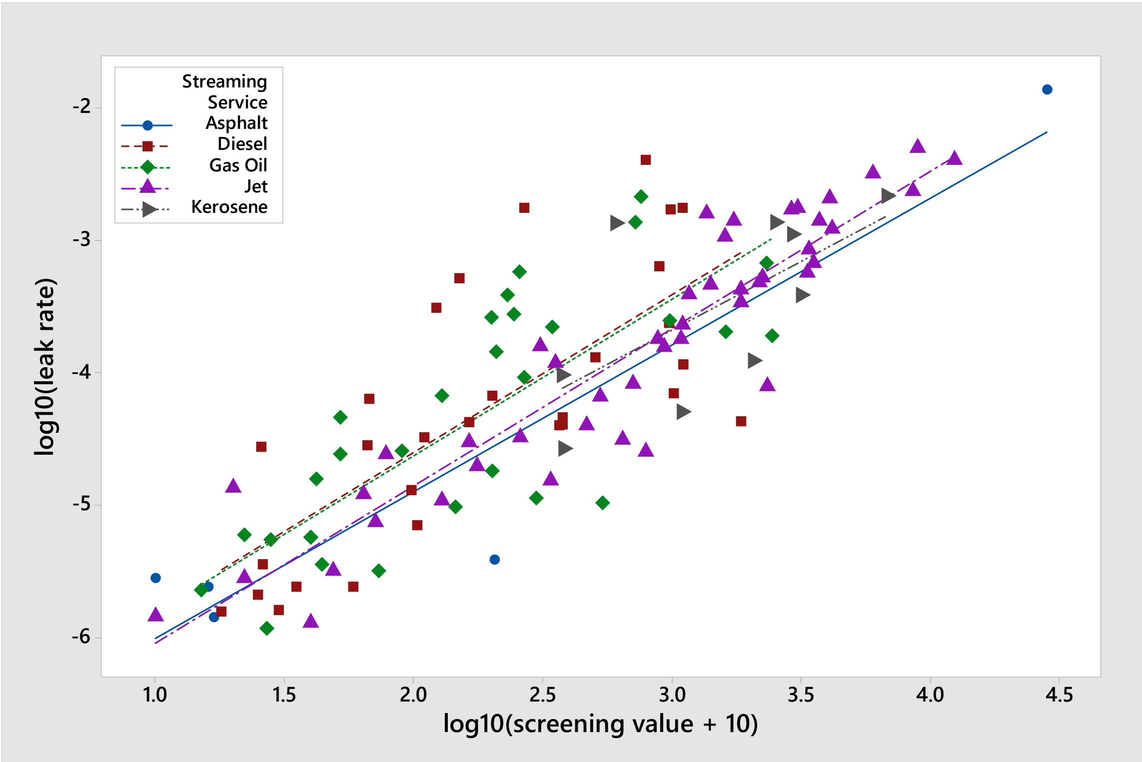

Figure III.i.2.12. Leak Rate versus Screening Value by Stream Service (for streaming services with at least five observations)

Generalized Process Unit / Area

As with process stream service, terms were added to Model 3 for Generalized Process Unit / Area. For connectors and valves, the differences among them are marginally significant (p-value = 0.016). Figure III.i.2.12 shows the differences, which range as much as a factor of 5 ($\log_{10}(5) \approx 0.7$). The increase in adjusted-R^2 was 1.3%, from 85.1% to 86.4%. For pumps, the "Other" category was statistically significant, but without this category, there was no significant difference among the others.

Figure III.i.2.13 shows y vs x_1 for process units with at least 6 observations. The addition of interactions with x_1 or x_2 did not improve the fit.

For pumps, the improvement in fit with the addition of process unit terms was not statistically significant.

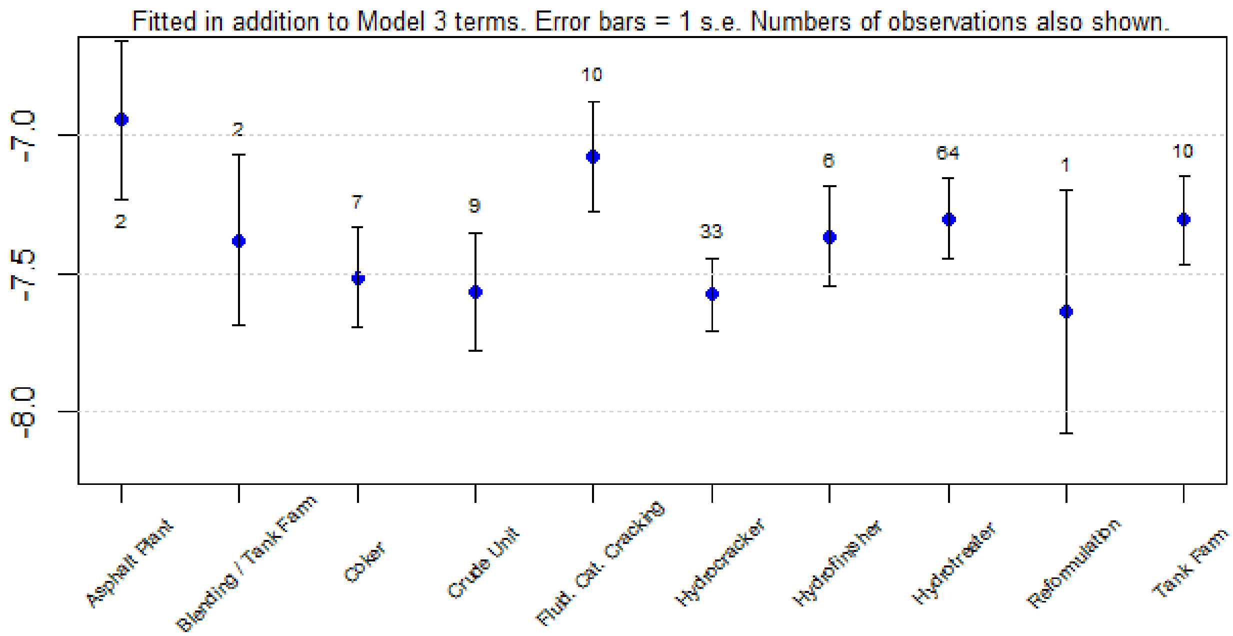

Figure III.i.2.13. Generalized Process Unit / Area Coefficients—Connectors & Valves

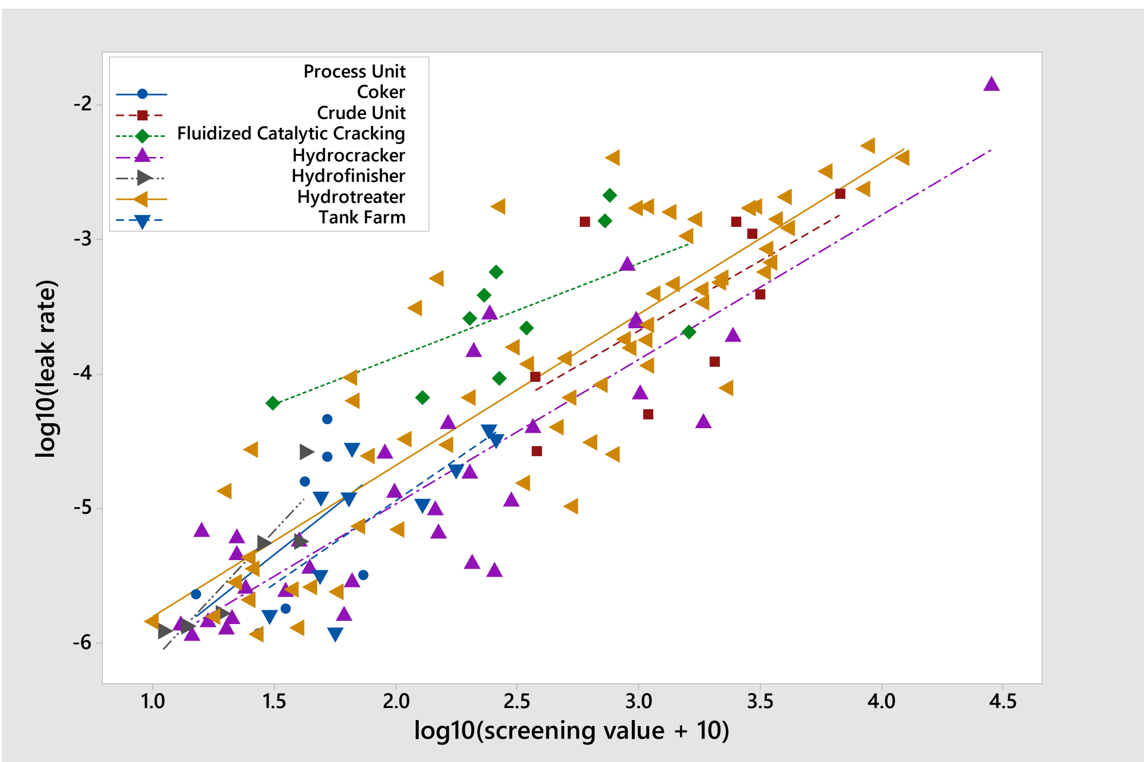

Figure III.i.2.14. Leak Rate vs Screening Value by General Process Unit / Area – Connectors and Valves (for process units with at least six observations)

Because including process unit adds to the complexity of the model while contributing little or nothing to the fit, process unit terms were not included in the final model.

ii. Extrapolation

When applying regression equations to components, caution is warranted to not extrapolate beyond the data used in deriving the regression equations as it can lead to inaccurate results.

Screening Value

The field instruments used to screen components were calibrated with six gases containing different amounts of hydrocarbons (0 ppmv, 10 ppmv, 100 ppmv, 500 ppmv, 3,000 ppmv, and 10,000 ppmv). The process of calibrating an instrument is to introduce a gas with a known amount of hydrocarbon concentration and to program the instrument to provide results that match the calibration gas for a given instrument response (units of current). From this, the instrument develops a relationship between measured values and the calibration gas standards that is used when measuring non-calibration gases.

As with regression analysis, extrapolating results of screening instruments beyond what was used to calibrate the instruments may lead to unreliable estimates.

Because the screening instruments were only calibrated with gases with a maximum hydrocarbon content of 10,000 ppmv, any screening value readings above 10,000 ppmv may not be accurate.

Previous studies have accounted for this by limiting use of regression equations to the highest concentration of gas used to calibrate screening instruments, either 10,000 ppmv or 100,000 ppmv.

Of the bagged data set, two components had *pegged values*, pre-bag screening values above 10,000 ppmv:

- C004: a 10-inch diameter gate valve handling asphalt with a pre-bag screening value of 28,300 ppmv, and
- D027: a 0.5-inch diameter gate valve handling jet fuel with a pre-bag screening value of 12,400 ppmv.

Of the field screening data set, three components had field screening values above 10,000 ppmv all within the same refinery process unit:

- D-499: a 0.75-inch diameter gate valve handling jet fuel with a screening value of 11,385 ppmv,
- D-601: a 2-inch diameter gate valve handling jet fuel with a screening value of 14,789 ppmv, and
- D-810: a 0.5-inch diameter gate valve handling jet fuel with a screening value of 11,985 ppmv.

In the present study, we exclude the components with these pegged values from the estimation and use of correlation equations, estimating these separately, as described below.

Temperature

The temperature range of components that were bagged varied between 48 degrees Fahrenheit to 540 degrees Fahrenheit. During field screening, there were 105 components that had measured temperatures below 48 degrees Fahrenheit and 150 components that had measured temperatures greater than 540 degrees Fahrenheit.

Moderate extrapolation may be acceptable, but too great extrapolation can produce poor estimates. A solution is to cap the temperature variable at 540 (e.g., to replace higher temperatures with 540) when estimating the leak rate.

iii. Regression Scenarios

Repeated (duplicate) measurements were taken at each of the five petroleum refineries. However, the Air District only measured emissions at two of the five petroleum refineries whereas Tricord measured emissions at all five petroleum refineries and comprised the majority (over 90 percent) of the total bagged measurements available for analysis. Although measures were implemented to minimize potential differences between bagging conducted by the Air District and Tricord, there may still be differences in the measurements due to personnel, equipment, and bagging techniques.

As mentioned above, there was also the question of model sensitivity to adding an arbitrary constant to the log screening value (x1). Therefore, restricting data to screening values greater than 10 ppmv was also considered (x1').

To understand these differences, bagged data was analyzed under eight scenarios (Table III.iii-1) depending on:

- the component leak concentration measured right before bagging, (x1 or x1')
- whether the measurement is an initial or duplicate measurement of a component, and
- the party that conducted the bagging.

Table III.iii-1. Different Scenarios for Regression Bag Analyses

Scenario	Description	Screening Values
1	All measurements, including duplicates	$0 \leq$ ppmv $<$ 10,000
2	No duplicate measurements, use first chronological bagged measurement	$0 \leq$ ppmv $<$ 10,000
3	No duplicate measurements, use first Tricord measurement of any duplicates	$0 \leq$ ppmv $<$ 10,000
4	No duplicate measurements, use first Tricord measurement of any duplicates, no Air District measurements	$0 \leq$ ppmv $<$ 10,000
5	All measurements, including duplicates	$10 <$ ppmv $<$ 10,000
6	No duplicate measurements, use first chronological bagged measurement	$10 <$ ppmv $<$ 10,000
7	No duplicate measurements, use first Tricord measurement of any duplicates	$10 <$ ppmv $<$ 10,000
8	No duplicate measurements, use first Tricord measurement of any duplicates, no Air District measurements	$10 <$ ppmv $<$ 10,000

Because the highest concentration of gas used to calibrate the screening instruments was 10,000 ppmv, bag measurements that had pre-bag screening values above 10,000 ppmv may not be accurate and are excluded from all eight scenarios.

The differences between Scenarios 1 through 4 and 5 through 8 is the range of screening values for which to derive and apply regression equations: either to include all bag results with pre-bag screening values below 10,000 ppm or to only include those bag results with pre-bag screening values equal to or greater than 10 ppmv and less than 10,000 ppmv.

For Scenarios 5 through 8, a minimum screening value of 10 ppmv was chosen as it was the concentration of the lowest gas used to calibrate screening instruments. Screening instruments also experienced the greatest instrument drift at the 10 ppmv level as compared to the other five calibration gases leading to greater uncertainty regarding lower screening value measurements.

Other than range of screening values, Scenarios 5 through 8 are identical to Scenarios 1 through 4 where differences include whether to include or exclude duplicate measurements, include or exclude Air District measurements, and which measurement to include of duplicate measurements.

The number of bagged measurements by component type and scenario is provided in Table III.iii-2.

Table III.iii-2. Regression Bagged Sample Sizes by Regression Scenarios

Component Type	Number of Regression Bagged Sample Sizes by Scenario							
	1	2	3	4	5	6	7	8
Pump Seals	31	30	29	28	28	27	26	25
Connectors and Valves	143	131	130	128	129	118	117	115

With the bagged measurements in each scenario, linear regression analysis (ordinary least squares) was performed. Regression coefficients and standard errors as well as the adjusted R^2 and sigma for each scenario are published in Table III.iii-3 for pump seals and in Table III.iii-4 for valves and connectors.

Table III.iii-3. Regression Parameters for Pump Seals by Regression Scenario

Scenario	Regression Coefficients			Regression Standard Errors			Adjusted R^2	Sigma
	Intercept	Screening Value	Temperature	Intercept	Screening Value	Temperature		
1	-8.000	1.426	0.00441	0.403	0.184	0.00139	0.726	0.64
2	-7.978	1.411	0.00443	0.415	0.193	0.00141	0.713	0.65
3	-8.146	1.524	0.00438	0.384	0.182	0.00129	0.769	0.59
4	-8.142	1.519	0.00438	0.392	0.186	0.00131	0.766	0.60
5	-7.729	1.233	0.00620	0.380	0.191	0.00172	0.760	0.61
6	-7.704	1.214	0.00624	0.391	0.201	0.00176	0.750	0.62
7	-7.862	1.332	0.00607	0.354	0.184	0.00157	0.808	0.56
8	-7.860	1.329	0.00607	0.362	0.189	0.00160	0.806	0.57

Table III.iii-4. *Regression Parameters for Valves and Connectors by Regression Scenario*

Scenario	Regression Coefficients			Regression Standard Errors			Adjusted R^2	Sigma
	Intercept	Screening Value	Temperature	Intercept	Screening Value	Temperature		
1	-7.415	1.088	0.00261	0.117	0.044	0.00027	0.842	0.42
2	-7.454	1.116	0.00255	0.120	0.047	0.00029	0.846	0.41
3	-7.472	1.122	0.00263	0.117	0.045	0.00029	0.857	0.40
4	-7.498	1.128	0.00273	0.117	0.046	0.00030	0.861	0.40
5	-7.251	1.029	0.00275	0.132	0.048	0.00029	0.818	0.43
6	-7.274	1.050	0.00269	0.135	0.050	0.00031	0.824	0.42
7	-7.294	1.056	0.00278	0.131	0.048	0.00030	0.838	0.41
8	-7.323	1.064	0.00288	0.130	0.049	0.00032	0.844	0.41

As seen in Table III.iii-3 and Table III.iii-4, the adjusted R^2 for regression equations for pump seals varied between 0.713 to 0.808 and for valves and connectors between 0.818 to 0.861.

For comparison, the regression equations derived in the 1980 EPA Study had a correlation coefficient (r) of 0.78 for valves, 0.68 for pump seals, and 0.74 for flanges[3]. These equate to an R^2 of 0.61 for valves, 0.46 for pump seals, and 0.55 for flanges.

For pump seals, Scenario 7 results in the regression equation with the highest adjusted R^2 and lowest sigma. For valves and connectors, Scenario 4 results in the regression equation with the highest adjusted R^2 and lowest sigma. However, the differences among the scenario fits are indistinguishable statistically.

III.iii.1. Validation Check

Although regressions provide an optimal least-squares fit to the data on the log scale, this does not guarantee such a fit on the original scale. In this section, a comparison is made of the original bagged values, with the raw predictions, and the predictions adjusted for underestimation bias.

For the comparison, the fitted correlation equations were applied to the original bagged values, using pre-bagged screening values and corrected temperatures as predictors. This is a log scale regression prediction for the leak rate of a component. Letting y = $\log_{10}$(leak rate of the component), the model $\hat{y} = b_0 + b_1\, log_{10}(sv) + b_2\, T$, was fitted where sv = screening value + 10 in Scenarios 1-4 and, for Scenarios 5-8, sv=screening value limited to screening values > 10 ppmv; and T is the component temperature during bagging. Pegged values (sv > 10,000 ppmv) were excluded.

The unadjusted leakage rate estimate is $\hat{L}_u = \frac{\sum_{i=1}^{n} 10^{\hat{y}_i}}{n}$, where n is the number of components. The adjusted leakage rate across components is estimated by simulating $\hat{L}_a = \frac{\sum_{i=1}^{n} 10^{\hat{y}_i + e_i^*}}{n}$, where the e_i* are independent normal N(0,sigma) variables and sigma is the regression sigma. These are compared with the mean of actual bagged samples: $L = \frac{\sum_{i=1}^{n} B_i}{n}$.

[3] See Table C6-1 on page C-147 of *Assessment of Atmospheric Emissions from Petroleum Refining: Volume 4. Appendices C, D, and E*. April 1980.

These equations were applied to the n=33 original bagged pumps, and the original n=141 valves and connectors with simulation sizes of 100,000. The figures and tables show the results.

Table III.III.iii.1-1. Comparison of Regression Predicted Emissions to Measured Emissions for Bagged Samples by Scenario

Scenario	Mean Mass of Measurements (kg/hour)					
	Pump Seals			Valves and Connectors		
	Measured	Predicted	Predicted / Measured (%)	Measured	Predicted	Predicted / Measured (%)
1	0.00119	0.00063	53%	0.00039	0.00029	87%
2	0.00123	0.00071	58%	0.00038	0.00028	91%
3	0.00124	0.00085	68%	0.00039	0.00031	87%
4	0.00128	0.00085	66%	0.00040	0.00032	86%
5	0.00132	0.00076	58%	0.00039	0.00029	86%
6	0.00137	0.00085	62%	0.00038	0.00028	91%
7	0.00139	0.00102	73%	0.00039	0.00031	86%
8	0.00144	0.00103	71%	0.00040	0.00032	85%

As shown in Table III.III.iii.1-1, regression equations derived from all eight scenarios underestimated measured emissions by 37 to 47 percent for pump seals and by 9 to 14 percent for valves and connectors. This difference can be attributed to the bias introduced by estimating the mean of the exponentiated value by the exponentiated mean.

Table III.III.iii.1-6 shows comparisons of the adjusted predictions with the actual. For pumps, the ratios cluster around 100%. For valves and connectors, the median ratio is 115%, somewhat above the actual.

Table III.III.iii.1-6. Comparison of Adjusted Regression Predicted Emissions to Measured Emissions for Bagged Samples by Scenario

Scenario	Mean Mass of Measurements (kg/hour)					
	Pump Seals			Valves and Connectors		
	Measured	Predicted	Predicted / Measured (%)	Measured	Predicted	Predicted / Measured (%)
1	0.00119	0.00114	96%	0.00039	0.00045	116%
2	0.00123	0.00113	92%	0.00038	0.00042	109%
3	0.00124	0.00139	111%	0.00039	0.00045	115%
4	0.00128	0.00137	107%	0.00040	0.00046	116%
5	0.00132	0.00126	96%	0.00039	0.00045	116%
6	0.00137	0.00131	95%	0.00038	0.00042	110%
7	0.00139	0.00149	107%	0.00039	0.00046	116%
8	0.00144	0.00154	107%	0.00040	0.00047	117%

III.iii.2. Uncertainties

Although sample sizes were reasonably large, they still represent a single study. Statistical theory shows that the mean prediction from a regression on the log scale will result in a substantial underestimation of the actual mean on the original scale. Adjusting for this expected underestimate may be accomplished through bias correction. However, bias correction will not perfectly match actual results. One question that was investigated was whether discrepancies between the predictions and the actual values was attributable to chance or were they exceptionally large.

To evaluate the uncertainty in the model, the "actual" values was repeatedly simulated, each time fitting the model and making predictions, as follows:

- starting with the regression prediction and sigma from Scenario 1, simulating new "actual" values: $y_i^* = b_0 + b_1 log_{10}(sv_i) + b_2 T_i + e_i^*$, I = 1,…,n, where n = 33 for pumps and n = 141 for valves and connectors and e_i* are simulated independent normal N(0,sigma) variables.
- For each set of "actual" values, the correlation equations were fitted, and unadjusted and adjusted predictions made, yielding simulated actual means

  $L, and\ unadjusted\ and\ adusted\ means\ \ \hat{L}_u^*\ and\ \hat{L}_a^*.$

The figures below show the ratios of predicted to actual: $\frac{\hat{L}_u^*}{L}\, and\, \frac{\hat{L}_a^*}{L}$ for pumps and valves and connectors, based on simulation sizes of 1,000 plus upper and lower 90% confidence limits.

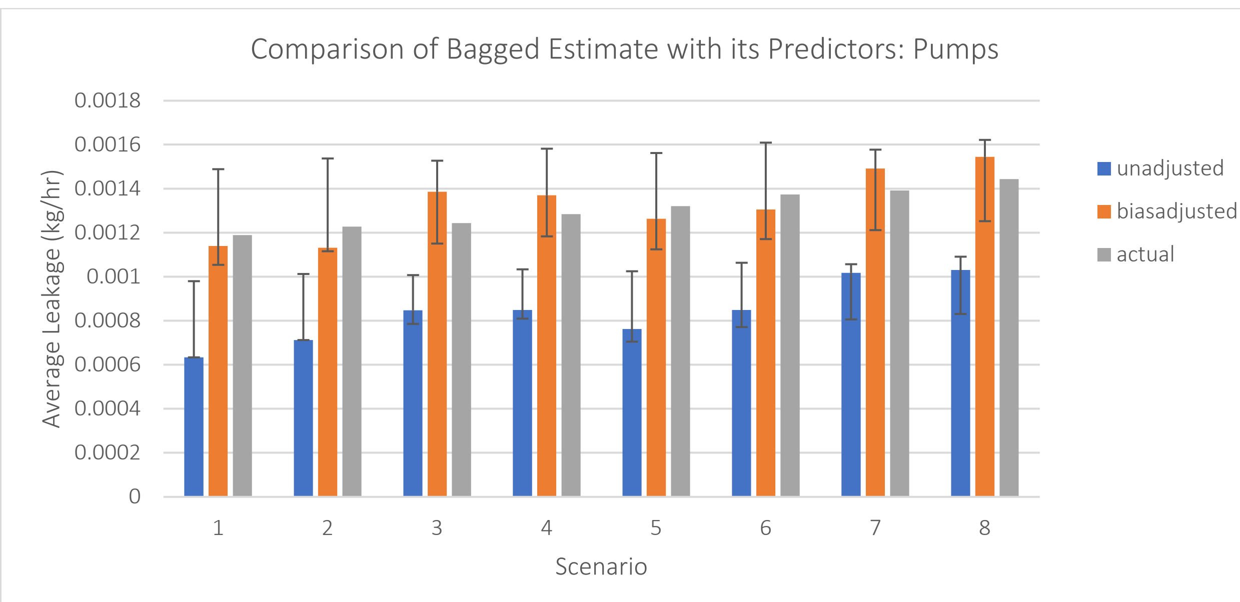

Figure III.III.iii.2-1 Comparison of predicted and adjusted pump means with actual

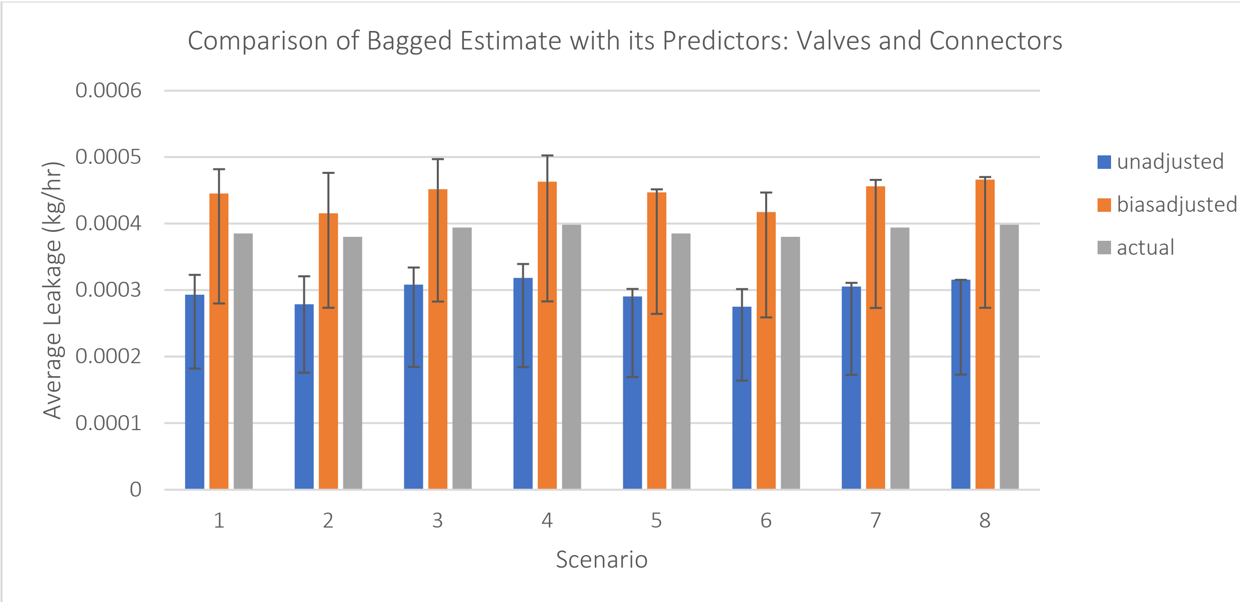

Figure III.III.iii.2-2 Comparison of predicted and adjusted valve and connector means with actual

For the unadjusted predictions, the confidence intervals fall below the actual, as expected. But the confidence intervals for the bias adjusted cover the actual, and the attributable ratios above – 92% to 107% for pumps and 110% to 117% for connectors and valves – fall within the confidence limits. Thus, there is no statistical evidence for model lack of fit.

IV. Uncertainty Methodology

i. Background

Surveys like the current Study include some degree of uncertainty. There is measurement error and there can be sampling error unless a complete census is taken. As can be seen above, component leakages have an extremely skewed distribution, with the vast majority being negligible, a minority with significant leakage, and one or two with very large leakage. Because estimation of the total or mean leakage is required, these very large leakers must be considered; the presence or absence of one or two such can affect the result substantially. It is possible to estimate the uncertainty, to provide a range of likely total or mean estimates.

In the model, the error term, e_i*, can be thought as representing measurement error, not just in the calibration of the other variables to the bagged leakage rate, but the error in the bagged leakage rate measurement as well.

Component leakage varies over time, but the observations are snapshots, taken at a specific time, rather than measured the entire year. Thus, even for a sampled component, the associated measurement is a sample of size one from its annual leakage distribution. And if the screened values themselves are a sample and not a census, then the estimate of uncertainty in the final estimate of the common mean, μ, must also take this sampling uncertainty into account also.

Contrast with the 1980 EPA Study

This study follows the methodology of the 1980 EPA study to a large extent, but there are some key differences necessitated because the sampling design was different.

The 1980 EPA Study did not determine a regression equation that perfectly modeled a relationship between independent variables (e.g., leak concentration) and measured mass emissions. Therefore, the 1980 EPA Study accounted for the regression error term in several ways including directly adjusting the measured values from one refinery that was determined to have a systematic bias as well as a scale correction bias.

In both the Heavy Liquids Study and the 1980 EPA Study, some refinery components were bagged, and a larger sample screened.

In both studies, a regression analysis was used to predict the bagged values from other variables, the goal being to make emissions rate estimates for the components that were screened but not bagged. In both studies, the relationship between bagged values and screening values differed by component type, so that more than one regression equation was used.

In the 1980 EPA Study, as with the current study, the regression analysis was done on the log scale because the distribution of leak rates was highly skewed. Because the mean emission rate was developed from the sum of emissions on the original scale and because simply averaging the exponentiated regression predictions would result in a downwardly biased estimate[4], random errors were simulated and added to the predicted values before exponentiation[4]. Thus, either directly bagged or indirectly estimated leakage rates were available for all sampled components.

However, because the design of the 1980 EPA Study and the Heavy Liquids Study differed, how the leakage rates will be estimated may differ and require different methods.

The following table provides a comparison of the number of components that were screened and bagged in the 1980 EPA Study and the current Study.

Table IV.i-1. Comparison of Number of Components Bagged and Estimated in 1980 EPA Study and Current Study

Type	Sources Sampled		Sources to Be Estimated (2)		Percentage of Components Sampled	
	1980 Study (1)	Study	1980 Study (1)	Study	1980 Study (1)	Study
Valves	474	70	153	5,350	75.6	1.3
Pump Seals	281	32	101	734	73.6	4.4
Flanges	43	N/A	19	N/A	69.4	N/A
Connectors	N/A	61	N/A	4,710	N/A	1.3

Notes:
1. Source: Unnumbered table on page C-146 in Appendix C of *Assessment of Atmospheric Emissions from Petroleum Refining: Volume 4. Appendices C, D, and E*. April 1980.
2. Sources to be estimated represent the number of components whose emissions will be estimated by regression equations. Unlike the current Study, the 1980 EPA Study did not use regression equations to estimate emissions of bagged components.

In the 1980 EPA Study, a large fraction of the screened values was bagged. The overall sample sizes were in the hundreds.

In the present study, most screened components were not bagged, but the number of screened components in heavy liquid service was much larger (approximately 10,000). Another important difference was that component selection and sampling was done randomly in the 1980 EPA Study but not in the current study.

In the 1980 EPA Study, a key factor was the relatively small sample sizes. The analysis was done separately for different component types and based on whether the stream was in gas, light liquid, or heavy liquid service. The highly skewed leak rates resulted in the simple arithmetic mean not being efficient – a few large outliers typically dominated, making the result uncertain. Fortunately, the distribution of the log leak rates was determined to be approximately Gaussian. For this, statistical theory produces a much more efficient estimator based on the sample mean and variance on the log scale, and a scaling factor which provided a bias adjustment to the naive estimator[5].

[4] For the 1980 study, see the leak rate equation and discussion on page C-146 in Appendix C of *Assessment of Atmospheric Emissions from Petroleum Refining: Volume 4. Appendices C, D, and E*. April 1980.
[5] See Section 5.1.2.2, page 110, from the Assessment of Atmospheric Emissions from Petroleum Refining: Volume I, Technical Report, EPA-600 /2-80-075a, April 1980, and page C-151. The adjustment is from J.D. Finney, "On the Distribution of a Variate Whose Logarithm is Normally Distributed," *Journal of the Royal Statistical Society, Series B*, 7:155-161, 1941.

In the present study, the sample size is much larger, but the observations were not taken randomly. Almost all pumps[6] were screened, that is, a virtual census. Therefore, there is essentially no sampling error, the only error deriving from estimation of the leakage rates from measurements, and that they were made over a short period.

Estimates of total emissions from connectors and valves are more involved. One issue is that the sampling was not done at random. Instead, only a few process units and stream services were sampled for each refinery. Because of this it is important to investigate the extent that leakage rates might vary among the units or services and, if substantial variation were found, to estimate the leakage rate for each unit or service and then take a weighted average where the weights were the fraction the unit or service had of the total number of components in the five refineries. Although steps were taken to minimize component selection bias, there is also the problem that sampling was not random even within a process unit or service. This is a potential source of error that may not be estimated.

To determine whether the same approach for errors used in the 1980 EPA Study may be applied in the current Study, the distribution of leak rates on the transformed scale (logarithmic) was evaluated. If the distribution follows a Gaussian (normal) distribution, then the same approach could be used. The distribution may be viewed though a histogram as well as a quantile-quantile (Q-Q) plot. A Q-Q plot charts the quantiles (equal-sized partitions) of two probability distributions against each other for comparison purposes.

Using regression equations developed from the field screening data set, the resulting mass emissions may be plotted within histograms and Q-Q plots to see if the same approach as the 1980 EPA Study may be used.

The following figures demonstrate that the aggregate distributions of connectors and valves, and of pumps, are not Gaussian on the log scale. The histograms (Figure IV.i.1a and Figure IV.i.2a) show that both are right-skewed rather than bell-shaped. Figure IV.i.1b and Figure IV.i.2b show a plot of the log (leak rate) quantiles compared with theoretical Gaussian quantiles. If the log (leak rate) were normally distributed, these plots would be almost straight. Instead, they are concave, an indication of being right-skewed relative to the Gaussian distribution.

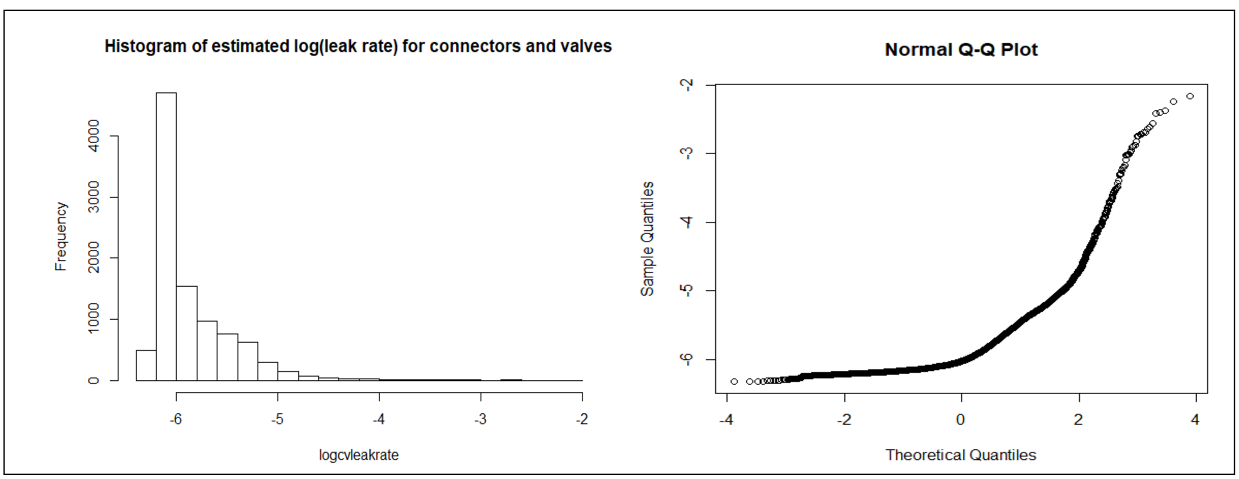

Figure IV.i.1.. a) Histogram of log leak rate for connectors and valves, b) Normal Q-Q plot of log leak rate for connectors and valves

[6] Some pumps were not screened because they were not accessible or were not operation.

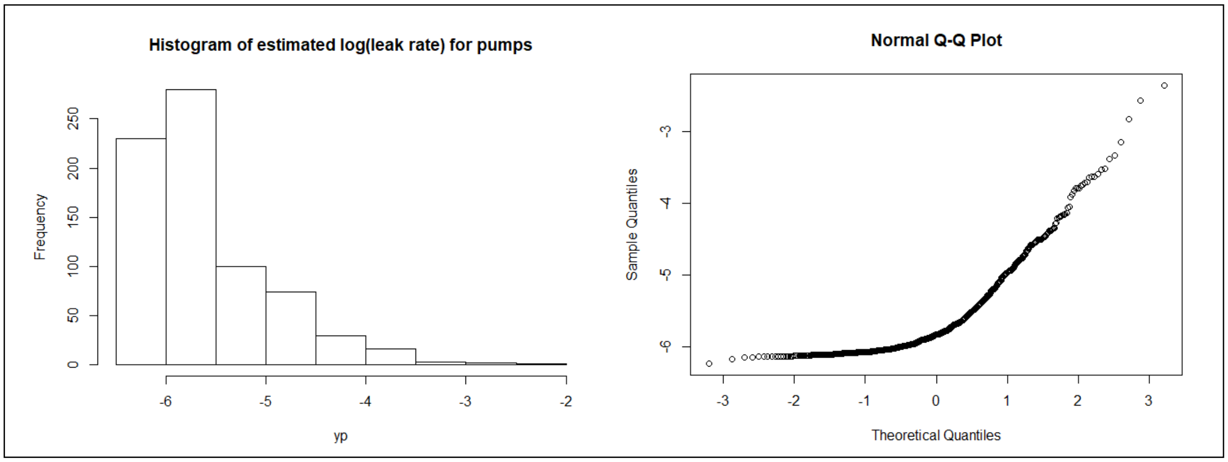

Figure IV.i.2. a) Histogram of log-leak rate for pumps, b) Normal Q-Q plot of log leak rate for pumps

Thus, the more efficient estimator used in the 1980 EPA Study is not appropriate here.

ii. Approach

A basic statistical theorem, the Law of Large Numbers, states that if there is a set of independent random variables, Y_1, Y_2, …, with common mean μ, then the sample mean based on n observations, $\bar{Y} = (Y_1 + Y_2 + \ldots + Y_n)/n = S/n$, gets closer and closer to μ as n becomes very large.

If all the components in the petroleum refineries could have been bagged at randomly selected times (a census), then S (or $n\bar{Y}$) would be a quite reasonable estimator of the total[7]. But if only a small number of components are measured, then the sample mean may differ substantially from the petroleum refinery-wide mean.

If the parametric distribution of the Y_i happens to be known, then another function of the Y_i may yield a more "efficient" estimator of μ, one that tends to be closer, that is, making more efficient use of the data.

This was done in the 1980 EPA Study, which assumed that the logarithm of leakage rates was normally distributed. In this Study, that assumption is false as shown in Figure IV.i.1 and Figure IV.i.2 above.

If the screened values themselves are a sample and not a census, then the estimate of uncertainty in the final estimate of the common mean, μ, must also take the sampling error into account.

Within this Study, because the sample sizes are large, the sample means of the estimated leak rates are simply computed. Because the sample sizes are large, the sampling uncertainty of the estimate is not too great. However, owing to the practical difficulty of sampling several hundred thousand components, a census of connectors and valves was not accomplished.

[7] Not perfect since measured emissions were a snapshot for each component as the goal is measuring the emissions over the entire year, plus the error in the measurement of mass.

Bootstrap Sampling

To account for sampling error, one may use a re-sampling technique such as bootstrapping with replacement. In bootstrapping with replacement, a new sample data set of the same size as the original data set is created. For each place within the new data set, an observation from the original data set is randomly selected and placed within the new data set. From the newly created data set, the mean is determined. This process is repeated multiple times to create a set of means.   The idea of the bootstrap is to approximate an actual distribution with the sample distribution. Here, the intent is that the distribution of the set of means mimics the actual distribution.

The following figure illustrates the bootstrap with replacement process for five re-samples and using a software program to randomly create the bootstrap samples.

Example:

Sample	Observations in Array Form	Sample Mean
Original Sample	[1, 5, 6, 3, 2]	3.4
Bootstrap Sample 1	[3, 1, 1, 1,5]	2.2
Bootstrap Sample 2	[6, 2, 2, 6, 5]	4.2
Bootstrap Sample 3	[3, 6, 6, 5, 2]	4.4
Bootstrap Sample 4	[1, 1, 3, 1, 2]	1.6
Bootstrap Sample 5	[5, 5, 3, 2, 5]	4.0

Mean of Bootstrap Samples: 3.3

Figure IV.ii.1. *Example of Bootstrapping with Replacement*

In this example, the original sample had a mean of 3.4 while the mean of the five bootstrap samples is 3.3[8].   The variation in the bootstrapped sample means provides an estimate of the true distribution of errors, that is, it provides a reasonable estimate of uncertainty. From a large bootstrap sample, the upper and lower percentiles can be chosen to provide a confidence interval for the mean.

One additional complication arises when regression is done on one scale, but what is of interest is the mean on the original scale – the mean leak rate. When regression is accomplished on one scale (e.g., logarithm) by transforming data and then the resulting regression-derived values are de-transformed, an additional error is introduced termed transformation scale bias. Averaging the exponentiated regression predictions would result in a downwardly biased estimate[9]. The 1980 EPA Study corrected for this bias through use of a Scale Bias Correction Factor.

The present study takes advantage of the much larger set of components that were screened but not bagged. With a regression of bagged values on screening and other variables, the analysis is calibrating these variables to be measurements of the bagged values.

As discussed above, for non-exact regression equations (e.g., $y = b_0 + b_1x_1 + b_2x_2 + e$, where y is the log of the bagged leak rate) there are two terms: the predicted value (e.g., $b_0 + b_1x_1 + b_2x_2$) and an error term (e).

[8] The bootstrap mean converges to the sample mean as the number of bootstrap samples grows large.
[9] This is a consequence of Jensen's Inequality.

The first term can be thought of as the calibrated measurement. The error term can be thought of as representing measurement error, not just in the calibration of the other variables to the bagged leakage rate, but the error in the bagged leakage rate as well.

The distribution of y = log (leak rate) has been demonstrated to not be normal and thus the same approach used in the 1980 EPA Study, where the non-zero leakage rates were assumed to be lognormally distributed, is not appropriate. However, the regression errors are reasonably approximated by the normal distribution.

An understanding of the distribution of the error term, e, can be made from the regression residuals. Figure IV.ii.2 shows the residuals[10] from a regression model for connectors and valves and another one for pumps each developed under one of the scenarios in Table III.iii-1.

A 1:1 line is drawn in shows the high degree of linearity. In both cases the correlation of the residuals with normal quantiles is 0.99. These correlations were used as a test for normality by vectors of normal variates of the same size, computing correlations with the normal quantiles, and seeing where the correlations with residuals fall. Based on simulations of 10,000, the estimated p-values were 0.11 and 0.55 respectively, so the assumption of normality could not be rejected.

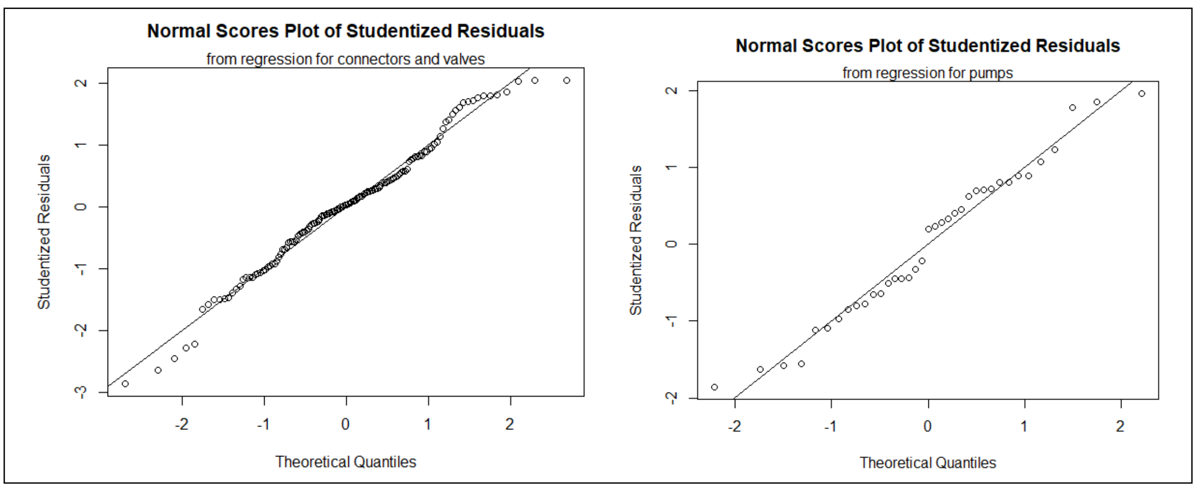

Figure IV.ii.2. Normal Q-Q plots of residuals versus quantiles of the normal distribution

Simulation

A straightforward alternative is simulation. The goal is to estimate the expected value of the exponentiated variable, L = e^Z :$E(L) = \int_{-\infty}^{\infty} e^z f(z)dz$, where f(z) is the probability density function of Z. If f(z) were known, by simulating random variates Z_1, Z_2, … Z_n, from f(z), and computing $\frac{\sum_{i=1}^{n} e^{z_i}}{n}$, we could get arbitrarily close to this integral by the Law of Large Numbers.

[10] These residuals have been studentized to have mean 0 and constant variance 1.

If every component screened had been bagged, yielding measured leakage rates L_i, i=1,…,n, then $\bar{L} = (L_1 + L_2 + \ldots + L_n)/n$, would be an unbiased estimate of the mean leakage rate, and a reasonable one, given the large samples, because of the Law of Large Numbers.

Here $Y_i = \log_{10}(L_i) = b_0 + b_1 x_{1i} + b_2 x_{2i} + e_i$ is modeled. Y_i is not observed for most components, but can be predicted by $b_0 + b_1 x_{1i} + b_2 x_{2i}$, with the knowledge that the error terms are roughly Gaussian. By simulating the e_i, as e_i^*, using the regression sigmas, the distribution of the Y_i can be approximately simulated as $Y_i^* = b_0 + b_1 x_{1i} + b_2 x_{2i} + e_i^*$.

As the Gaussian assumption is not unreasonable for the regression errors, the errors can be simulated using pseudo-random normal variates and added to the regression predictions. $\bar{L}$ can then be estimated by $\frac{\sum_{i=1}^{n} e^{Y_i^*}}{n}$.

V. Mean Emissions Estimate Methodology

As discussed previously, emissions from Study components are estimated from two terms: the predicted term and error term.

i. Predicted Term

How the predicted term is estimated depends upon which set of regression equations are used and the specifics of the component.

For example, in Scenarios 1 through 4 of Table III.iii-1, regression equations were derived with and were used for components that had a net screening value greater than 0 ppmv and below 10,000 ppmv. The prediction for the ith component was:

$$\hat{y}_i = b_0 + b_1 x_{1i} + b_2 x_{2i} \qquad \text{[Equation D-1]}$$

where b_0, b_1 and b_2 are coefficients from a row of table Table III.iii-3 for a pump seal and in Table III.iii-4 for a valve or a connector, x_{1i} = $\log_{10}$(screening value of ith component + 10) and x_{2i} = operating temperature of ith component.

In Scenarios 5 through 8 of Table III.iii-1, regression equations were derived with and used for components that had a net screening value equal to or greater than 10 ppmv and below 10,000 ppmv. The prediction for the ith component was:

$$\hat{y}_i = b_0 + b_1 x'_{1i} + b_2 x_{2i} \qquad \text{[Equation D-2]}$$

where b_0, b_1 and b_2 are coefficients from a row of table Table III.iii-3 for a pump seal and in Table III.iii-4 for a valve or a connector, x_{1i}' = $\log_{10}$(screening value of ith component) and x_{2i} = operating temperature of ith component.

For components that had a net screening value less than 10 ppmv, emissions were estimated by randomly selecting one of the bagged components that had a net screening value below 10 ppmv and substituting the mass emissions from the selected component for the emissions of the Study component. No statistical difference was found among the bagged values of connectors, valves and pumps with net screening values below 10 ppmv, so sampling was done from the pooled sample.

ii. Error Term

The error terms were assumed to be Gaussian. For each component, i, a pseudo-random standard normal variate was generated and multiplied by the regression standard error and added to the regression mean using the following equation:

$$e_i = s \; z_i \qquad \text{[Equation D-3]}$$

where:

e_i* = pseudo-random normal observation for the i[th] component

s = regression standard error

z_i = pseudo-random standard normal variate

iii. Emissions Estimation

This study estimated mean emissions by simulating the emissions from individual screened components and averaging them. The resulting simulated means provide both an estimate of mean emissions as well as an estimate of the uncertainty. The following section lays out the simulation methodology.

V.iii.1. Simulated Emissions

The simulation method depends on whether the screening sample can be considered a census, as with pumps, or as a fraction of the total population of components, as with connectors and valves.

V.iii.2. Simulations for a Census of Components – Method for Pump Seals

If using regression equations derived from Scenario 1 through 4, emissions of the i[th] pump is simulated using the following equation:

$$L_i^* = \begin{cases} 10^{\hat{y}_i + e_i^*}, & \text{if screening value}_i < 10{,}000 \text{ ppmv} \\ P_i^* & \text{if screening value}_i \geq 10{,}000 \text{ ppmv} \end{cases}$$ [Equation D-4]

i = 1,…, n, where n = number of pumps

where:

L_i* = pseudo-random observation for the i[th] component

$\hat{y}_i$ = predicted value from the regression equation for the i[th] component, using equation D1.

e_i* = pseudo-random normal observation for the i[th] component

P_i^* = randomly selected bagged value where screening value was ≥ 10,0000 ppmv

If using regression equations derived from Scenario 5 through 8, emissions are simulated using the following equations:

$$L_i^* = \begin{cases} B_i^*, & \text{if screening value}_i \leq 10 \text{ ppmv} \\ 10^{\hat{y}_i + e_i^*}, & \text{if screening value}_i > 10 \text{ ppmv and} < 10{,}000 \text{ ppmv} \\ P_i^*, & \text{if screening value}_i \geq 10{,}000 \text{ ppmv} \end{cases}$$ [Equation D-5]

i = 1,…, n, where n = number of pumps

where:

$\hat{y}_i$ = predicted value from the regression equation for component I (where screening value > 10 ppmv)

e_i* = pseudo-random normal observation

B_i^* = randomly selected bagged value from bagged measurements with screening values ≤ 10 ppmv

P_i^* = randomly selected bagged value where screening value was ≥ 10,0000 ppmv

V.iii.3. Simulations That Include Sampling Error – Method for Connectors and Valves

The regression error term addresses the difference between regression prediction and the observed values used to derive the regression equations.

However, there is an additional error when the observations are a sample and not the population.

For pumps, for which there was essentially a census, there is virtually no sampling error.

For connectors and valves, as the sample size was much smaller than the population, sampling error was considered. In this case, bootstrap sampling of the screened values was employed to account for sampling error. To simulate this case, a bootstrap sample of (SV_{1i}*, T_{2i}*) pairs was selected from the set of screened connector and valve observations, i = 1, ..., n = # of screened connectors and valves. As with the simulation of pumps, different equations were used for scenarios 1-4 and scenarios 5-8. For scenarios 1-4, the predictions were

$\hat{y}_i^* = b_0 + b_1 x_{1i}^* + b_2 x_{2i}^*$, and $\hat{y}_i^* = b_0 + b_1 x_{1i}'^* + b_2 x_{2i}^*$ for connectors and valves,

where the x_1 and x_2 are defined with Equations D-1 and D-2. Then Equations D-4 or D-5 were applied to simulate connector or valve emissions L_i*.

iv. Approach by Component Type and Regression Derived Equations

V.iv.1. Pump Seals, Scenarios 1 - 4 – Regression Equations Using Entire Range of Screening Values

Step 1: Use regression-derived equations to estimate predicted emissions from the entire field screening data set For regression equation terms of logarithmic form, add a constant, i = 1 to n, where n = # of screened pumps.

$\hat{y}_i = b_0 + b_1$*log10[screening value$_i$ + 10] + b_2*temperature$_i$

Step 2: Generate an array – of the same size as the number of pump observations) - of pseudo-random normal observations, e_i*, (mean 0, standard deviation = regression standard deviation).

Step 3: Add the random variates to the predicted values (the same set of random variates will be used in all scenarios to make comparisons between them more precise): $\hat{y}_i + e_i^*$

Step 4a: If screening value$_i$ < 10,000 ppmv, estimate the leak rate of the ith pump as $L_i^* = 10^{\hat{y}_i + e_i^*}$,

Step 4b: If screening value$_i$ ≥ 10,000 ppmv, estimate the leak rate of the ith pump as $L_i^* = P_i^*$, where P_i* is randomly selected from the set of bagged values, P_i, whose pre-bagged screening value was ≥ 10,000 ppmv.

Step 5: Estimate the mean leak rate for pumps as: $\bar{L}_P = \frac{\sum_{i=1}^{n} L_i^*}{n}$.

Step 6: Repeat Steps 2 to 5 10,000 times to derive an array of 10,000 means

Step 7: From the 10,000 means, construct the median and a 90 percent confidence interval.

A diagram of this approach is shown in the following figure.

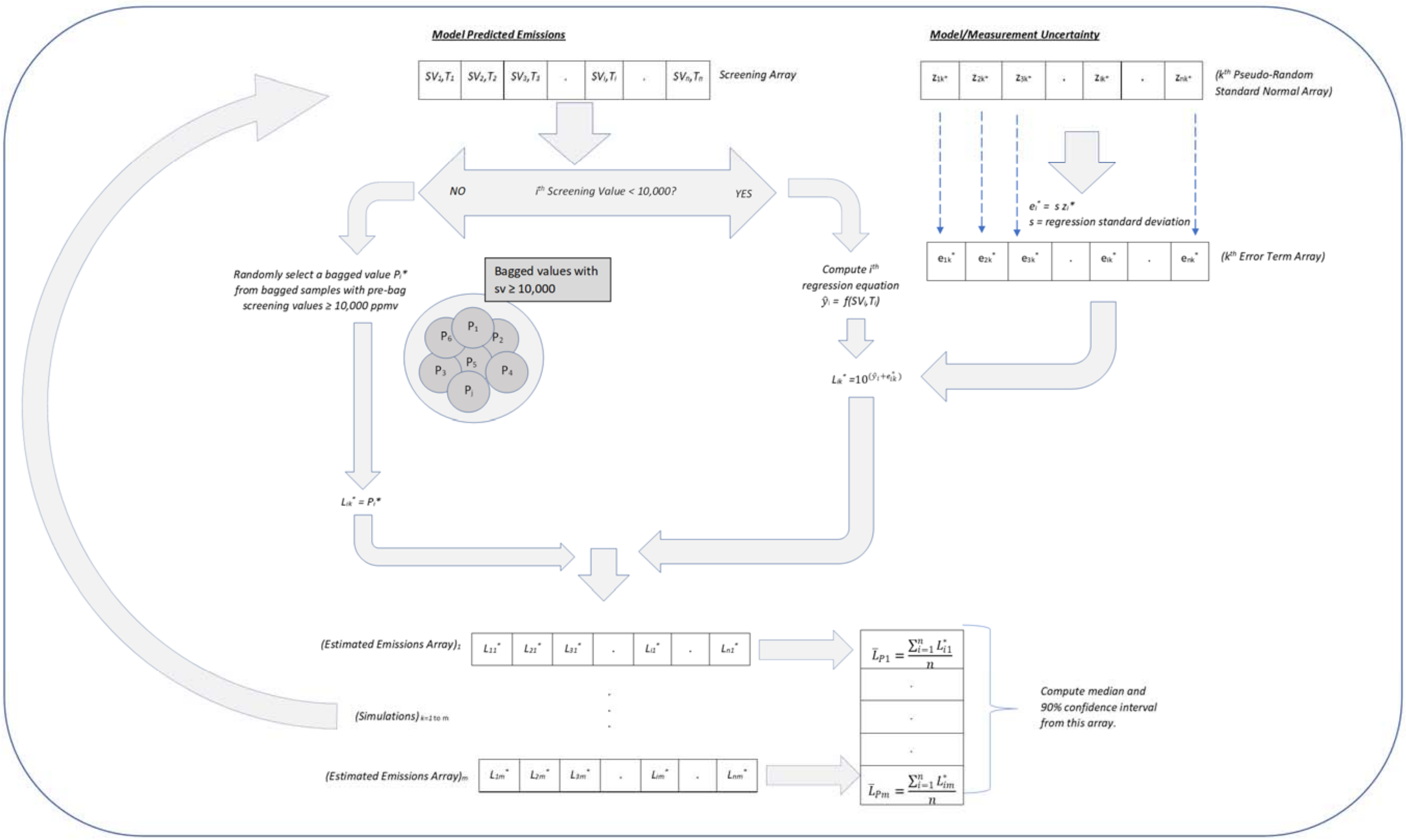

Figure V.iv.1.1. Emissions Estimation Approach for Pump Seals, Scenarios 1-4

V.iv.2. Connectors and Valves, Scenarios 1 - 4 – Regression Equations Using Entire Range of Screening Values

Step 1: Use regression-derived equations to estimate predicted emissions from the entire field screening data set Use the regression terms, a, b & c, to compute estimates of component leakage rates, i = 1 to n, for the n screened connectors (Identical methodology used for valves).

$\hat{y}_i = b_0 + b_1$*log10[screening value$_i$ + 10] + b_2*temperature

Step 2: Generate an array – of the same size, n, as the number of connector observations) – of pseudo-random normal observations, e_i*, (mean 0, standard deviation = regression standard deviation)

Step 3: Add the random variates to the predicted values (the same set of random variates will be used in all scenarios to make comparisons between them more precise): $\hat{y}_i + e_i^*$

Step 4: Draw bootstrap sample of size n the array of predicted values: $\hat{y}_i^* + e_i^*$

Step 5a: If screening value$_i$ < 10,000 ppmv, estimate the leak rate of the ith connector or valve as $L_i^* = 10^{\hat{y}_i^* + e_i^*}$,

Step 5b: If screening value$_i$ ≥ 10,000 ppmv, estimate the leak rate of the ith connector as $L_i^* = P_i^*$, where P_i* is randomly selected from the set of bagged values, P_i, whose pre-bagged screening value was ≥ 10,000 ppmv.

Step 6: Estimate the mean leak ($\bar{L}_C$)using the following equation $\bar{L}_C = \frac{\sum_{i=1}^{n} L_i^*}{n}$Step 6: Repeat Steps 2 to 5 10,000 times to derive an array of 10,000 means

Step 7: From the 10,000 means, construct the median and a 90 percent confidence interval.

A diagram of this approach is shown in the following figure.

Valves, Scenarios 1-4. Use identical methodology as for connectors to derive $\bar{L}_V$.

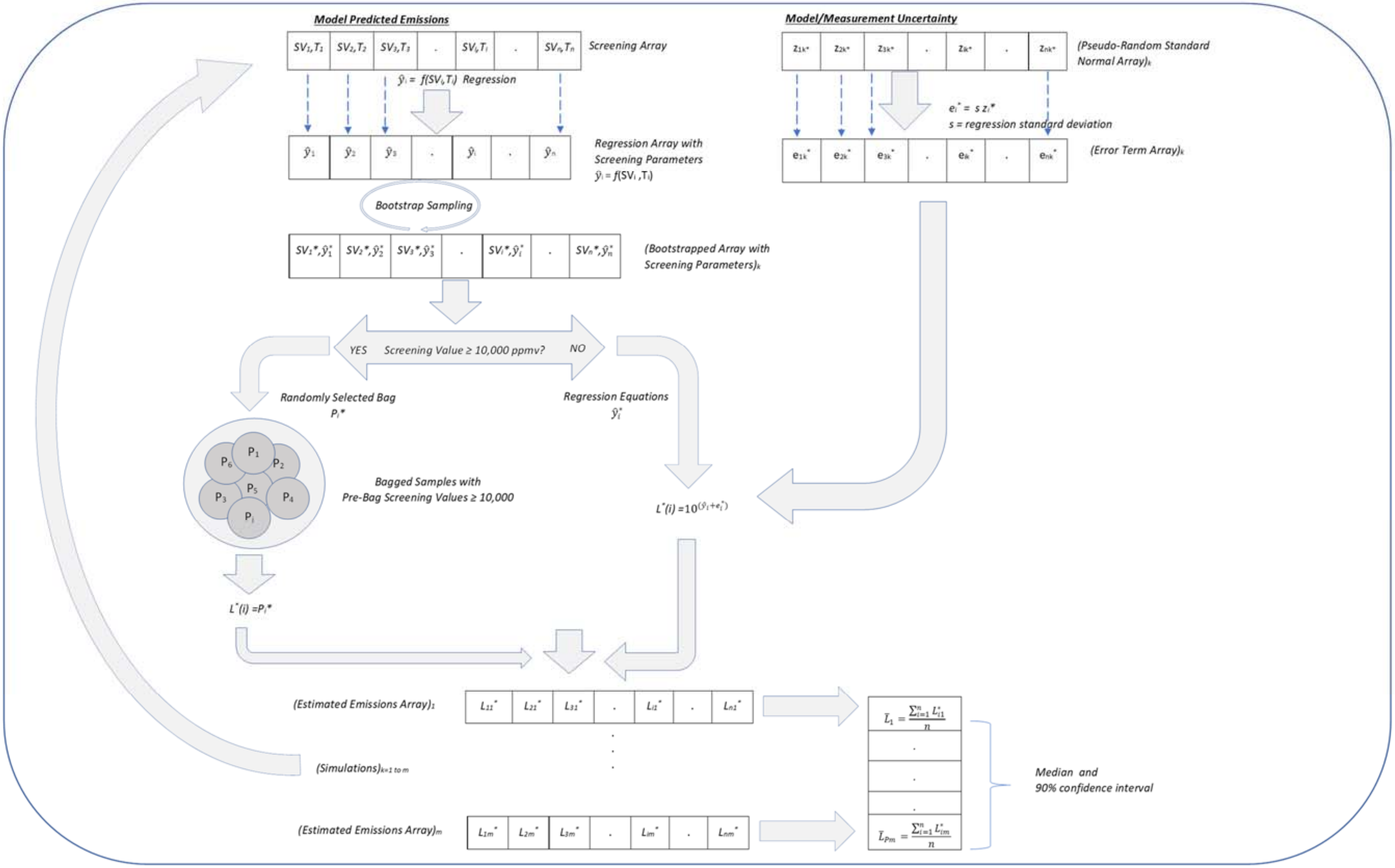

Figure V.iv.2.1. Emissions Estimation Approach for Connectors and Valves, Scenarios 1-4.

V.iv.3. Pump Seals, Scenarios 5 - 8 – Regression Equations Using Limited Range of Screening Values

Step 1: Predict emissions for each field screening observation

For each observation, predicted emissions will depend on the field screening leak concentration: If the field screening leak concentration is less than 10 ppmv, one of the bagged samples that had pre-bag screening values less than or equal to 10 ppmv, will be randomly selected and its measured mass will be used for the predicted emissions. If the screening value is greater than 10,000 ppmv, use one of the bagged samples that had pre-bag screening values greater than 10,000 ppmv.

If the field screening leak concentration is between 10 ppmv and 10,000 ppmv, use the regression-derived equations to estimate predicted emissions

Step 2: Generate an array – of the same size as the number of pump observations > 10 ppm and < 10,000 ppmv - of pseudo-random normal observations, e_i*, (mean 0, standard deviation=regression standard deviation).

Step 3: Add the random variates to the predicted values (the same set of random variates will be used in all scenarios) to those components where the pre-bag screening value was > 10 and < 10,000: $\hat{y}_i + e_i^*$

Step 4: Estimate the mean leak ($\bar{L}_P = \frac{\sum_{i=1}^{n} L_i^*}{n}$) using the following equation:

$$
\mathrm{L}_\mathrm{i}^* = \begin{cases} \mathrm{B}_\mathrm{i}^*, & \text{if screening value}_\mathrm{i} \leq 10 \text{ ppmv} \\ 10^{\hat{y}_\mathrm{i}+\mathrm{e}_\mathrm{i}^*}, & \text{if screening value}_\mathrm{i} > 10 \text{ ppmv and} < 10{,}000 \text{ ppmv} \\ \mathrm{P}_i^*, & \text{if screening value}_\mathrm{i} \geq 10{,}000 \text{ ppmv} \end{cases}
$$

i = 1,…, n, where n = number of pumps with 10 < sv < 10,000 and where:

$\hat{y}_i$	= predicted value from the regression equation for component I (where screening value > 10 ppmv)
e_i*	= pseudo-random normal observation
B_i^*	= randomly selected bagged value where its screening value was ≤ 10 ppmv
P_i^*	= randomly selected bagged value where its screening value was ≥ 10,0000 ppmv

Step 4: Repeat steps 1 through 4 10,000 times to derive an array of 10,000 means

Step 5: From the 10,000 means, construct the median and a 90 percent confidence interval.

A diagram of this approach is shown in the following figure.

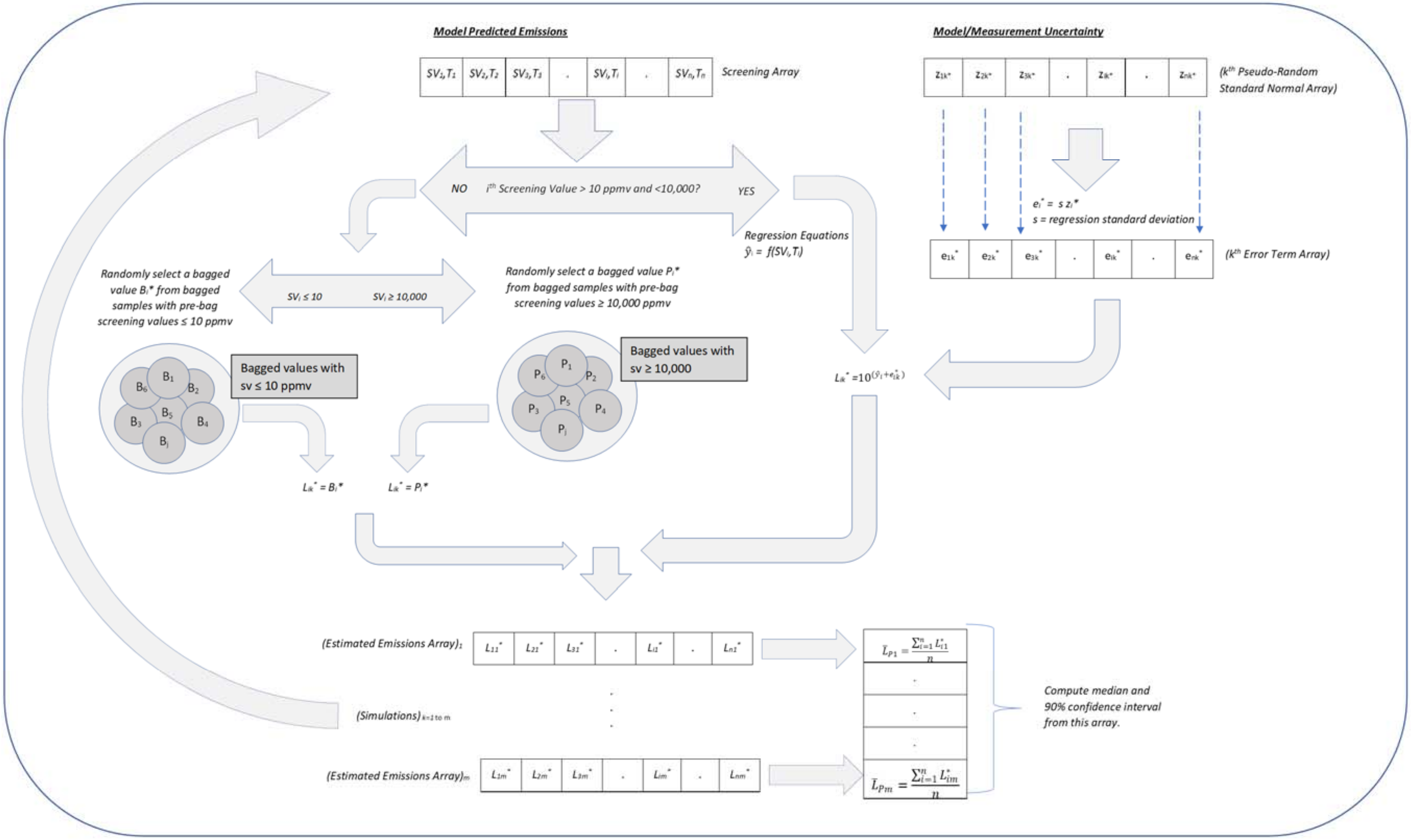

Figure V.iv.3.4. Emissions Estimation Approach for Pump Seals, Scenarios 5-8

V.iv.4. Connectors and Valves, Scenarios 5 - 8 – Regression Equations Using Limited Range of Screening Values

Step 1: Predict emissions for each connector field screening observation

For each observation, predicted emissions will depend on the field screening leak concentration: If the field screening leak concentration is less than 10 ppmv, one of the bagged samples that had pre-bag screening values less than or equal to 10 ppmv, B_i will be randomly selected and its measured mass will be used for the predicted emissions. If the screening value is greater than 10,000 ppmv, randomly select one of the bagged samples, P_i, that had pre-bag screening values greater than 10,000 ppmv.

If the field screening leak concentration is between 10 ppmv and 10,000 ppmv, use the regression-derived equations to estimate predicted emissions

Step 2: Generate an array – of the same size as the number of pump observations > 10 ppmv and < 10,000 ppmv - of pseudo-random normal observations, e_i*, (mean 0, standard deviation=regression standard deviation).

Step 3: Add the random variates to the predicted values (the same set of random variates will be used in all scenarios) to those components where the pre-bag screening value was > 10 and < 10,000: $\hat{y}_i + e_i^*$

Step 4: Draw bootstrap sample of size n from the array of predicted values

Step 5: Estimate the mean leak ($\bar{L}_P$) using the following equation:

$$L_i^* = \begin{cases} B_i^*, & \text{if screening value}_i \leq 10 \text{ ppmv} \\ 10^{\hat{y}_i + e_i^*}, & \text{if screening value}_i > 10 \text{ ppmv and} < 10{,}000 \text{ ppmv} \\ P_i^*, & \text{if screening value}_i \geq 10{,}000 \text{ ppmv} \end{cases}$$

i = 1,..., n, where n = number of connectors with 10 < sv < 10,000 and where:

$\hat{y}_i$	= predicted value from the regression equation for component I (where screening value > 10 ppmv)
e_i*	= pseudo-random normal observation
B_i^*	= randomly selected bagged value where its screening value was ≤ 10 ppmv
P_i^*	= randomly selected bagged value where its screening value was ≥ 10,0000 ppmv

Step 6: Repeat steps 1 through 5 10,000 times to derive an array of 10,000 means

Step 7: From the 10,000 means, construct the median and a 90 percent confidence interval.

A diagram of this approach is shown in the following figure.

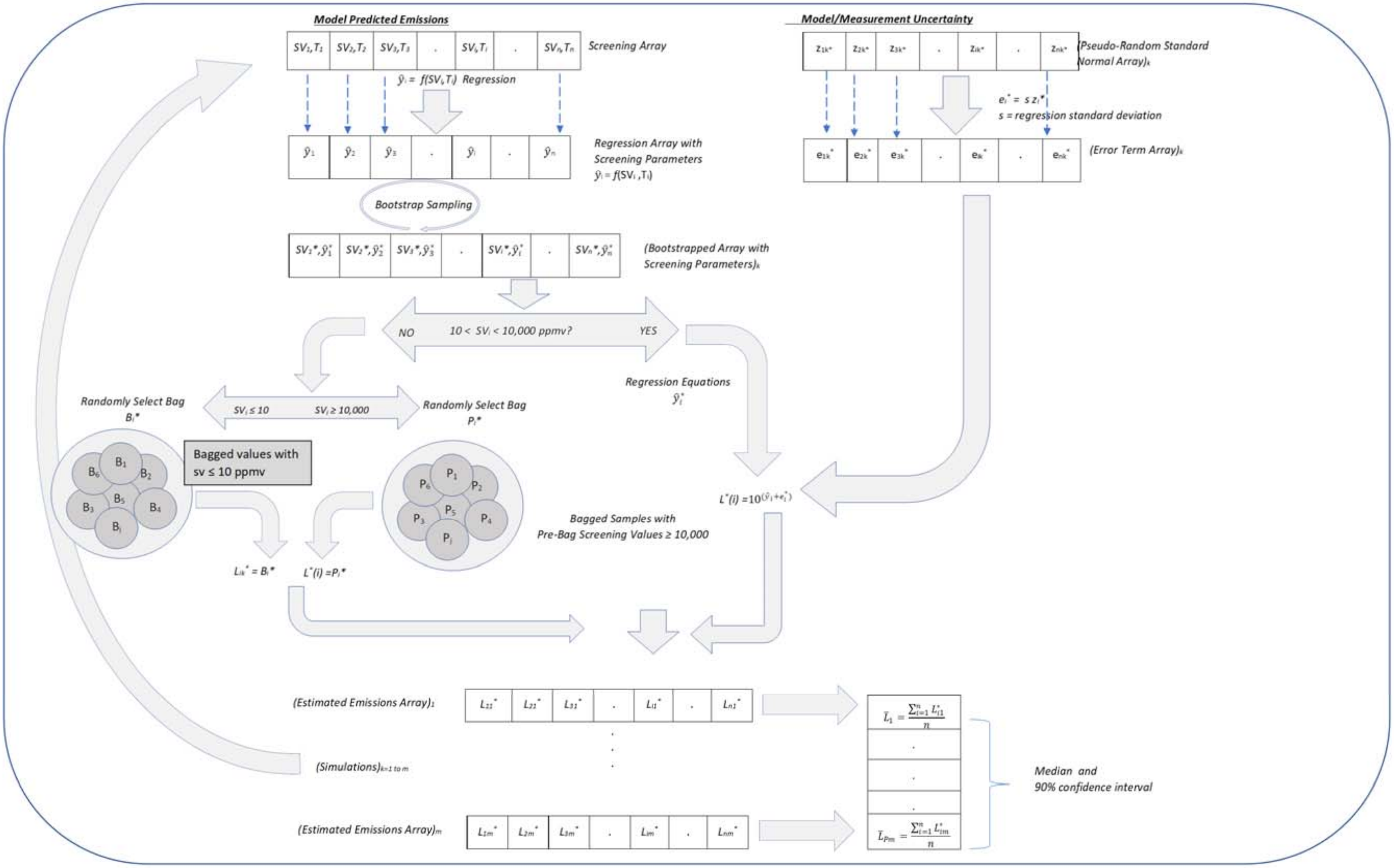

Figure V.iv.4.1. *Estimated Emissions Approach for Valves and Connectors, Scenarios 5-8*

VI. Average Emissions Development

Like the bagged data set, there are numerous considerations regarding the field screening data set for determining which components to include or exclude from an average emissions analysis.

i. Bagged Components

Components that were bagged had emissions measured at the time of bagging. For emissions from bagged components, the emissions that were measured from bagging could be used or emissions could be estimated using the approach discussed in the previous section.

Because of the time that elapsed between initial field screening and bagging, measured emissions during bagging may not actually represent the emissions that would have been measured if the component could have been bagged on the same day as field screening. Because of this, the approach discussed in the previous section was used to estimate emissions from bagged components.

ii. Initial Boiling Point

Some components were screened but were subsequently determined to have an initial boiling point below 302 degrees Fahrenheit. As the intent of the Study was to understand emissions from components in heavy liquid service, which was defined as materials with an initial boiling point of 302 degrees Fahrenheit or greater, components that did not meet this criterion were excluded from further analysis even though there were screened.

iii. Leak Detection and Repair Components

At the beginning of field screening, components that were in heavy liquid service but included within a leak detection and repair program had been screened and included in the Study. After Refinery A, a change in Study design was made to exclude future components from the Study so as not to bias Study results low.

The purpose of a leak detection and repair program is to find and repair leaks through routine monitoring. Components are screened with screening results compared against a leak action threshold. If component is found to have a leak with a screening value above this threshold, action is taken by the refinery to mitigate or eliminate the leak. Such action includes tightening or replacing any packing or gasket materials or even replacing the component if needed.

Because these components are routinely screened and repaired as needed, emissions from such components are expected to be much less than identical components in identical service that are not within a leak detection and repair program.

iv. Lube Oil Components

During field screening at Refinery A, it was found that there were a sizable number of components handling non-process lube oil. These components were principally associated with rotating components (pump shafts, compressor shafts, etc.) where lube oil was used for lubrication. These components have not been included in emissions inventories as there was no method for estimating the number of such components. Because emissions from such components were expected to significantly differ from process lube oil and other heavy liquid material streams, it was decided to exclude these components from the Study and determine emissions within a separate study, the Lube Oil Study.

v. Storage Tank Area Components

The current method of estimating the number of components in heavy liquid service for use in emissions inventories does not account for components that are not in process units such as storage tank areas. However, to address a potential concern that excluding such components may bias Study results high, several hundred components within storage tank areas were included within the field screening portion as well as some within the bagging portion of the Study.

vi. Gaseous Phase

While screening at Refinery D, several components with significant leaks were found handling material with an initial boiling point greater than 302 degrees Fahrenheit but in the gaseous phase. Some of the petroleum refineries were monitoring such components within their leak detection and repair programs components while others did not (Refinery D did not). The five petroleum refineries via the Western States Petroleum Association submitted an agreement to the Air District to include such components within their leak detection and repair programs. Because these components would be routinely monitored, have any leaks repaired, and emissions reported using CAPCOA correlation equations for monitored components; including emissions from such components in average emission factors representing non-monitored components would result in an overestimation of emissions.

VII. Results

Using the procedures discussed in Section V, the mean leak rate per component was estimated for two data sets: including components in heavy liquid service that were part of a leak detection and repair (LDAR) program and excluding such components.

Screened components that were in non-process lube oil service, gaseous phase, or steam-quenched seal were excluded from the analysis.

Table VII-1 presents the results of this analysis. The median pump seal leakage rate estimates are around 1.5E-04 kg/hour, an order of magnitude larger than for valves 2.6E-05 kg/hour and connectors 8.7E-06 kg/hour. However, because there are so many more valves and connectors across the refineries, the latter two values will predominate in an estimated total.

These are the estimated mean leakage rates among the components *screened*. There is significant variation in screening values among process units, and the percentage of these units in the five refineries differs from the percentage in the sample. Thus, the mean leakage rates for the five refineries overall will differ from these somewhat. This latter approach has not been used because the data are inadequate.

For example, in the Blending / Tank Farm category, no valves and only one connector were sampled, whereas there are an estimated 2,330 valves and 7,928 connectors located in blending and/or tank farm process units across the five refineries. Thus, computing leakage means weighted by refinery-wide counts would require either additional data or additional assumptions about the variation in leakage rates across general process units.

To get a sense of how much an estimated refineries-wide average might differ, averages were computed weighted by refineries-wide estimated numbers of components in different processing units. Table VIII shows the results. Although the weighted means differ considerably from the simple component means, they are within 90% confidence limits, indicating that there is no statistical difference. That is, although there are statistically significant differences in mean leakage rates among process units, the data are insufficient to make statistically distinct mean estimates.

Table VII-1. Mean Leakage Rate per Component by Component Type

Scenario	Connectors (kg/hour/connector)			Valves (kg/hour/valve)			Pump Seals (kg/hour/pump seal)		
	Point Estimate	Confidence Interval 5%	Confidence Interval 95%	Point Estimate	Confidence Interval 5%	Confidence Interval 95%	Point Estimate	Confidence Interval 5%	Confidence Interval 95%
1	8.69E-06	6.05E-06	1.46E-05	2.58E-05	1.64E-05	4.00E-05	1.42E-04	7.57E-05	4.61E-04
2	8.59E-06	5.86E-06	1.47E-05	2.68E-05	1.69E-05	4.18E-05	1.55E-04	7.77E-05	5.66E-04

Notes:
Scenario 1 excludes gaseous phase components, steam-quenched pumps, and components handling non-process lube oil
Scenario 2 excludes same components as Scenario 1 as well as LDAR components

Table VIII. Mean Leakage Rate Estimates Weighted by Number of Refinery Components

Scenario	Connectors (kg/hour/connector)	Valves (kg/hour/valve)	Pump Seals (kg/hour/pump seal)
1	1.38E-05	1.44E-05	1.63E-04
2	1.40E-05	1.47E-05	1.94E-04

VIII. Other Analyses

i. Large Leakers

Emissions from components in heavy liquid service is dominated by a few large leakers. Over 80 percent of emissions is from approximately two percent of components. Most pump seals were sampled, but only about 10 percent of the estimated number of valves and five percent of the estimated number of connectors were sampled.

The overall distribution of leak rates is skewed. The following figure is a plot of the logarithms of the emissions from connectors, pump seals, and valves relative to the normal (Q-Q plots). If the data were log-normally distributed, there would appear a straight-line relationship.

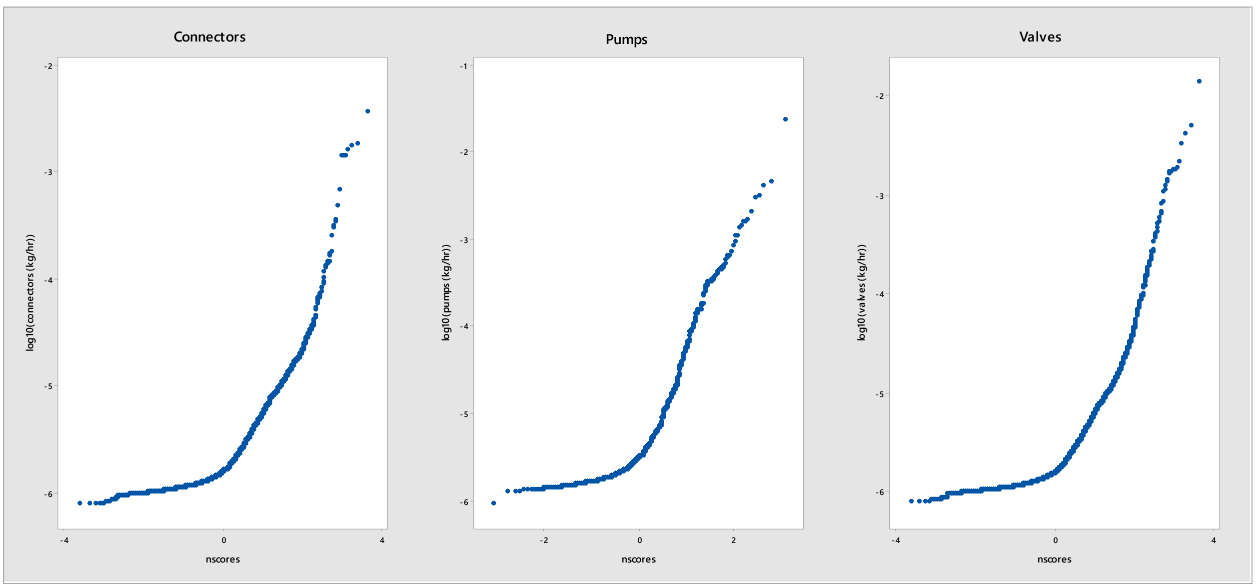

Figure VIII.i.1. Normal Scores Plots for Connectors, Pump Seals, and Valves on Log Scale

As shown in the figure, the plots are right-skewed indicating that it is not well modeled with a log normal distribution.

However, the upper tails of the distribution are roughly linear, as shown in Figure VIII.i.2.

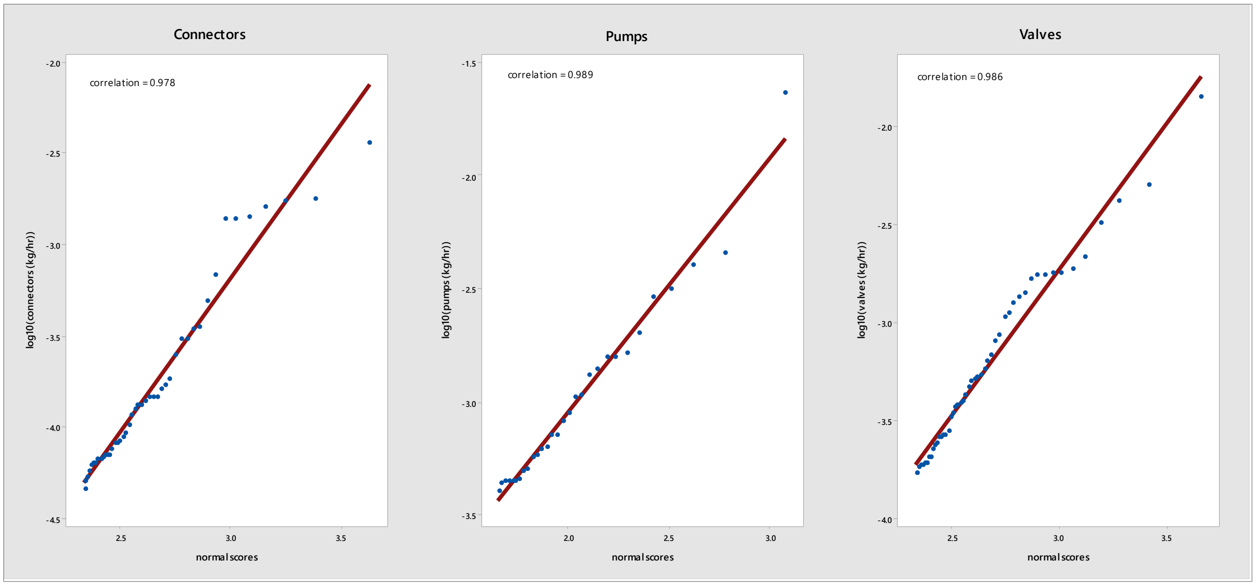

Figure VIII.i.2. Normal Scores Plots of Upper Tails of Connectors, Pump Seals, and Valves

In Figure VIII.i.2, the upper one percent of connectors (45 of 4,487) and valves (51 of 5,079), and the upper five percent of pump seals (30 of 609) are shown against the corresponding normal scores. To test whether these fit the log-normal model, simulations were performed to determine if the correlations are significantly lower than expected if they were from this model.

For connectors, sets of 4,487 log-normal variates were simulated, the 45 largest values selected and the correlation with the same normal scores computed. This was repeated 10,000 times. Of these, 2,134 were smaller than the observed correlation of 0.978 (i.e., a p-value of about 0.21). Based on the data, the log-normal assumption was not unreasonable. Similarly, 7,307 simulated correlations were less than 0.989 observed for pump seals; and 4,089 simulated correlations were less than 0.986 for valves.

Thus, assuming the upper tails of these distributions were log-normally distributed is not unreasonable from the data. Using these distributions can provide an estimate as to how much larger a component leak may be.

An estimate of μ and σ can be made by the intercept and slope of a regression of the tail values against the normal scores. The regression lines are shown in Figure VIII.i.2.

Distribution of the largest leaker

Using the regression estimates, $\hat{\mu}$ and $\hat{\sigma}$, the cumulative probability distribution of the maximum leak rate, M, can be estimated with $P(M < x) \approx \Phi(\frac{x-\hat{\mu}}{\hat{\sigma}})^N$, where N is the total estimated number of components among the five petroleum refineries: 900 pump seals, 191,000 connectors, and 52,000 valves.

The probability density function of the kth order statistic from a set of n independent and identically distributed random variables, $X_1, X_2, \ldots, X_n$ with a continuous distribution with CDF F(x) and pdf f(x) is:

$$\frac{n!}{(n-k)!(k-1)!} f(x)[F(x)]^{k-1}[1-F(x)]^{n-k}.$$

If the Xi are distributed as N(μ,σ), then the density is:

$$\frac{n!}{(n-k)!(k-1)!}\frac{1}{\sigma}\phi\left(\frac{x-\mu}{\sigma}\right)[\Phi\left(\frac{x-\mu}{\sigma}\right)]^{k-1}[1-\Phi\left(\frac{x-\mu}{\sigma}\right)]^{n-k},$$

where ϕ and Φ are the pdf and cdf of a standard normal random variable.

Letting z = (x-μ)/σ, then x = μ + σz, and dx = σdz, so the expected value of the kth order statistic, $X_{(k)}$, is:

$$E(X_{(k)}) = \int_{-\infty}^{+\infty} x\frac{n!}{(n-k)!\,(k-1)!}\frac{1}{\sigma}\phi\left(\frac{x-\mu}{\sigma}\right)\left[\Phi\left(\frac{x-\mu}{\sigma}\right)\right]^{k-1}\left[1-\Phi\left(\frac{x-\mu}{\sigma}\right)\right]^{n-k}\mathrm{dx}$$
$$= \mu + \sigma\int_{-\infty}^{+\infty} z\frac{n!}{(n-k)!\,(k-1)!}\phi(z)[\Phi(z)]^{k-1}[1-\Phi(z)]^{n-k}\mathrm{dx} = \mu + \sigma E(Z_{(k)}),$$

where $Z_{(1)}$, $Z_{(2)}$, …, $Z_{(n)}$ are order statistics from a sample of n iid standard normal random variables. That is, the expected values of the order statistics are a linear function of the normal scores and, hence, μ and σ can be estimated by the intercept and slope of a regression of the $x_{(k)}$ against $E(Z_{(k)})$.

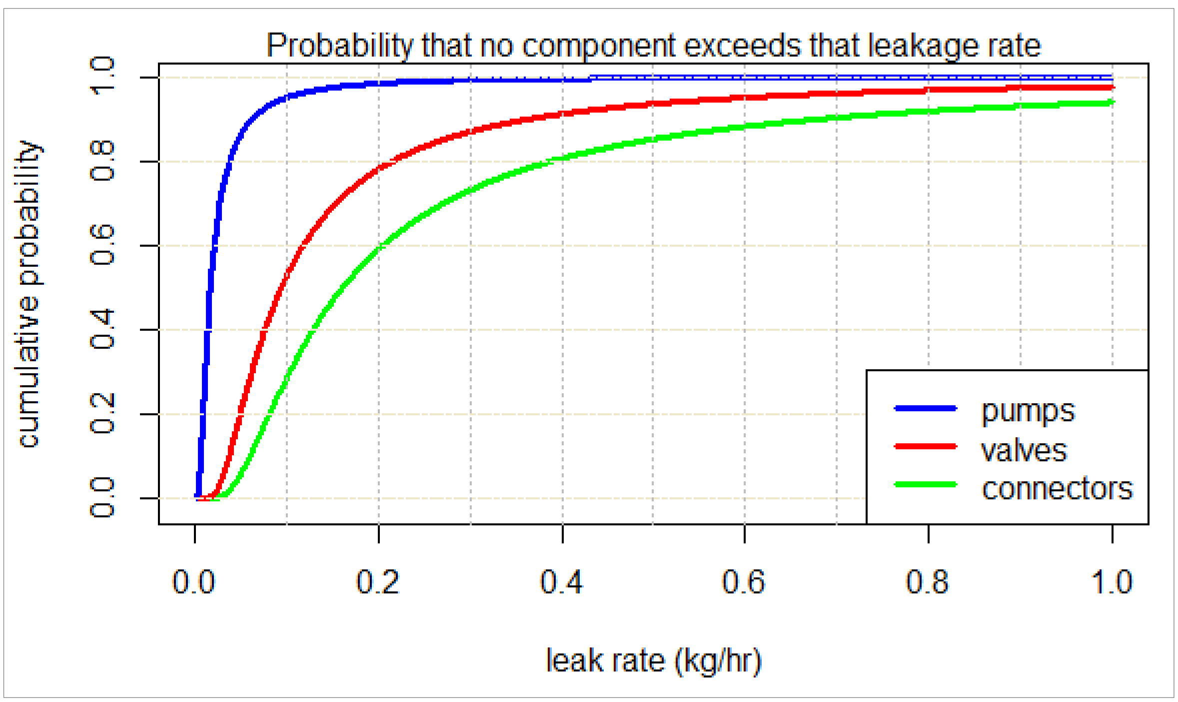

Figure VIII.i.3. Cumulative Distribution of Maximum Leakage by Component Type (Pump Seals, Valves, Connectors)

Figure VIII.i.3 shows there is a 70 percent chance of one of the petroleum refineries' connectors leaking more than 0.1 kg/hour and a 40 percent chance of the maximum being greater than 0.2 kg/hour. For valves, there is a close to 50 percent chance of leaking more than 0.1 kg/hour and a 20 percent chance of leaking more than 0.2 kg/hour.

Although pump seals leak considerably more than connectors or valves on average, their maximum leakage is lower because there are not nearly as many; there is a less than 10 percent chance of a pump leakage rate greater than 0.1 kg/hour.

ii. Impact of Bag Measurement Error on Leakage Analysis

Replicate bag measurements were made, affording an opportunity to estimate the error from this source and the extent that it affects the regression equations, and the benefits if any of using the means of the replicate measurements rather than just using the primary or replicate measurements.

The replicates were done either in parallel, where the leakage stream was split into A and B channels; or sequential, where an A sample was taken followed by a B sample. Presumably, the sequential samples would have a larger error, including the potential additional short-term measurement variability in the leakage stream (e_{ls}), which would be independent of the purely measurement error (e_m).

The regression equations are of the form:

y = a + b*x + c*temp + e

where:

y	= $\log_{10}$(bagged results, kg/hour),
x	= $\log_{10}$(screening value, ppmv),
temp	= operating temperature (degrees Fahrenheit), and
e	= error.

The error term is affected by several things, including the uncertainty in the bagged measurements, but also the measurement errors in screening and temperature and the imperfect relationship between screening and bagged values.

If error is considered $e = e_m + e_{ls} + e_{other}$, the bagged measurement error is independent of the other errors, so that the variance of e is the sum of the variances: $\sigma^2 = \sigma_m^2 + \sigma_{ls}^2 + \sigma_{other}^2$.

Thus, if by estimating σ^2, σ_m^2 and σ_{ls}^2; the relative impact of the latter on the former can be derived.

Figure VII.ii.1 a) shows a plot of y versus x for all bagged components and Figure VII.ii.1 b) shows the paired measurements.

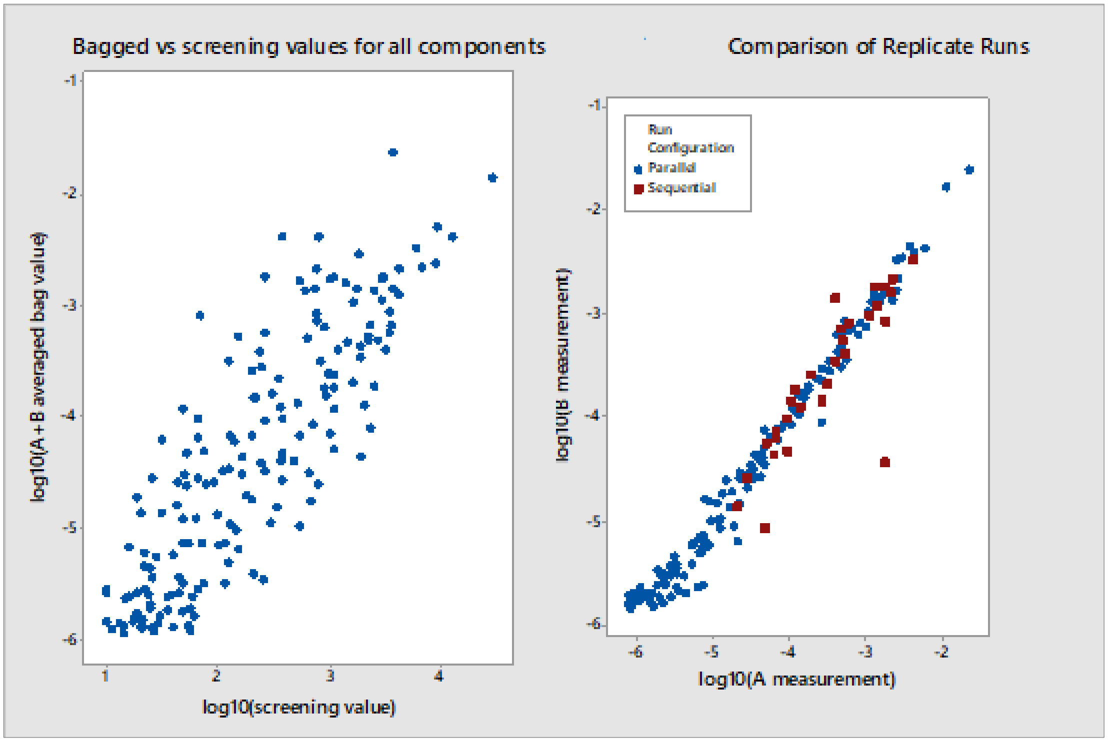

Figure VII.ii.1. a) Plots of logarithm of bagged results versus logarithm of screening results, b) Comparison of Replicate Runs

As shown in the figures, there is more spread in Figure VII.ii.1 a) than in Figure VII.ii.1 b), indicating that σ^2 is much larger than $\sigma_m^2 + \sigma_{ls}^2$.

Replicate Measurements Conducted in Parallel

Numerical results for primary and replicate measurements taken in parallel were derived by first determining the differences in the 144 A and B parallel pairs:

$Z_i = \log_{10}(\text{B measurement}_i) - \log_{10}(\text{A measurement}_i)$, i = 1…, 144.

An estimate of σ_Z^2 with the Z_i (mean of the squares), results in $\hat{\sigma}_Z^2 = 0.0285.$ Because $\sigma_Z^2 = 2*\sigma_m^2$, σ_m^2 can be estimated: $\hat{\sigma}_m^2 = 0.014.$

Replicate Measurements Conducted Sequentially

The differences of the 31 sequential samples were first computed:

$W_i = \log_{10}(\text{B measurement}_i) - \log_{10}(\text{A measurement}_i)$, i = 1…, 31,

and the mean of the squares, then $\sigma_W^2 = 2*\sigma_m^2 + 2*\sigma_{ls}^2$.

The latter term can be estimated as $\hat{\sigma}_{ls}^2 = (\hat{\sigma}_W^2 - \hat{\sigma}_Z^2)/2$.

Using the mean of W_i^2, $\hat{\sigma}_W^2 = 0.1391$.

If an apparent outlier, A009, is removed, variance decreases considerably to $\hat{\sigma}_W^2 = 0.0485$.

With this, σ_{ls}^2 is estimated: $\hat{\sigma}_{ls}^2 = \frac{.0485 - .0285}{2} = 0.010$.

It should be noted that the log transform appears to overcorrect for variability, that is, the variability of the smallest observations in Figure VII.ii.1 b), is greater than the large ones.

However, since no sequential observations were very small, this suggests that the leakage stream variation is actually larger vis-à-vis the pure measurement variation.

Because the sequential samples include both sources of error in the bag measurement process, a comparison of the regression error was made.

As discussed in the sections above, regressions were done separately for pumps and for valves and connectors.

Because there was no statistical difference between the measurement uncertainties between the components, the estimated variance based on the sequential samples was used, namely, for the A measurement of the sequence, $\sigma_A^2 = \sigma_W^2/2$, which was estimated to be $\hat{\sigma}_A^2 = \frac{\hat{\sigma}_W^2}{2} = \frac{0.0485}{2} = 0.024$.

Using the primary (A) measurements alone to derive the regression equations, estimates of σ and σ^2 were obtained from the eight regression scenarios depicted in Table III.iii-1.

Results are shown in the following tables.

Table VII.ii-1. Comparison of Bagged Measurement Variance with Total Regression Error Variance for Valves and Connectors

Variances	Regression Scenarios							
	1	2	3	4	5	6	7	8
Using Only Primary (A) Measurements								
$\hat{\sigma}$	0.428	0.423	0.415	0.413	0.431	0.425	0.416	0.413
$\hat{\sigma}^2$	0.183	0.179	0.172	0.170	0.186	0.181	0.173	0.171
$\hat{\sigma}_A^2$	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024
$\hat{\sigma}_A^2$ as % of $\hat{\sigma}^2$	13.1	13.4	13.9	14.1	12.9	13.3	13.9	14.1
Using Mean of Primary (A) and Replicate (B) Measurements								
$\hat{\sigma}_{mean}$	0.417	0.412	0.404	0.400	0.426	0.420	0.411	0.406
$\hat{\sigma}_{mean}^2$	0.174	0.170	0.164	0.160	0.181	0.176	0.169	0.165
$\hat{\sigma}^2 - \hat{\sigma}_{mean}^2$	0.009	0.009	0.009	0.010	0.004	0.005	0.004	0.006

Table VII.ii-2. Comparison of Bagged Measurement Variance with Total Regression Error Variance for Pump Seals

Variances	Regression Scenarios							
	1	2	3	4	5	6	7	8
Using Only Primary (A) Measurements								
$\hat{\sigma}$	0.641	0.644	0.612	0.623	0.601	0.608	0.563	0.575
$\hat{\sigma}^2$	0.411	0.415	0.375	0.388	0.362	0.369	0.317	0.330
$\hat{\sigma}_A^2$	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024
$\hat{\sigma}_A^2$ as % of $\hat{\sigma}^2$	5.8	5.8	6.4	6.2	6.6	6.5	7.6	7.3
Using Mean of Primary (A) and Replicate (B) Measurements								
$\hat{\sigma}_{mean}$	0.635	0.638	0.599	0.608	0.604	0.611	0.559	0.569
$\hat{\sigma}_{mean}^2$	0.403	0.408	0.359	0.370	0.364	0.373	0.312	0.324
$\hat{\sigma}^2 - \hat{\sigma}_{mean}^2$	0.008	0.007	0.016	0.018	-0.003	-0.004	0.005	0.007

For valves and connectors, bag measurement error represents 13% to 14% of the regression error variance; and for pump seals the bagged measurement error variance represents 4% to 6%.

When using the mean of the primary (A) and replicate (B) measurements[11], this should in theory reduce the regression error variance:

$\sigma_{mean}^2 = (\sigma_m^2 + \sigma_{ls}^2) /2 + \sigma_{other}^2 = \sigma_A^2 /2 + \sigma_{other}^2$.

Thus, the reduction in regression error variance should be approximately $\sigma^2 - \sigma_{mean}^2$, or $\sigma_A^2 /2$, roughly 0.024/2 = 0.012.

From Table VII.ii-1, the valve and connector differences range from 0.004 to 0.010, with a median of 0.0075.

From Table VII.ii-2, for pump seals, the differences have a wider range, from -0.004 to 0.018, but the median is 0.007.

Both are below 0.012, but in the ballpark.

This indicates that there is a small gain in precision by using the means of the primary (A) and replicate (B) measurements.

[11] The A measurements are only used for those where the A and B measurements were made sequentially. For the sequential samples we use the A measurement. Therefore, the reduction in variance would be somewhat less than 50%.

iii. Repeated Sampling

Nine of the components were bagged twice, ranging between 3 and 44 days apart. This provides some information on the extent that component leakage changes over time. The leakage amounts may change substantially, and there is some data to suggest that leakage tends to increase over time.

The following figure shows data on the log scale. Both the bagged measurements and the prior screening values are shown.

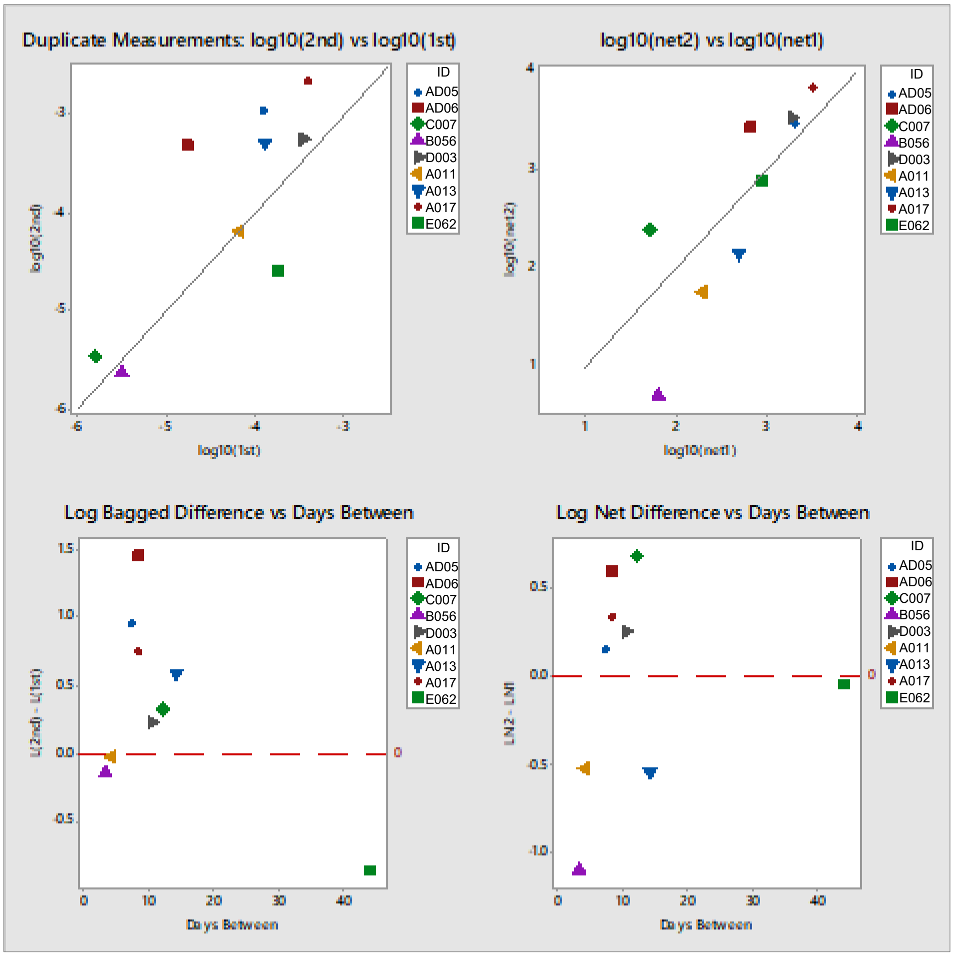

Figure VII.iii.1. Plots of Repeated (Duplicate) Measurements Results

For both, there is a reasonably strong correlation between the two measurements – around 0.8, but the variation is much larger than for simple measurement error. It is readily apparent that the leakage rates vary over time.

The bagged leakage rates can increase substantially, with four values with a log difference greater than 0.5, that is, greater than $10^{0.5} \approx 3$, including the largest leaker, A017.

Except for two measurements with the shortest days between and the measurement with the longest, all the other bagged differences are positive. The two with the shortest days have bagged measurements close to zero, although the net values show a larger negative difference. Note, however that these are also two of the three smallest net values as can be seen in the upper right plot. The net values on the original scale were (63,5) and (192,57), so there is greater measurement error.

APPENDIX D-2
Statistical Software and Program Code

Software

Leak Rate Estimates

The following code loads data sets (screening and bagging), determines regression equations ("Correlation Equations"), and estimates emission rates through use of the regression equations, bootstrap sampling, and simulation.

```
#  Compute correlation equations for pumps and use these to simulate leakage rates

#  Input:  Bagged data ("bagged data final.rdata")
#        Screening data ("screening data final plus bagged")
#        Functions used ("leak rate funcitons.r")


setwd("C:/projects/Heavy Liquid Study/final data")

source("leak rate functions.r")

load("bag data final.rdata")  #  Data loaded to bagsall

load("screening data final plus bags.rdata")  #   Data loaded to w0

#                                  COMPUTE CORRELATION EQUATIONS for 8 scenarios

pumpcorreq <- CorrelationEquations(bagsall,"Pumps")[[1]]   #    pumpcorreq has the estimated coefficients, their standard errors, and other regression info for the correlation equations for pumps

valveconnectorcorreq <- CorrelationEquations(bagsall,"valves and connectors")[[1]]   #    pumpcorreq has the estimated coefficients, their standard errors, and other regression info for the correlation equations for pumps


#                                  SIMULATE PUMP, CONNECTOR AND VALVE LEAK RATES using the correlation equations

lp <- SimulateLeakRates(w0,pumpcorreq,bagsall,"Pumps")  #                    lp contains 10,000 simulated mean pump leak rates for each scenario

simulated_pump_emissions_quantiles <- apply(lp,c(2,3),function(x) {quantile(x, c(.05,.5,.95),na.rm=TRUE)})


lc <- SimulateVnCLeakRates(w0,valveconnectorcorreq,bagsall,"Connectors")  #               lc contains 10,000 simulated mean connector leak rates for each of 32 scenarios.  These include bootstrap sampling from the screening data.
simulated_connector_emissions_quantiles <- apply(lc,c(2,3),function(x) {quantile(x, c(.05,.5,.95),na.rm=TRUE)})
lv <- SimulateVnCLeakRates(w0,valveconnectorcorreq,bagsall,"Valves")  #               lv contains 10,000 simulated mean valve leak rates for each of 32 scenarios.  These include bootstrap sampling from the screening data.
simulated_valve_emissions_quantiles <- apply(lv,c(2,3),function(x) {quantile(x, c(.05,.5,.95),na.rm=TRUE)})
```

```
#                                                  SIMULATE REFINERY TOTALS + CONFIDENCE INTERVALS

SimulatedRefineryTotals <- Estimated_Refinery_Totals(w0,lp,lc,lv)
SimulatedRefineryTotalQuantiles <- apply(SimulatedRefineryTotals,c(2,3),function(x) {quantile(x,
c(.05,.5,.95),na.rm=TRUE)})

#                                              COMPUTE ESTIMATED LEAK RATE FOR EACH SCREENED COMPONENT

CompEsts <- IndividualComponentEstimates(w0,pumpcorreq,valveconnectorcorrreq,bagsall)

#                                                  COMPUTE CONFIDENCE INTERVALS FOR REFINERY TOTALS
BASED ON BOOTSTRAPPING INDIVIDUAL COMPONENTS

BootRefineryTotals <- BootstrapRefineryTotals(w0,CompEsts)
BootRefineryTotalQuantiles <- apply(BootRefineryTotals,c(2,3),function(x) {quantile(x, c(.05,.5,.95),na.rm=TRUE)})


#                                   POINT ESTIMATES OF PUMP, CONNECTOR AND VALVE LEAK RATES BASED ON
SIMULATIONS

simulated_pump_emissions_estimates <- apply(lp,c(2,3),function(x) {mean(x,na.rm=TRUE)})
simulated_connector_emissions_estimates <- apply(lc,c(2,3),function(x) {mean(x,na.rm=TRUE)})
simulated_valve_emissions_estimates <- apply(lv,c(2,3),function(x) {mean(x,na.rm=TRUE)})


#                                   POINT ESTIMATES OF PUMP LEAK RATES USING THE FINNEY METHOD

finn_estimated_pump_emissions_estimates <- FinneyPointEstimates(w0,pumpcorreq,bagsall,"Pumps")
finn_estimated_connector_emissions_estimates <-
FinneyPointEstimates(w0,valveconnectorcorreq,bagsall,"Connectors")
finn_estimated_valve_emissions_estimates <- FinneyPointEstimates(w0,valveconnectorcorreq,bagsall,"Valves")
```

Program Functions

The following functions are used in the leak rate estimate software code in the preceding section.

```
bootmean <- function(x) {
  y <- array(0,c(3,8,4)); i <- 0
  samplemean <- function(x) { nonamean(sample(x,length(x),replace=TRUE))}
  for (comp in c("P","C","V")) {
    qq <- x[rownames(x)==comp,,]
    n <- dim(qq)[1]
    i <- i+1
    y[i,,] <- apply(qq,c(2,3),samplemean)
  }
  return(y)
}

BootstrapRefineryTotals <- function(w0,CompEsts) {

  #x <- IndividualComponentEstimates(w0,pumpcorreq,valveconnectorcorrreq,bagsall)  # x has individual
component estimates for all 32 scenarios
  x <- CompEsts
  simsize = 1000
  b <- array(0,c(simsize,3,8,4))
  cat("Even more time")
  for (i in 1:simsize) {        #       Get bootstrap means for pumps, connectors and valves
   if (i%%100==0) { cat(".")}
   b[i,,,] <- bootmean(x)
  }
  return(Estimated_Refinery_Totals(w0,b[,1,,],b[,2,,],b[,3,,]))
}

CompData <- function(w0,component) {            # make a dataset with all screened pumps, connectors or valves
whose emissions can be estimated, with certain exceptions
  c1 <- w0[w0$Component.Type==component,]
  c1 <- c1[c1$Exclude != "YES",]
  c1 <- c1[!is.na(c1$Net.SV) & !is.na(c1$External.Component.Temp),]            #exclude component if either net
screening value or temperature is missing
  c1 <- c1[c1$Net.SV<10000,]
  c1$logscreen10 <- log10(c1$Net.SV+10)
  rownames(c1) <- 1:dim(c1)[1]
  uu1 <- grep("steam",c1$Field.Sheet.Comments)                       # exclude pumps that appear to have a steam
quench seal
  uu2 <- grep("Steam",c1$Field.Sheet.Comments)
  c1 <- c1[!(1:dim(c1)[1] %in% c(uu1,uu2)),]
  return(c1)
}
```

```
ComputeCorrelationEquations <- function(comps,simsize,method) {
  qqq <- c(0,0)
  pc <- rep(0,13)
  if (method=="all") { #                                    get regression equation
      ce <- lm(comps$loglr~comps$logscreen10+comps$CorrectedTemperature)
  } else {
      ce <- lm(comps$loglr~comps$logscreen+comps$CorrectedTemperature)
  }
  pc[1:3] <- ce$coefficients
  ces <- summary(ce)
  pc[4:6] <- unlist(ces[4])[4:6]       #              coefficient standard errors
  pc[7] <- unlist(ces[9])              #              adjusted R2
  sigma <-unlist(ces[6])
  pc[8] <- unlist(ces[6])              #              regression sigma
  pc[9] <- unlist(ces[7])[1]+unlist(ces[7])[2]  #        sample size
  pc[10] <- sum(comps$Bagged.THC)      #              sum of bagged values
  ppred <- comps$loglr-ces$residuals
  pc[11] <- sum(10^(comps$ppred)) #         sum of predicted values on original scale
  n <- length(ppred)
  w <- matrix(sigma*rnorm(n*simsize),ncol = simsize)
  w10 <- 10^(w + ppred)
  pc[12] <- median(apply(w10,2,sum))  #              estimated expected sum of bagged values
  pc[13] <- ce$df.residual

  return(list(pc, vcov(ce)))
}

CorrelationEquations <- function(bagsall,component) {
  correq <- data.frame(matrix(0,nrow=8,ncol=13))
  vvcov <- array(0,c(8,3,3))
  colnames(correq) <- c("intercept","screen coef","temp coef","int se","scr se","tmp se","adj-
r2","sigma","n","bagsum","predsum","biasadjsum","dfresidual")

  simsize = 10000
  for (j in 1:4) {                                        # Select 1 of 4 scenarios for Tricord:

    bags <- bagsall[bagsall[,j+19]=="X",]
    if (component=="Pumps") {                                  # using all bags, x1 = log10(sv + 10)
      comps <- bags[bags$Component.Type=="P",]
    } else {
      comps <- bags[bags$Component.Type=="V" | bags$Component.Type=="C", ]
    }
    comps <- comps[!is.na(comps$CorrectedTemperature),]
```

```
    vv <- ComputeCorrelationEquations(comps,simsize,"all")
    correq[j,] <- unlist(vv[1])
    vvcov[j,,] <- unlist(vv[2])

                                                        # using only screening values > 10 ppmv,  x1 = log10(sv)
    bags1 <- bags[bags$Net.SV>10,]
    bags1$logscreen <- log10(bags1$Net.SV)
    if (component=="Pumps") {                           # using all bags, x1 = log10(sv + 10)
      comps1 <- bags1[bags1$Component.Type=="P",]
    } else {
      comps1 <- bags1[bags1$Component.Type=="V" | bags1$Component.Type=="C", ]
    }
    comps1 <- comps1[!is.na(comps1$CorrectedTemperature),]
    vv <- ComputeCorrelationEquations(comps1,simsize,"over 10")
    correq[j+4,] <- unlist(vv[1])
    vvcov[j+4,,] <- unlist(vv[2])
  }
  return(list(correq,vvcov))
}

Estimated_Refinery_Totals <- function(w0,lp,lc,lv) {
  rc <- Total_Refinery_Counts(w0)
  tt <- rc[1]*lp + rc[2]*lc + rc[3]*lv
  return(tt)
}

finncomp <- function(c,r,vcov,correq,cleaks,j) {          # Estimate leak rate using the Finney approach

  X <- cbind(rep(1,dim(c)[1]),c$logscreen10,c$External.Component.Temp)
  U <- X %*% vcov %*% t(X)
  u <- diag(U)
  t <- log(10)^2*(1 - u)*correq$sigma[j]^2/2
  ht <- unlist(lapply(t,function(x) {h(x,correq$dfresidual[j])}))
  return(mean(c(10^r*ht,cleaks)))
}

finncomp10 <- function(c,ct,s,vcov,correq,cleaks,M0,j) {          # Estimate leak rate using the Finney
approach
  n <- dim(c)[1]; m <- dim(ct)[1]
  X <- cbind(rep(1,m),ct$logscreen10,ct$External.Component.Temp)
  U <- X %*% vcov %*% t(X)
  u <- diag(U)
  t <- log(10)^2*(1 - u)*correq$sigma[j]^2/2
  ht <- unlist(lapply(t,function(x) {h(x,correq$dfresidual[j])}))
```

```
  k <- length(c(10^s[,j-4]*ht,cleaks))
  return((k*mean(c(10^s[,j-4]*ht,cleaks)) + (n-k)*M0)/n)
}

FinneyPointEstimates <- function(w0,correq,bagsall,component) {
 vvcov <- CorrelationEquations(bagsall,component)[[2]]
 bags <- bagsall[bagsall$A.Not.gt.10000=="X",]                          # Eliminate observations with
screening values > 10,000 ppmv
 bags0 <- bags[bags$Net.SV<=10,]

 Z <- substr(component,1,1)                          # Z = "C" or "V"
 cleaks <- bagsall$Bagged.THC[bagsall$Component.Type==Z]        # use actual leak values on the components
that were bagged.

                                     # c1 thru c4 contain data for pumps, connectors or valves
including/excluding gas phase stream service and/or LDAR monitored
 c1 <- CompData(w0,Z)
 c1 <- c1[c1$Bagged != "X",]
 c2 <- c1[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
 c3 <- c1[c1$LDAR.Monitored != "X",]
 c4 <- c1[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

 n <- dim(c1)[1]
 r <- matrix(0,nrow=n,ncol=4)
 for (j in 1:4) {
   r[,j] <- correq$intercept[j] + correq$`screen coef`[j]*c1$logscreen10 + correq$`temp
coef`[j]*c1$External.Component.Temp
 }
 r1 <- r
 r2 <- r[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
 r3 <- r[c1$LDAR.Monitored != "X",]
 r4 <- r[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

#                                     splitting regressions by sv <=10 and sv > 10 ppmv
 c10 <- c1[c1$Net.SV>10,]
 c10$logscreen <- log10(c10$Net.SV)
 c12 <- c10[c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
 c13 <- c10[c10$LDAR.Monitored != "X",]
 c14 <- c10[c10$LDAR.Monitored != "X" & c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

 n10 <- dim(c10)[1]
 s <- matrix(0,nrow=n10,ncol=4)
 for (j in 1:4) {
```

```
    s[,j] <- correq$intercept[j] + correq$`screen coef`[j]*c10$logscreen + correq$`temp
coef`[j]*c10$External.Component.Temp
  }
  s1 <- s
  s2 <- s[c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  s3 <- s[c10$LDAR.Monitored != "X",]
  s4 <- s[c10$LDAR.Monitored != "X" & c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

  M0 <- mean(bags0$Bagged.THC)
  finn <- matrix(nrow=8,ncol=4)
#                                    Leakage rate estimates using unbiased (Finney) estimator
  for (j in 1:4) {
    finn[j,1] <- finncomp(c1,r1[,j],vvcov[j,,],correq,cleaks,j)
    finn[j,2] <- finncomp(c2,r2[,j],vvcov[j,,],correq,cleaks,j)
    finn[j,3] <- finncomp(c3,r3[,j],vvcov[j,,],correq,cleaks,j)
    finn[j,4] <- finncomp(c4,r4[,j],vvcov[j,,],correq,cleaks,j)
  }
  for (j in 5:8) {
    finn[j,1] <- finncomp10(c1,c10,s1,vvcov[j,,],correq,cleaks,M0,j)
    finn[j,2] <- finncomp10(c2,c12,s2,vvcov[j,,],correq,cleaks,M0,j)
    finn[j,3] <- finncomp10(c3,c13,s3,vvcov[j,,],correq,cleaks,M0,j)
    finn[j,4] <- finncomp10(c4,c14,s4,vvcov[j,,],correq,cleaks,M0,j)
  }
  return(finn)
}

GPU_Counts <- function(w0) {
   n <- dim(w0)[1]
   ba <- matrix("",n,1)
   ba[1,] <- c( w0$Generalized.Process.Unit.Area.Category[1])
   bmall <- 1
   bcall <- matrix(0,nrow=n,ncol=3)
   if (w0$Component.Type[1]=="P") {
     bcall[1,1] <- 1
   } else if (w0$Component.Type[1]=="C") {
     bcall[1,2] <- 1
   } else {
     bcall[1,3] <- 1
   }


   for (i in 2:n) {
     bc <- 0
     for (j in 1:bmall) {
```

```
      if (w0$Generalized.Process.Unit.Area.Category[i]==ba[j,1] ) {
        j1 <- j
        if (w0$Component.Type[i]=="P") {
          bcall[j,1] <- bcall[j,1] + 1
        } else if (w0$Component.Type[i]=="C") {
          bcall[j,2] <- bcall[j,2] + 1
        } else {
          bcall[j,3] <- bcall[j,3] + 1
        }
        bc <- 1
      }
    }
    if( bc == 0) {
        bmall <- bmall + 1
        ba[bmall,] <- w0$Generalized.Process.Unit.Area.Category[i]
        if (w0$Component.Type[i]=="P") {
          bcall[bmall,1] <- 1
        } else if (w0$Component.Type[i]=="C") {
          bcall[bmall,2] <-  1
        } else {
          bcall[bmall,3] <-  1
        }
     }
  }

  ba2 <- cbind(ba,bcall)
  ba2 <- as.data.frame(ba2)
  ba2 <- ba2[1:bmall,]
  for (i in 2:4) { ba2[,i] <- as.numeric(ba2[,i])}
  ba3 <- ba2[order(ba2$V1),]
  colnames(ba3) <- c("gen process unit","pump count","conn count", "valve count")
  return(ba3)
}
h <- function(t,n) {         # My version of Finney's function that finds a correction factor h(t) for an unbiased
estimate of E(L) = E(exp(sum(beta(j)*x(j) + e))) of the form exp(b(j)*x(j))*h(c*s^2)
  s <- 1 + t
  s0 <- 1
  u <- t
  j <- 1
  while (abs(s-s0)>.00000001) {
    s0 <- s
    u <- u*t*(n-1)/((n+2*j-1)*(j+1))
    j <- j+1
    s <- s + u
```

```
   }
return(s)
}
#                                                   Calculate leak rates for each screened component for each
scenario
IndividualComponentEstimates <- function(w0,pumpcorreq,valveconnectorcorrreq,bagsall) {
   cat("This is gonna take a while")
   cat("\nSimulating pumps")
   cp <- IndividualLeakRates(w0,pumpcorreq,bagsall,"Pumps")
   cat("\nSimulating connectors")
   cc <- IndividualLeakRates(w0,valveconnectorcorreq,bagsall,"Connectors")
   cat("\nSimulating valves")
   cv <- IndividualLeakRates(w0,valveconnectorcorreq,bagsall,"Valves")
   cleaks <- cp
   for (i in 1:8) {
      for (j in 1:4) {
         cleaks[,i,j] <- ifelse(!is.na(cp[,i,j]),cp[,i,j],ifelse(!is.na(cc[,i,j]),cc[,i,j],cv[,i,j]))
      }
    }
    rownames(cleaks) <- w0$Component.Type
    return(cleaks)
}

IndividualLeakRates <- function(w0,correq,bagsall,component) {
  w0$nid <- seq(1:dim(w0)[1])

  bags <- bagsall[bagsall$A.Not.gt.10000=="X",]                      # Eliminate observations with
screening values > 10,000 ppmv
  bags0 <- bags[bags$Net.SV<=10,]
  M0 <- nonamean(bags0$Bagged.THC)
  Z <- substr(component,1,1)                      # Z = "P", "C", or "V"
  compleaks <- bagsall$Bagged.THC[bagsall$Component.Type==Z]

                                        # c1 thru p4 contain data for pumps, connectors or valves
including/excluding gas phase stream service and/or LDAR monitored
  c1 <- CompData(w0,Z)
  #c1 <- c1[c1$Bagged != "X",]
  c2 <- c1[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  c3 <- c1[c1$LDAR.Monitored != "X",]
  c4 <- c1[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

  rownames(c1) <- 1:dim(c1)[1]
  n <- dim(c1)[1]
  r <- matrix(0,nrow=n,ncol=4)
```

```
  for (j in 1:4) {
    r[,j] <- correq$intercept[j] + correq$`screen coef`[j]*c1$logscreen10 + correq$`temp
coef`[j]*c1$External.Component.Temp
  }
  r1 <- r
  r2 <- r[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  r3 <- r[c1$LDAR.Monitored != "X",]
  r4 <- r[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
                                                            # set up data for correlation equations based on
screening values > 10 ppmv
  c10 <- c1[c1$Net.SV>10,]
  c10$logscreen <- log10(c10$Net.SV)
  n10 <- dim(c10)[1]

  s <- matrix(0,nrow=n10,ncol=4)
  for (j in 1:4) {
    s[,j] <- correq$intercept[j] + correq$`screen coef`[j]*c10$logscreen + correq$`temp
coef`[j]*c10$External.Component.Temp
  }
  s1 <- s
  s2 <- s[c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  s3 <- s[c10$LDAR.Monitored != "X",]
  s4 <- s[c10$LDAR.Monitored != "X" & c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

  n1 <- dim(c1[c1$Net.SV<=10,])[1]
  n2 <- dim(c2[c2$Net.SV<=10,])[1]
  n3 <- dim(c3[c3$Net.SV<=10,])[1]
  n4 <- dim(c4[c4$Net.SV<=10,])[1]

  simsize <- 10000
  l <- array(0,dim=c(simsize,8,4))
  compleaks <- array(0,dim=c(n,8,4))

  cat(" (one dot per 200 iterations):")
  for (i in 1:simsize) {                                        s
    if (i%%200==0) { cat(".")}
    e <- rnorm(n)
    for (j in 1:4) {
      l1 <- r1[,j] + e*correq$sigma[j]
      compleaks[,j,1] = compleaks[,j,1] + 10^l1
      compleaks[,j,2] = ifelse(c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",compleaks[,j,2] + 10^l1,NA)
      compleaks[,j,3] = ifelse(c1$LDAR.Monitored != "X",compleaks[,j,3] + 10^l1,NA)
      compleaks[,j,4] = ifelse(c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X" & c1$LDAR.Monitored != "X",
compleaks[,j,4] + 10^l1,NA)
```

```
    }

    e <- e[c1$Net.SV>10]
    for (j in 1:4) {
      l1 <- s1[,j] + e*correq$sigma[j+4]
      compleaks[,j+4,1] = compleaks[,j+4,1] + ifelse(c1$Net.SV>10, 10^l1, M0)
      compleaks[,j+4,2] = ifelse(c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",compleaks[,j+4,2] +
ifelse(c1$Net.SV>10, 10^l1, M0),NA)
      compleaks[,j+4,3] = ifelse(c1$LDAR.Monitored != "X",compleaks[,j+4,3] + ifelse(c1$Net.SV>10, 10^l1,
M0),NA)
      compleaks[,j+4,4] = ifelse(c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X" & c1$LDAR.Monitored !=
"X",compleaks[,j+4,4] + ifelse(c1$Net.SV>10, 10^l1, M0),NA)
    }
  }
  compleaks <- compleaks/simsize
  cl <- apply(compleaks,c(2,3), function(x) { ifelse(c1$Bagged=="X",c1$lrbagged,x)})  # use bagged value where
available
  c2 <- cl[match(w0$nid,c1$nid),,]
  return(c2)
}


#                                   Find Counts of pumps, connectors & valves by process unit in the screening
data

                            # Get counts of the total # of components in all refineries by component type &
generalized process area
Refinery_Counts <- function() {
   rc <- read.csv("estimates of refinery components in hl service.csv")
   rcpumps <- aggregate(rc$Pumps...All. ,list(rc$Generalized.Process.Area),sum)
   rcconnect <- aggregate(rc$Connectors,list(rc$Generalized.Process.Area),sum)
   rcvalves <- aggregate(rc$Valves,list(rc$Generalized.Process.Area),sum)
   rcall <- cbind(rcpumps,rcconnect[,2],rcvalves[,2])
   colnames(rcall) <- c("General Process Unit","Pumps","Connectors","Valves")
   return(rcall)
}

#                                          Simulate leak rates using all screened values mainly with pumps,
but can also use w connectors & valves (these latter w/o including bootstrap)
SimulateLeakRates <- function(w0,correq,bagsall,component) {
  bags <- bagsall[bagsall$A.Not.gt.10000=="X",]                          # Eliminate observations with
screening values > 10,000 ppmv
  bags0 <- bags[bags$Net.SV<=10,]
  Z <- substr(component,1,1)                    # Z = "P", "C", or "V"
```

```
  compleaks <- bagsall$Bagged.THC[bagsall$Component.Type==Z]

                                                           # c1 thru p4 contain data for pumps, connectors or valves
including/excluding gas phase stream service and/or LDAR monitored
  c1 <- CompData(w0,Z)
  c1 <- c1[c1$Bagged != "X",]
  c2 <- c1[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  c3 <- c1[c1$LDAR.Monitored != "X",]
  c4 <- c1[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

  n <- dim(c1)[1]
  r <- matrix(0,nrow=n,ncol=4)
  for (j in 1:4) {
    r[,j] <- correq$intercept[j] + correq$`screen coef`[j]*c1$logscreen10 + correq$`temp
coef`[j]*c1$External.Component.Temp
  }
  r1 <- r
  r2 <- r[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  r3 <- r[c1$LDAR.Monitored != "X",]
  r4 <- r[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
                                                                                  # set up data for correlation equations based on
screening values > 10 ppmv
  c10 <- c1[c1$Net.SV>10,]
  c10$logscreen <- log10(c10$Net.SV)
  n10 <- dim(c10)[1]

  s <- matrix(0,nrow=n10,ncol=4)
  for (j in 1:4) {
    s[,j] <- correq$intercept[j] + correq$`screen coef`[j]*c10$logscreen + correq$`temp
coef`[j]*c10$External.Component.Temp
  }
  s1 <- s
  s2 <- s[c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  s3 <- s[c10$LDAR.Monitored != "X",]
  s4 <- s[c10$LDAR.Monitored != "X" & c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

  n1 <- dim(c1[c1$Net.SV<=10,])[1]
  n2 <- dim(c2[c2$Net.SV<=10,])[1]
  n3 <- dim(c3[c3$Net.SV<=10,])[1]
  n4 <- dim(c4[c4$Net.SV<=10,])[1]

  simsize <- 10000
  l <- array(0,dim=c(simsize,8,4))
  cat("Doing simulation:")
```

```
  for (i in 1:simsize) {                                        #  The simulation -- Put iteration results into array
l
    if (i%%1000==0) { cat(".")}
    e <- rnorm(n)
    for (j in 1:4) {
      l1 <- r1[,j] + e*correq$sigma[j]
      l[i,j,1] <- mean(c(10^l1,compleaks))
      l2 <- r2[,j] + e[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X"]*correq$sigma[j]
      l[i,j,2] <- mean(c(10^l2,compleaks))
      l3 <- r3[,j] + e[c1$LDAR.Monitored != "X"]*correq$sigma[j]
      l[i,j,3] <- mean(c(10^l3,compleaks))
      l4 <- r4[,j] + e[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F !=
"X"]*correq$sigma[j]
      l[i,j,4] <- mean(c(10^l4,compleaks))
    }

    e <- e[c1$Net.SV>10]
    for (j in 1:4) {
      l1 <- s1[,j] + e*correq$sigma[j+4]
      s <- sample(bags0$Bagged.THC,n1,replace=TRUE)
      l[i,j+4,1] <- mean(c(10^l1,s,compleaks))
      l2 <- s2[,j] + e[c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X"]*correq$sigma[j+4]
      s <- sample(bags0$Bagged.THC,n2,replace=TRUE)
      l[i,j+4,2] <- mean(c(10^l2,s,compleaks))
      l3 <- s3[,j] + e[c10$LDAR.Monitored != "X"]*correq$sigma[j+4]
      s <- sample(bags0$Bagged.THC,n3,replace=TRUE)
      l[i,j+4,3] <- mean(c(10^l3,s,compleaks))
      l4 <- s4[,j] + e[c10$LDAR.Monitored != "X" & c10$Gaseous.Phase.Material.with.IBP.gt.302.deg.F !=
"X"]*correq$sigma[j+4]
      s <- sample(bags0$Bagged.THC,n4,replace=TRUE)
      l[i,j+4,4] <- mean(c(10^l4,s,compleaks))
    }
  }
  return(l)
}

#                                        SIMULATE VALVE OR CONNECTOR LEAK RATES, including
bootstrap samples of the screening values
SimulateVnCLeakRates <- function(w0,valveconnectorcorreq,bagsall,component) {
  bags <- bagsall[bagsall$A.Not.gt.10000=="X",]                       # Eliminate observations with
screening values > 10,000 ppmv
  bags0 <- bags[bags$Net.SV<=10,]
  Z <- substr(component,1,1)                         # Z = "C" or "V"
```

```
  cleaks <- bagsall$Bagged.THC[bagsall$Component.Type==Z]          # use actual leak values on the components
that were bagged.
  nbig <- length(cleaks)
                                                   # c1 thru p4 contain data for pumps, connectors or valves
including/excluding gas phase stream service and/or LDAR monitored
  c1 <- CompData(w0,Z)
  c1 <- c1[c1$Bagged != "X",]
  c2 <- c1[c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
  c3 <- c1[c1$LDAR.Monitored != "X",]
  c4 <- c1[c1$LDAR.Monitored != "X" & c1$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]

  n <- dim(c1)[1]
  r <- matrix(0,nrow=n,ncol=4)
                                                                      # set up data for correlation equations based on
screening values > 10 ppmv
  c10 <- c1[c1$Net.SV>10,]
  c10$logscreen <- log10(c10$Net.SV)
  n10 <- dim(c10)[1]


  n1 <- dim(c1[c1$Net.SV<=10,])[1]
  n2 <- dim(c2[c2$Net.SV<=10,])[1]
  n3 <- dim(c3[c3$Net.SV<=10,])[1]
  n4 <- dim(c4[c4$Net.SV<=10,])[1]

  simsize <- 10000
  l <- array(0,dim=c(simsize,8,4))
  cat("Doing simulation (each dot = 200):")
  for (k in 1:simsize) {   #                    just one loop take bootstrap samples from original valve/connector data
    if (k%%200 == 0) { cat(".")}
    ss <- sample(1:n,n,replace = TRUE)
    vs <- c1[ss,]
    for (j in 1:4) {
      r[,j] <- valveconnectorcorreq$intercept[j] + valveconnectorcorreq$`screen coef`[j]*vs$logscreen10 +
valveconnectorcorreq$`temp coef`[j]*vs$External.Component.Temp
    }
    r1 <- r
    r2 <- r[vs$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
    r3 <- r[vs$LDAR.Monitored != "X",]
    r4 <- r[vs$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X" & vs$LDAR.Monitored != "X",]

    vss <- vs[vs$Net.SV>10,]
    vss$logscreen <- log10(vss$Net.SV)
    n10 <- dim(vss)[1]
```

```
    s <- matrix(0,nrow=n10,ncol=4)

    for (j in 1:4) {
      s[,j] <- valveconnectorcorreq$intercept[j] + valveconnectorcorreq$`screen coef`[j]*vss$logscreen10 +
valveconnectorcorreq$`temp coef`[j]*vss$External.Component.Temp
    }

    s1 <- s
    s2 <- s[vss$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X",]
    s3 <- s[vss$LDAR.Monitored != "X",]
    s4 <- s[vss$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X" & vss$LDAR.Monitored != "X",]

    e <- rnorm(n)
    sbig <- sample(cleaks,nbig,replace = TRUE)
    for (j in 1:4) {
      l1 <- r1[,j] + e*valveconnectorcorreq$sigma[j]
      l[k,j,1] <- mean(c(10^l1,sbig))
      l2 <- r2[,j] + e[vs$Gaseous.Phase.Material.with.IBP.gt.302.deg.F != "X"]*valveconnectorcorreq$sigma[j]
      l[k,j,2] <- mean(c(10^l2,sbig))
      l3 <- r3[,j] + e[vs$LDAR.Monitored != "X"]*valveconnectorcorreq$sigma[j]
      l[k,j,3] <- mean(c(10^l3,sbig))
      l4 <- r4[,j] + e[vs$LDAR.Monitored != "X" & vs$Gaseous.Phase.Material.with.IBP.gt.302.deg.F !=
"X"]*valveconnectorcorreq$sigma[j]
      l[k,j,4] <- mean(c(10^l4,sbig))
    }
    e <- e[vs$Net.SV>10]
    for (j in 1:4) {
      l1 <- s1[,j] + e*valveconnectorcorreq$sigma[j+4]
      sb0 <- sample(bags0$Bagged.THC,n1,replace=TRUE)
      l[k,j+4,1] <- mean(c(10^l1,sb0,sbig))
      l2 <- s2[,j] + e[vss$Gaseous.Phase.Material.with.IBP.gt.302.deg.F. != "X"]*valveconnectorcorreq$sigma[j+4]
      sb0 <- sample(bags0$Bagged.THC,n2,replace=TRUE)
      l[k,j+4,2] <- mean(c(10^l2,sb0,sbig))
      l3 <- s3[,j] + e[vss$LDAR.Monitored != "X"]*valveconnectorcorreq$sigma[j+4]
      sb0 <- sample(bags0$Bagged.THC,n3,replace=TRUE)
      l[k,j+4,3] <- mean(c(10^l3,sb0,sbig))
      l4 <- s4[,j] + e[vss$LDAR.Monitored != "X" & vss$Gaseous.Phase.Material.with.IBP.gt.302.deg.F. !=
"X"]*valveconnectorcorreq$sigma[j+4]
      sb0 <- sample(bags0$Bagged.THC,n4,replace=TRUE)
      l[k,j+4,4] <- mean(c(10^l4,sb0,sbig))
    }
  }
  return(l)
}
```

```
Total_Refinery_Counts <- function(w0) {  #                    Get estimated total number of pumps, connectors
and valves across all 5 refineries

   ba3 <- GPU_Counts(w0)
   rcall <- Refinery_Counts()
   vv <- ba3[match(rcall$`General Process Unit`,ba3$`gen process unit`),]
   xxx <- cbind(rcall,vv)
   xxx <- xxx[(xxx[,2]>0 | xxx[,3]>0 | xxx[,4]>0 | !is.na(xxx$`gen process unit`)),]
   ss <- pmax(xxx[,2:4],xxx[6:8],na.rm=TRUE) #                    Use the screening sample size if it's
larger
   return(apply(ss,2,sum))

}

#                    FUNCTIONS TO ESTIMATE LEAK RATE FOR EACH INDIVIDUAL SCREENED COMPONENT
```

APPENDIX E
Photographs of Sampled Components

Refinery A Samples

Figure 0.1. Sample A01: a) pre-bag, b) bagged

Figure 0.2. Sample A03: a) pre-bag, b) bagged

Figure 0.3. Sample A04

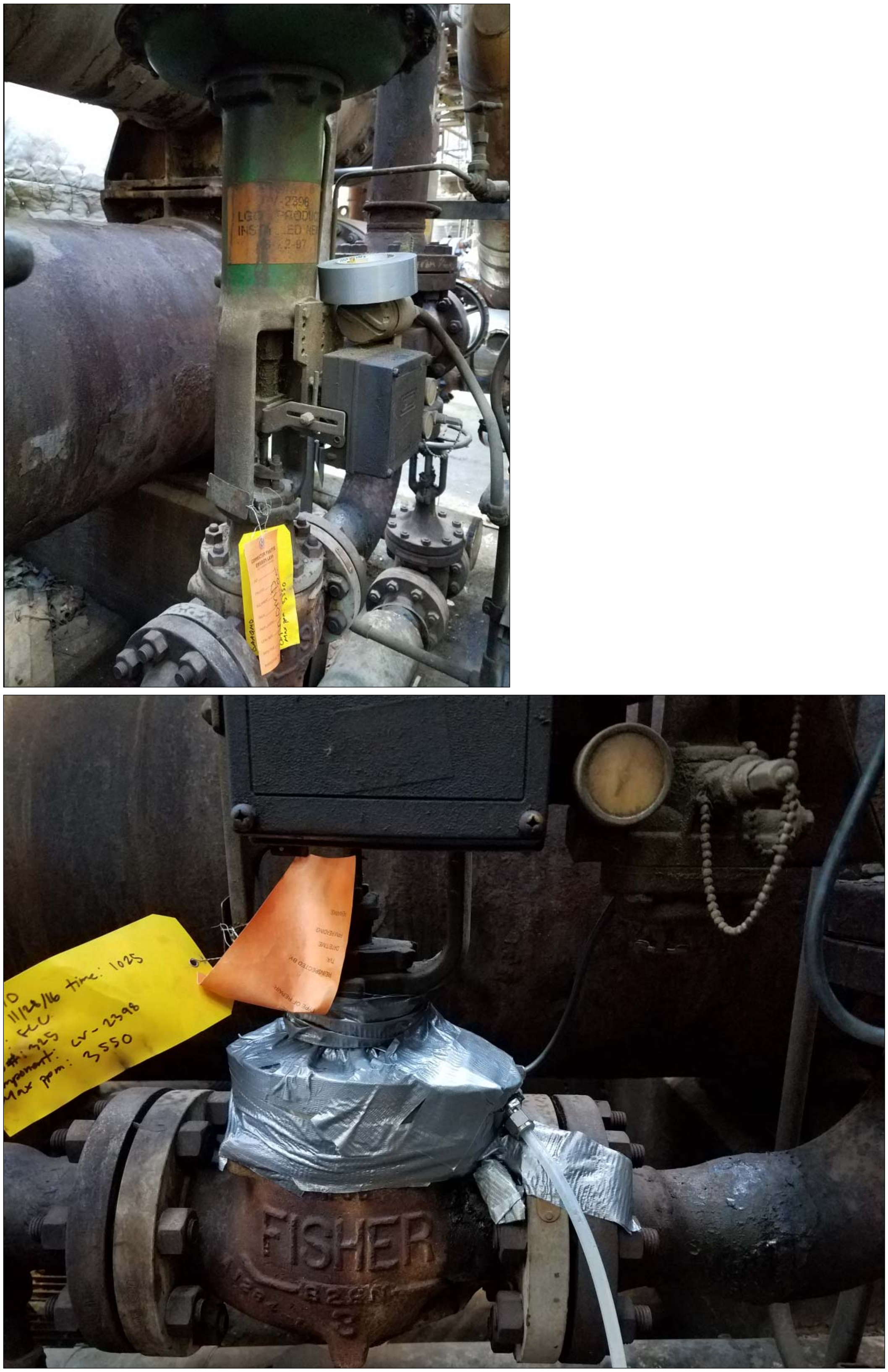

Figure 0.4. Sample 05: a) top, pre-bag, b) bottom, bagged

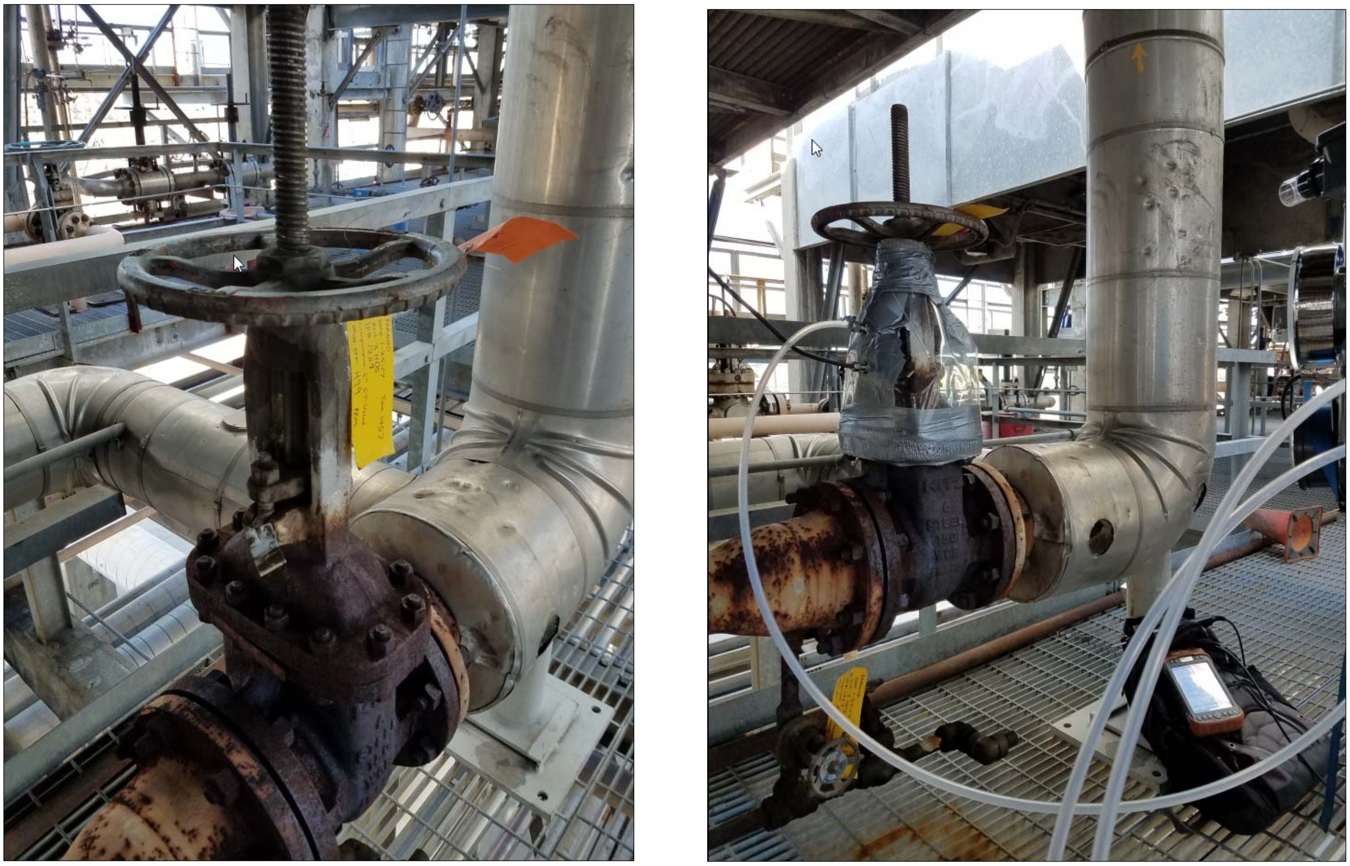

Figure 0.5. Sample A05: a) pre-bag, b) bagged

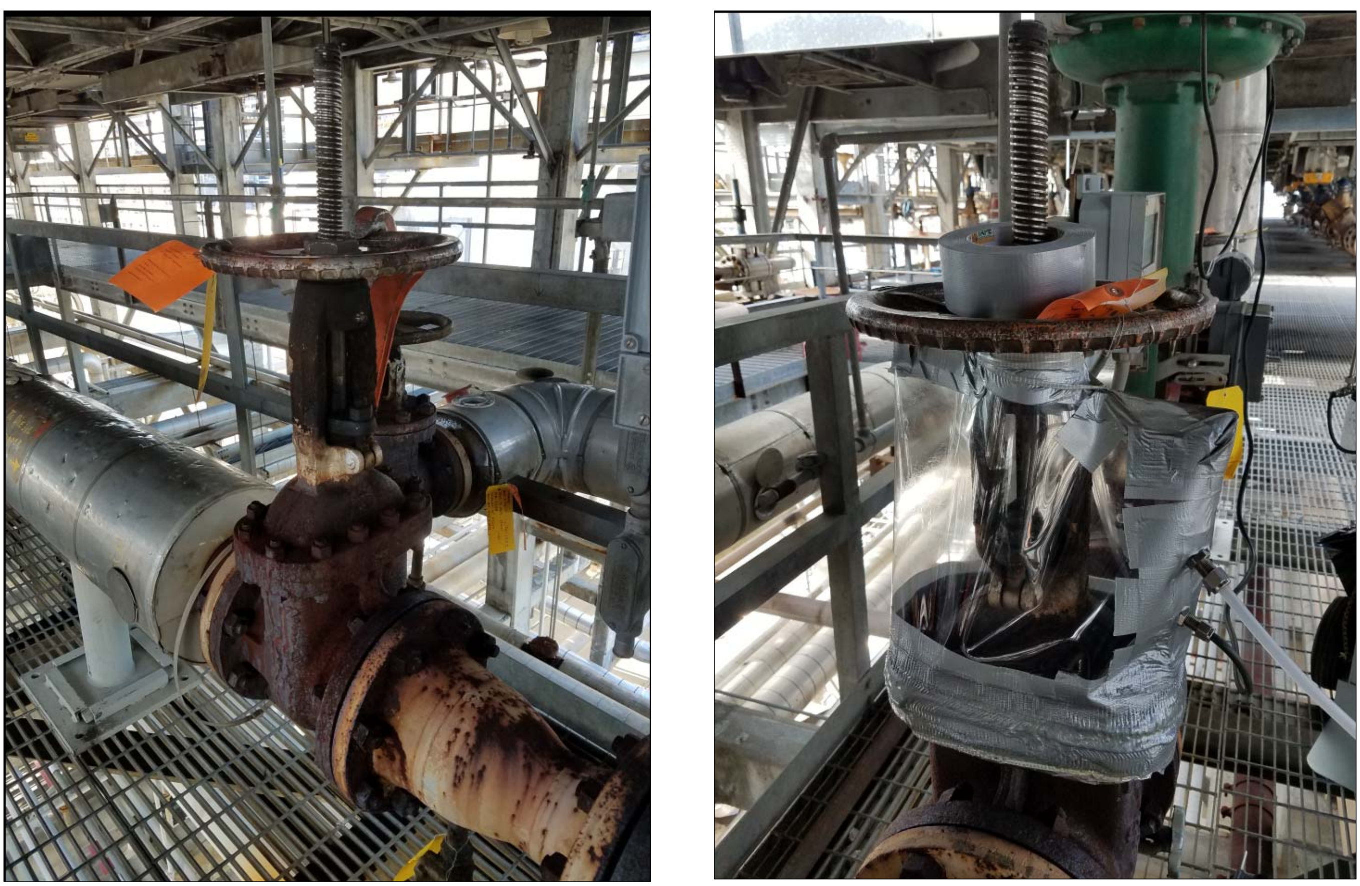

Figure 0.6. Sample A07: a) pre-bag, b) bagged

Figure 0.7. Sample A08

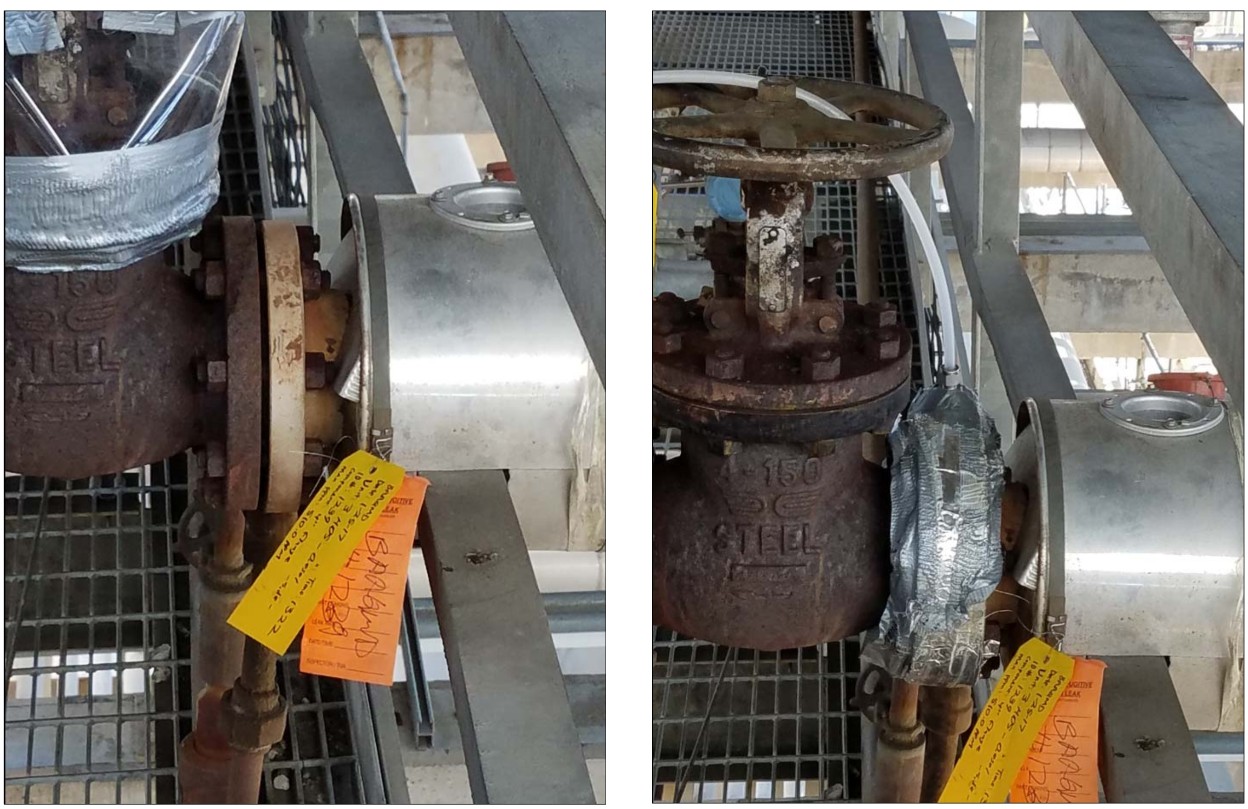

Figure 0.8. Sample A09: a) pre-bag, b) bagged

Figure 0.9. *Sample A011: a) pre-bag, b) bagged*

Figure 0.10. *Sample A012: a) pre-bag, b) bagged*

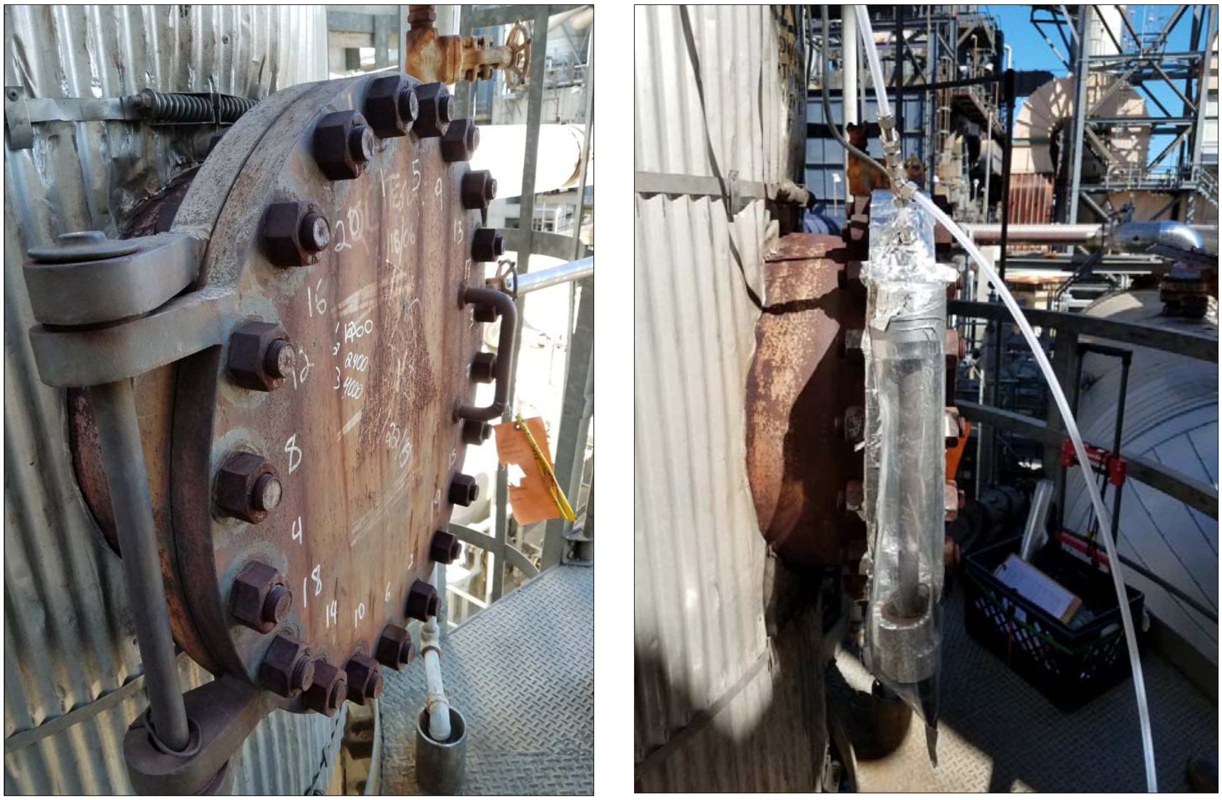

Figure 0.11. *Sample A013: a) pre-bag, b) bagged*

Figure 0.12. *Sample A015: a) pre-bag, b) bagged*

Figure 0.13. Sample A017: a) pre-bag, b) bagged

Figure 0.14. Sample A018: a) pre-bag, b) bagged

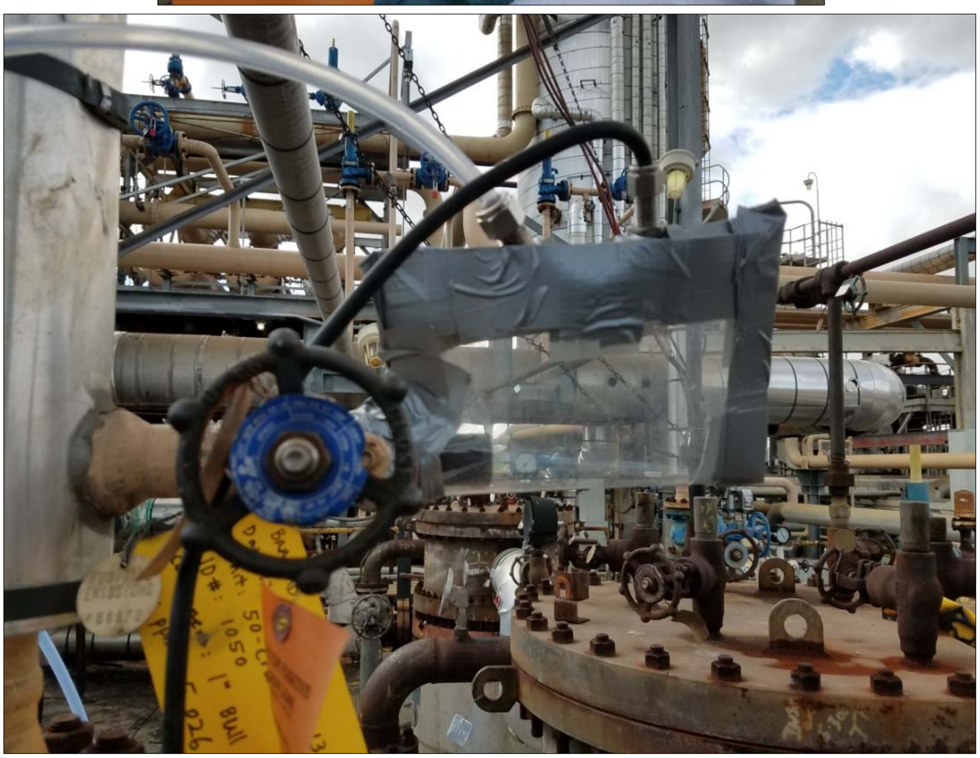

Figure 0.15. Sample A019: a) top, pre-bag, b) bottom, bagged

Figure 0.17. *Sample A020: a) pre-bag, b) bagged*

Figure 0.16. *Sample A022: a) pre-bag, b) bagged*

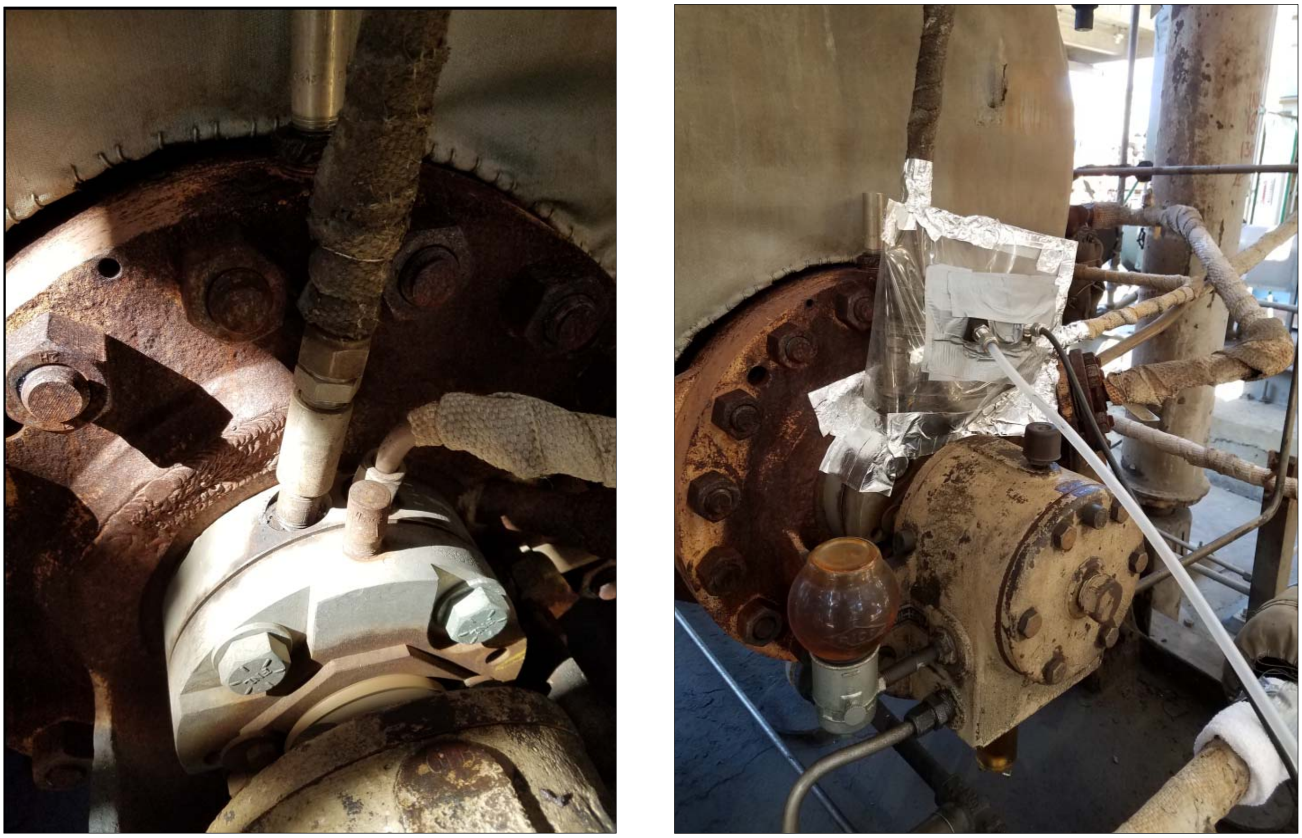

Figure 0.18. *Sample A025: a) pre-bag, b) bagged*

Figure 0.19. *Sample A027*

Figure 0.20. Sample A029: a) pre-bag, b) bagged

Figure 0.21. Sample A030: a) pre-bag, b) bagged

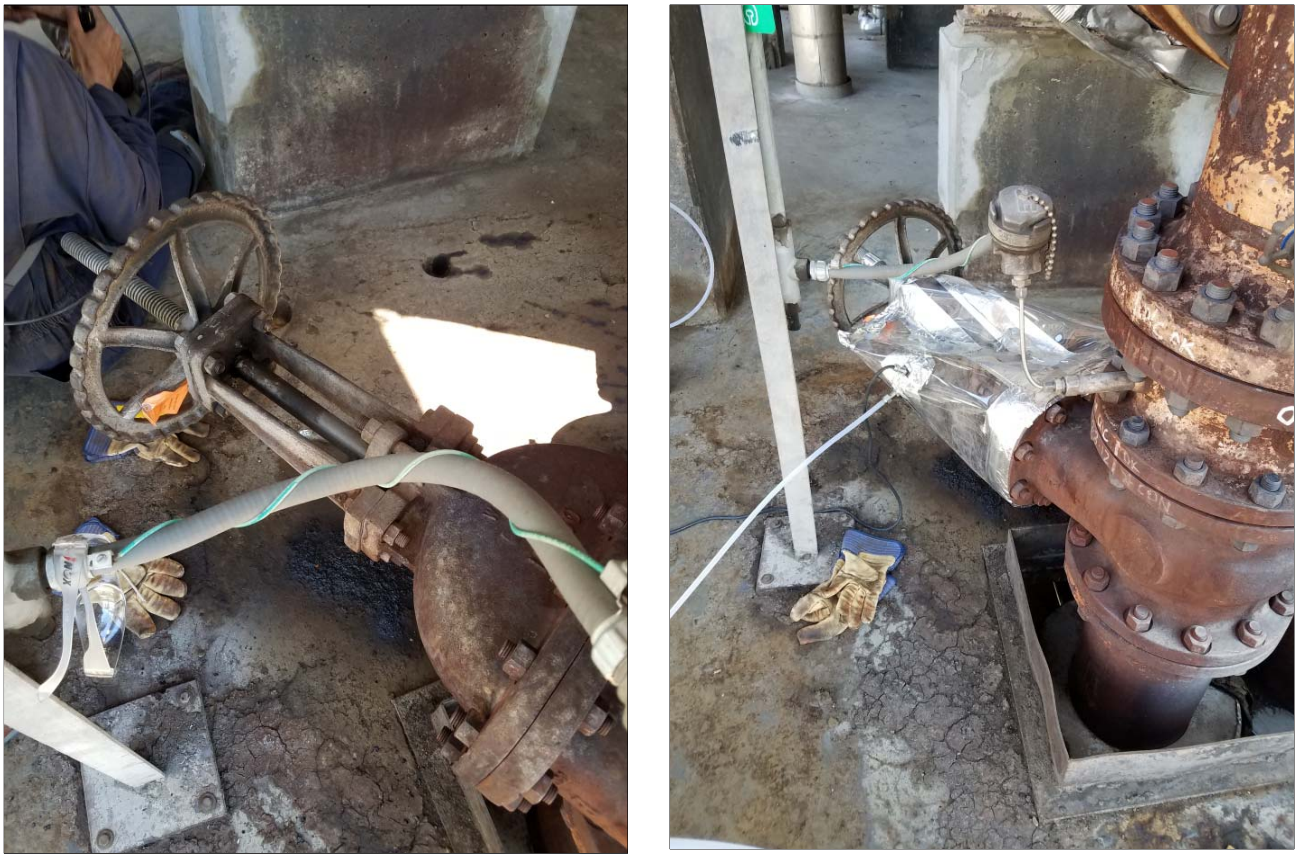

Figure 0.22. Sample A032: a) pre-bag, b) bagged

Figure 0.23. Sample A034: a) pre-bag, b) bagged

Refinery B Samples

Figure 0.24. Sample B01: a) top, pre-bag, b) bottom, bagged

Figure 0.25. Sample B03: a) pre-bag, b) bagged

Figure 0.26. Sample B05: a) pre-bag, b) bagged

Figure 0.27. Sample B07: a) top, pre-bag, b) bottom, bagged

Figure 0.28. *Sample B010: a) pre-bag, b) bagged*

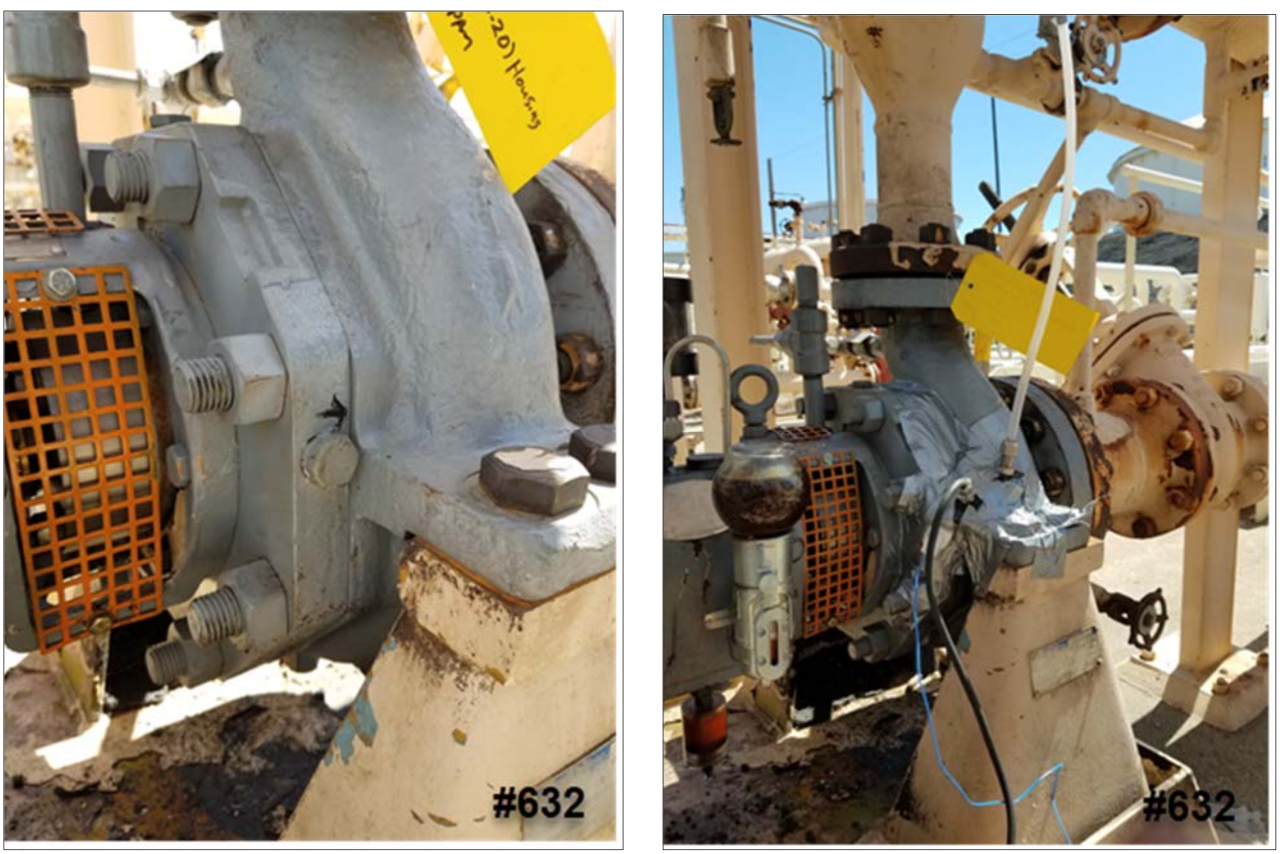

Figure 0.29. *Sample B012: a) pre-bag, b) bagged*

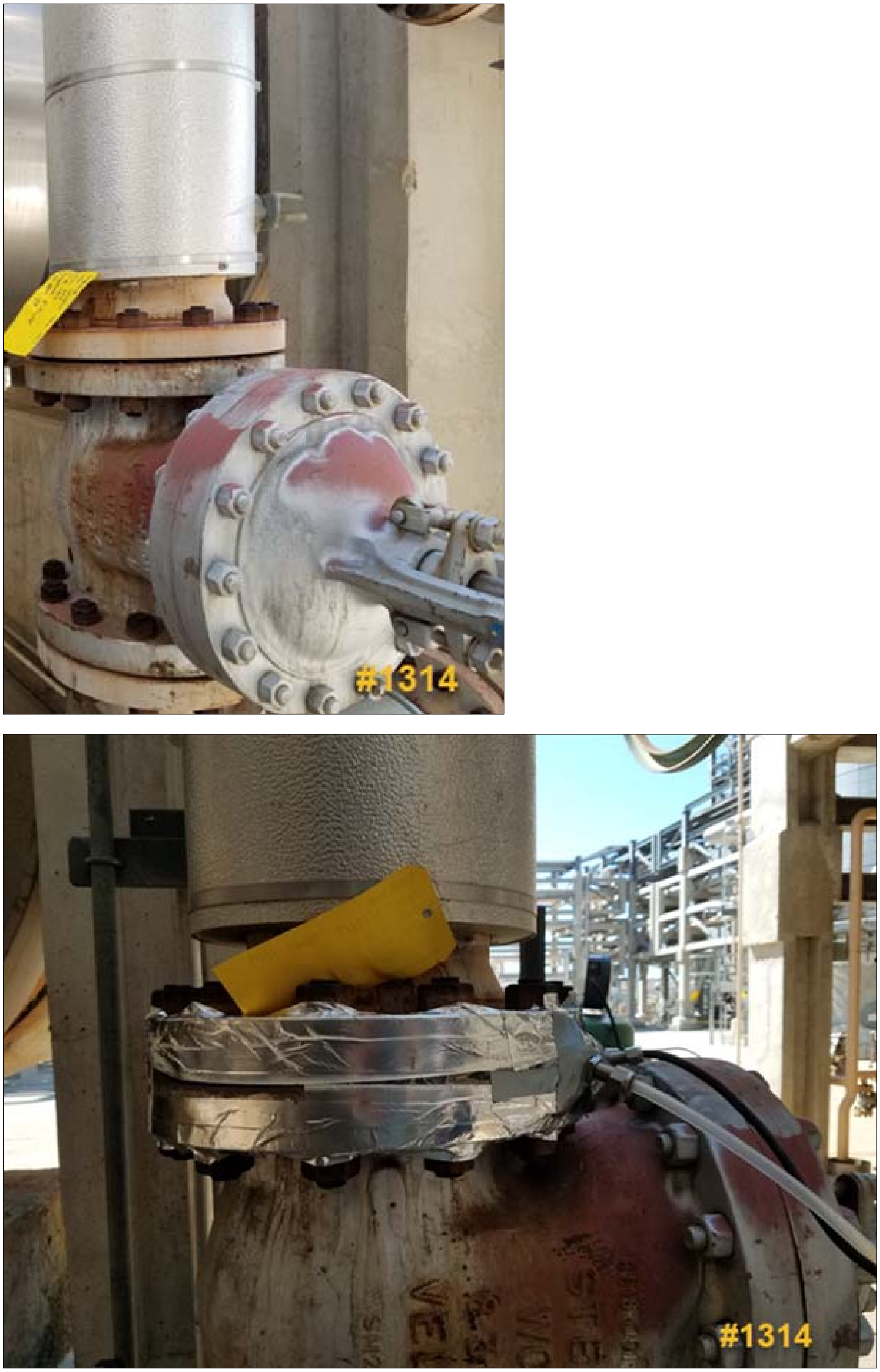

Figure 0.30. Sample B015: a) pre-bag, b) bagged

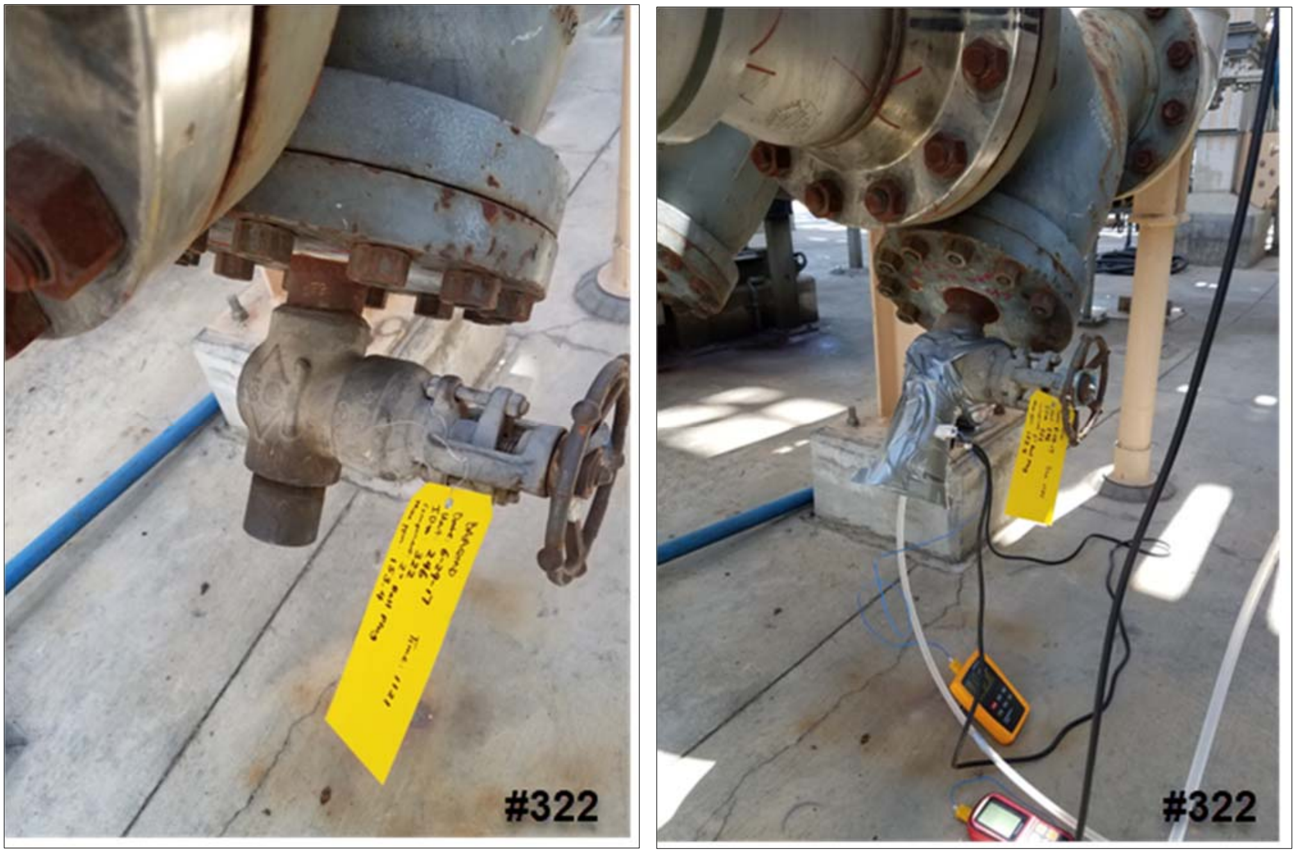

Figure 0.31. *Sample B017: a) pre-bag, b) bagged*

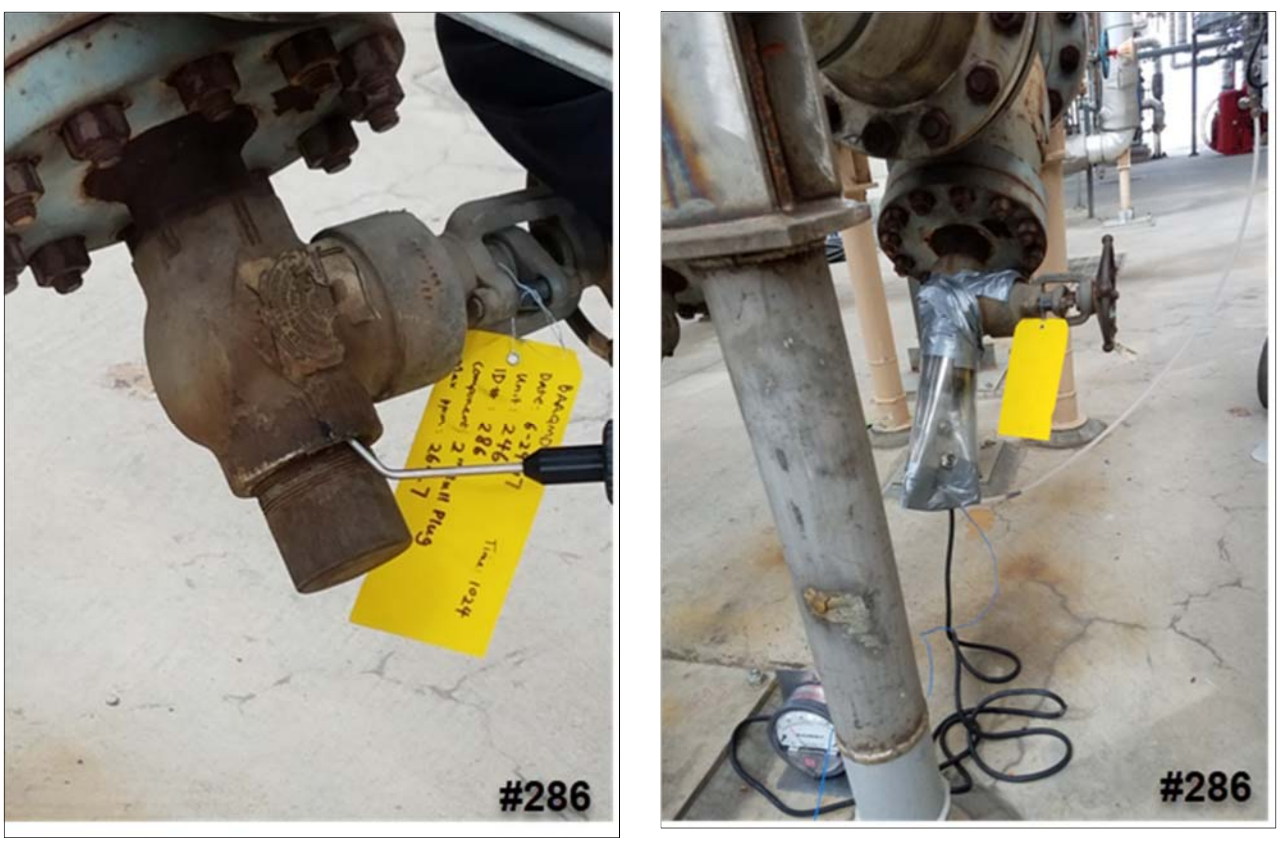

Figure 0.32. *Sample B019: a) pre-bag, b) bagged*

Figure 0.33. Sample B021: a) pre-bag, b) bagged

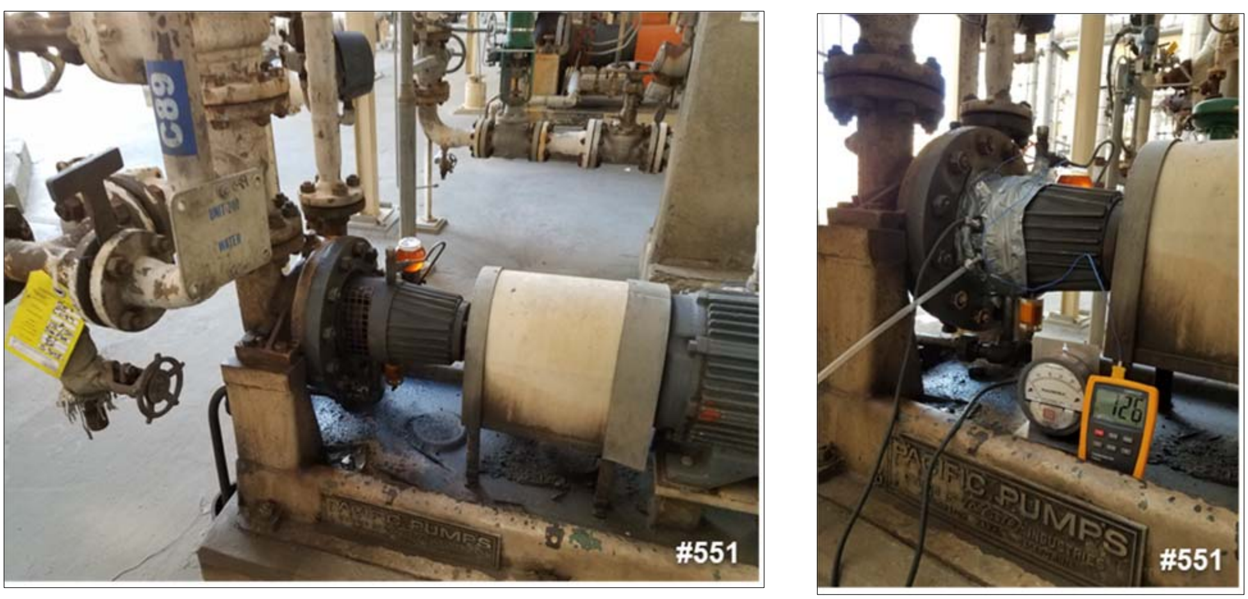

Figure 0.34. Sample B023: a) pre-bag, b) bagged

Figure 0.35. *Sample B026: a) pre-bag, b) bagged*

Figure 0.36. *Sample B029: a) pre-bag, b) bagged*

Figure 0.37. *Sample B031: a) pre-bag, b) bagged*

Figure 0.38. *Sample B033: a) pre-bag, b) bagged*

Figure 0.39. Sample B036: a) pre-bag, b) bagged

Figure 0.40. Sample B039: a) pre-bag, b) bagged

Figure 0.41. *Sample B041: a) pre-bag, b) bagged*

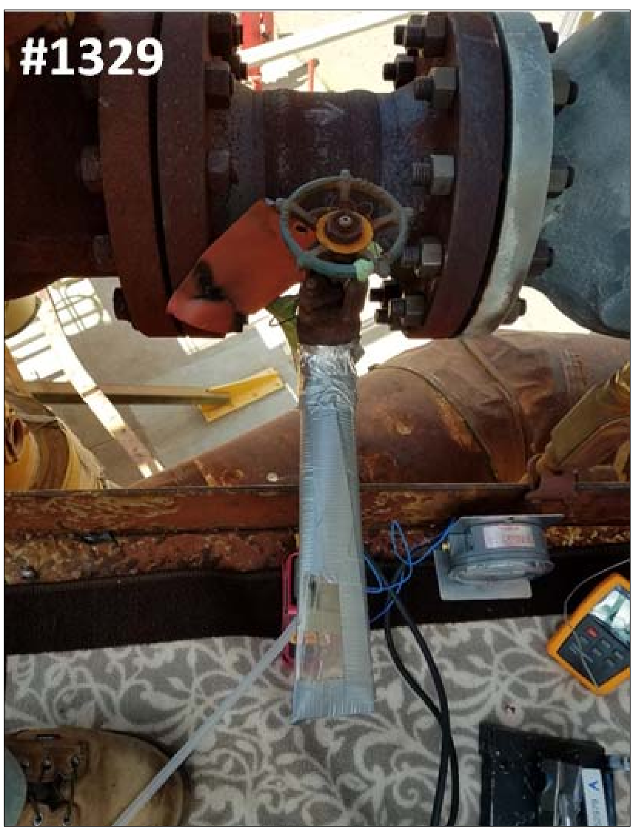

Figure 0.42. Sample B043

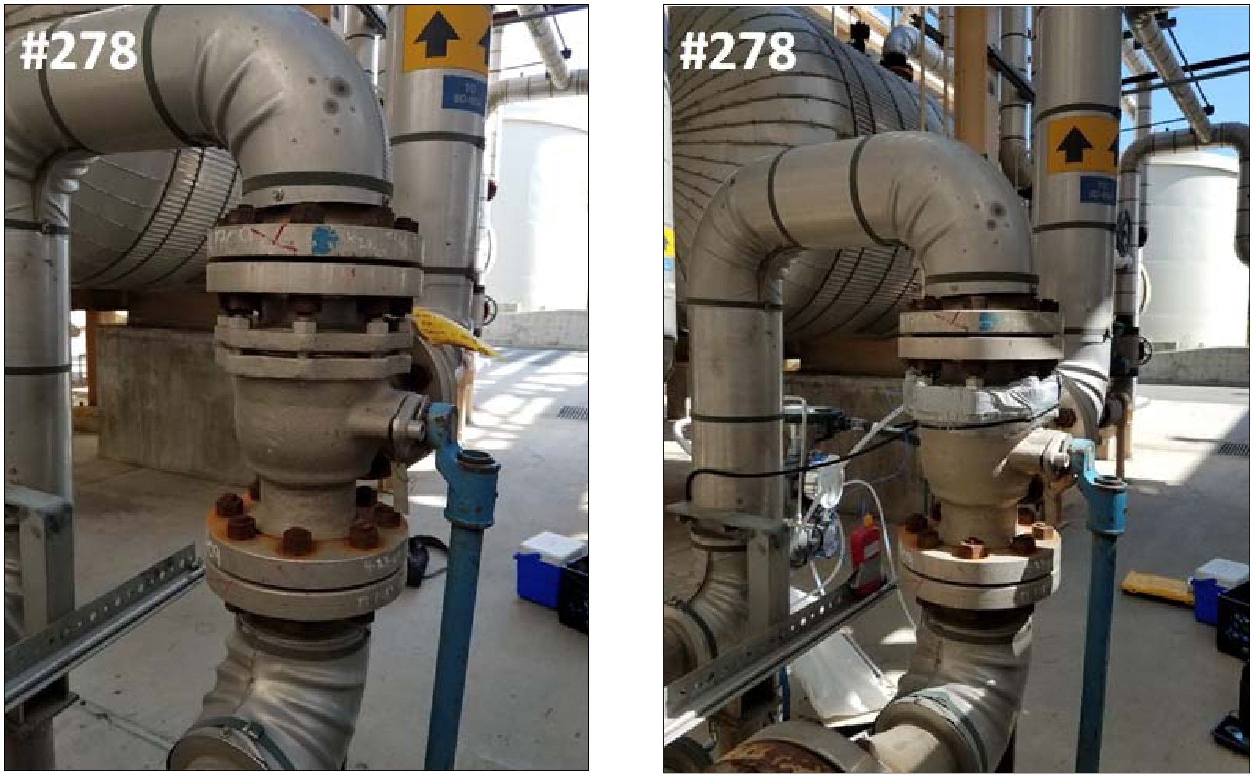

Figure 0.43. Sample B045: a) pre-bag, b) bagged

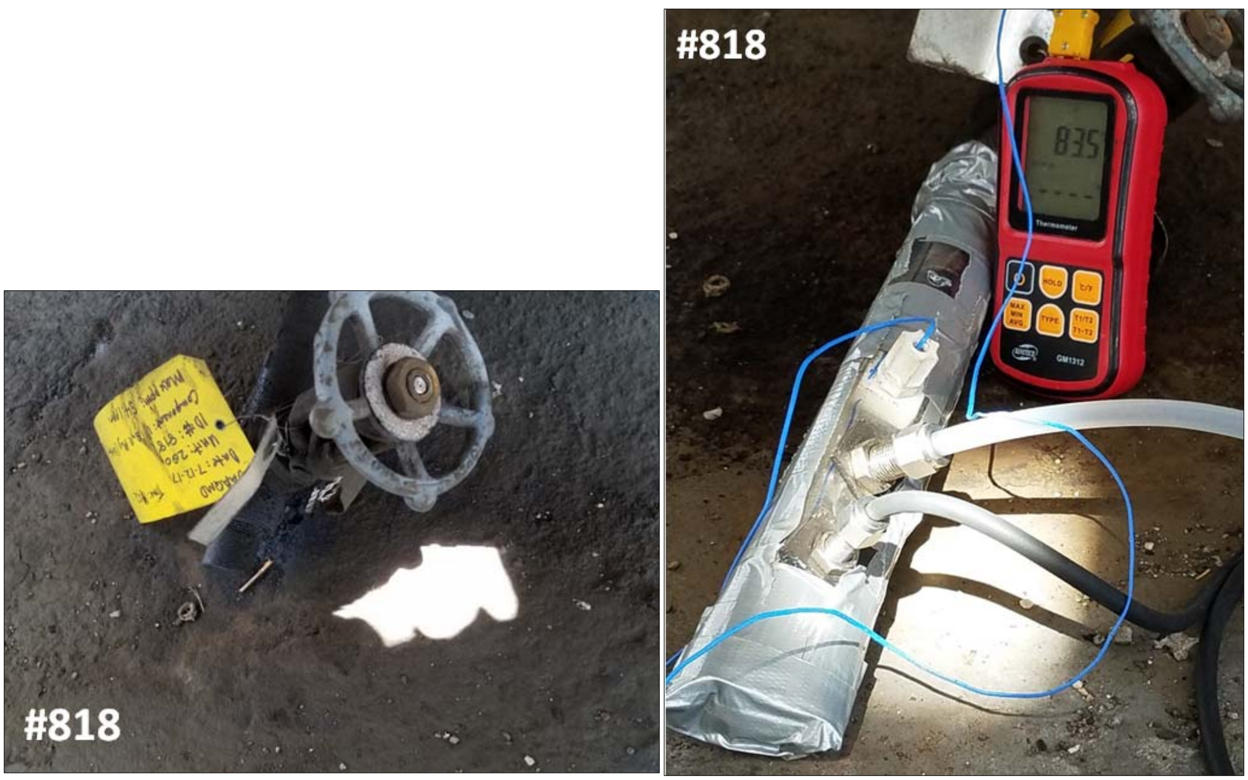

Figure 0.44. Sample B047: a) pre-bag, b) bagged

Figure 0.45. Sample B049: a) pre-bag, b) bagged

Figure 0.46. Sample B052

Figure 0.47. Sample B056: a) pre-bag, b) bagged

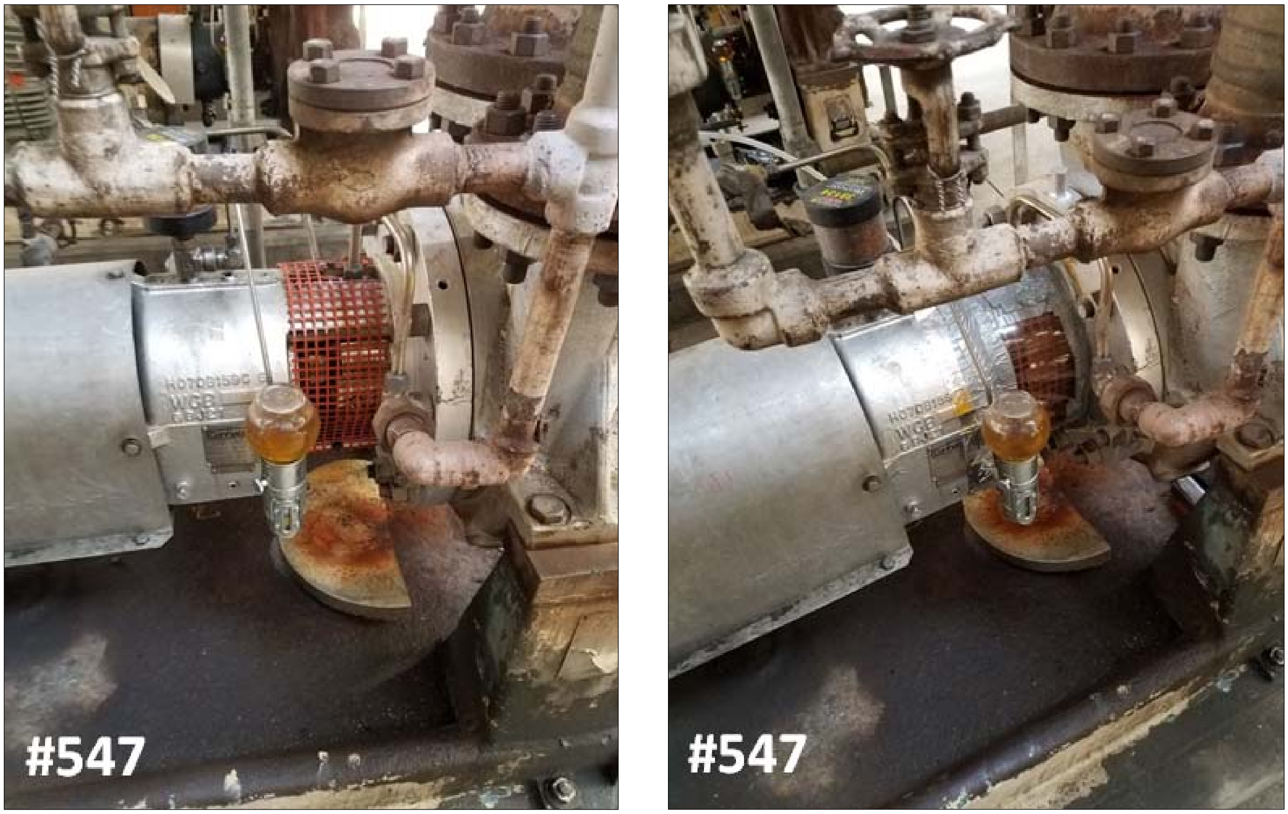

Figure 0.48. *Sample B058: a) pre-bag, b) bagged*

Figure 0.49. *Sample B060: a) pre-bag, b) bagged*

Figure 0.50. Sample B062: a) top, pre-bag, b) bottom, bagged

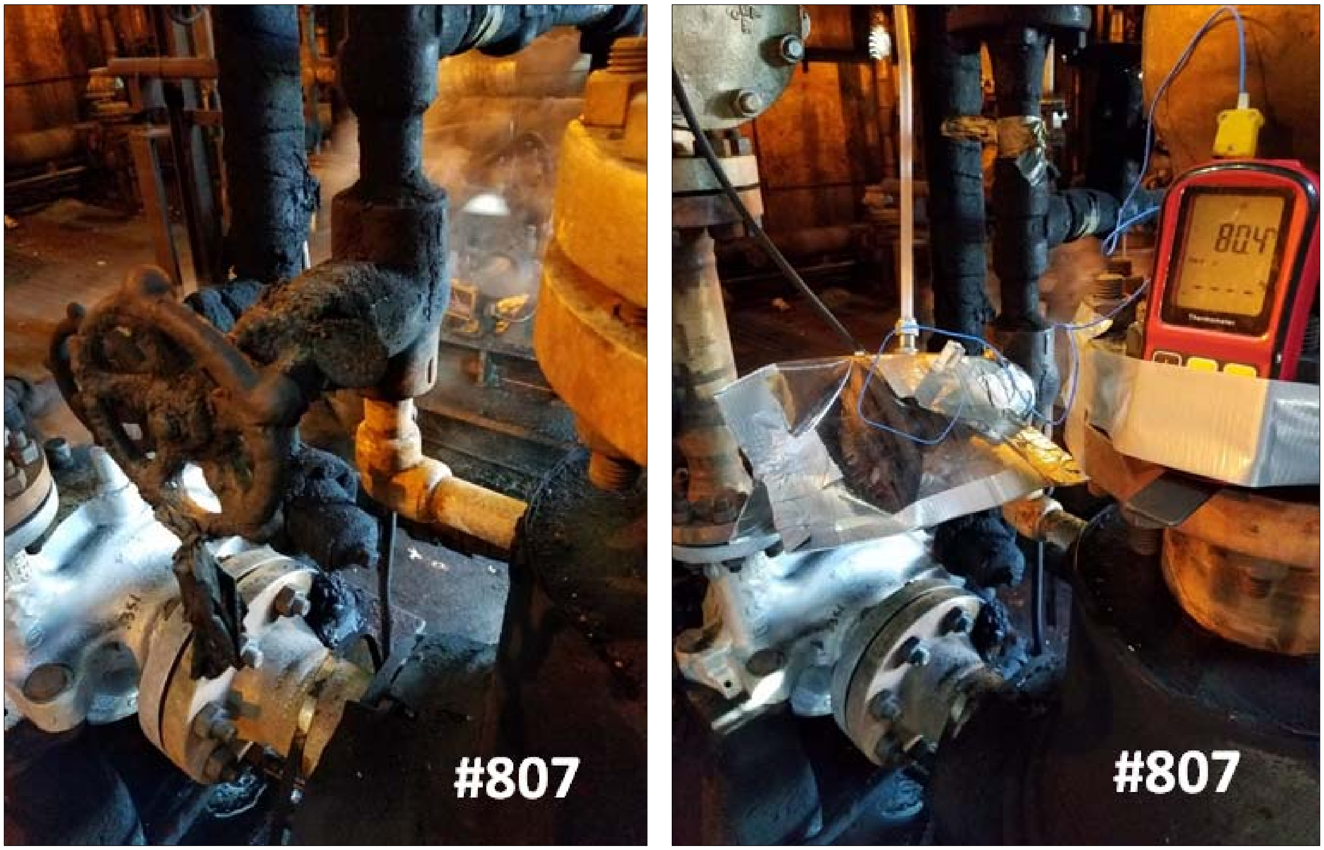

Figure 0.51. *Sample B064: a) pre-bag, b) bagged*

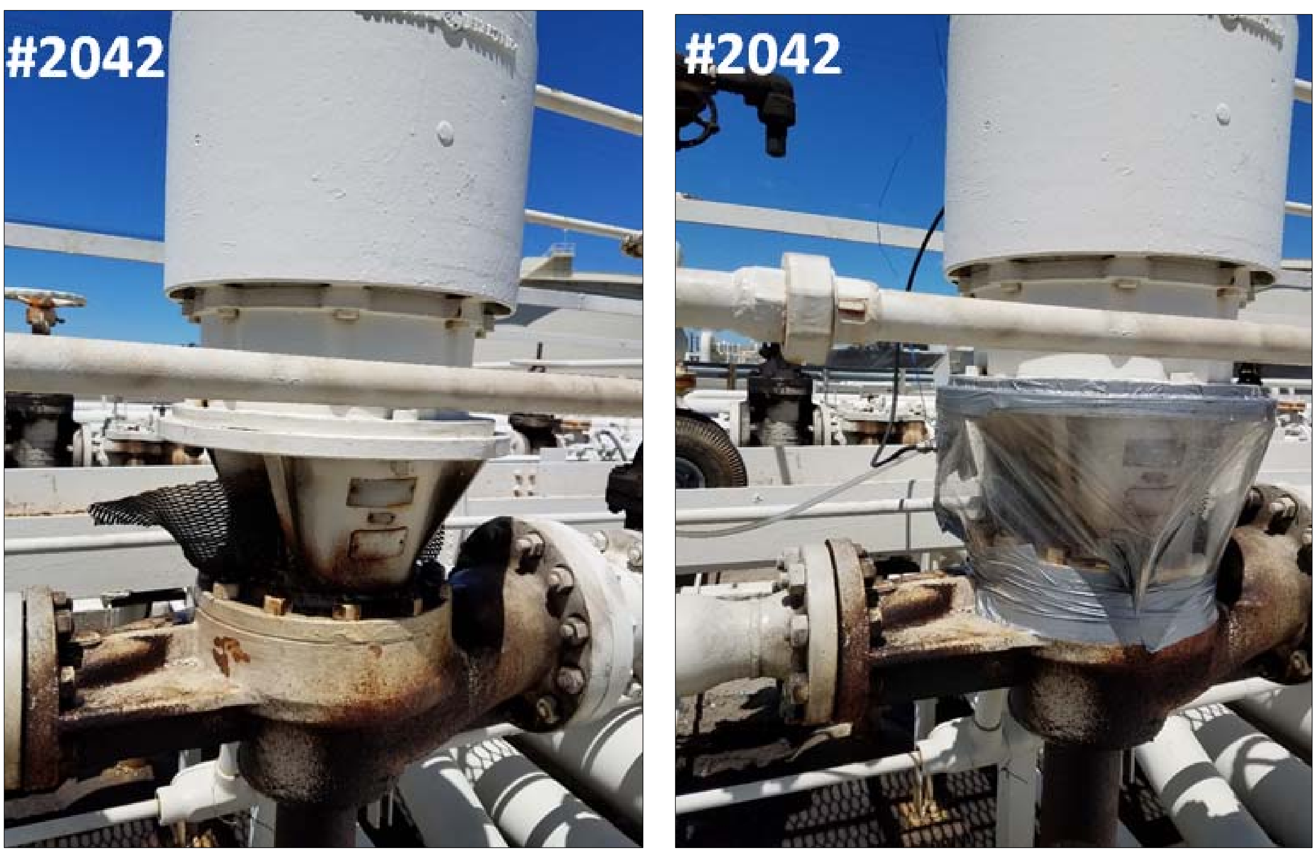

Figure 0.52. *Sample B066: a) pre-bag, b) bagged*

Refinery C Samples

Figure 0.53. *Sample C001: a) pre-bag, b) bagged*

Figure 0.54. *Sample C004: a) pre-bag, b) bagged*

Figure 0.55. *Sample C007: a) pre-bag, b) bagged*

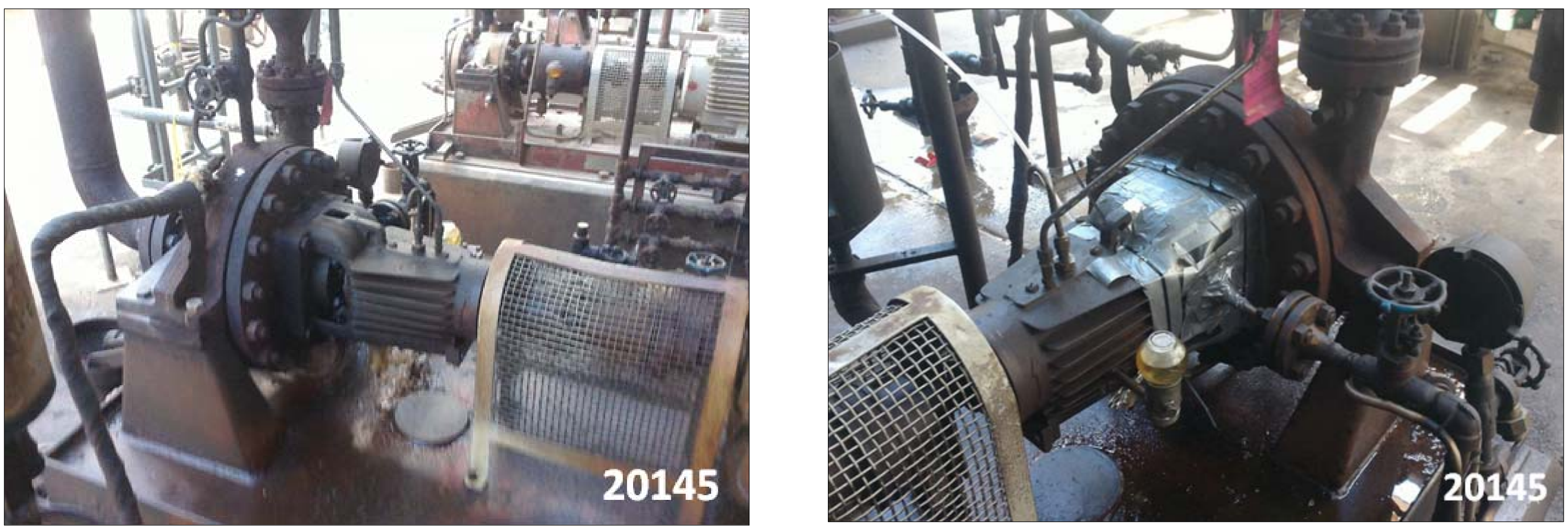

Figure 0.56. *Sample C009: a) pre-bag, b) bagged*

Figure 0.57. Sample C013: a) top, pre-bag, b) bottom, bagged

Figure 0.58. Sample C016: a) top, pre-bag, b) bottom, bagged

Figure 0.59. Sample C018: a) pre-bag, b) bagged

Figure 0.60. Sample C020

Figure 0.61. Sample C022: a) pre-bag, b) bagged

Figure 0.62. Sample C025: a) pre-bag, b) bagged

Figure 0.63. Sample C027: a) pre-bag, b) bagged

Figure 0.64. Sample C029: a) pre-bag, b) bagged

Figure 0.66. *Sample C031: a) pre-bag, b) bagged*

Figure 0.65. *Sample C033*

Figure 0.67. *Sample C035: a) pre-bag, b) bagged*

Figure 0.68. *Sample C037*

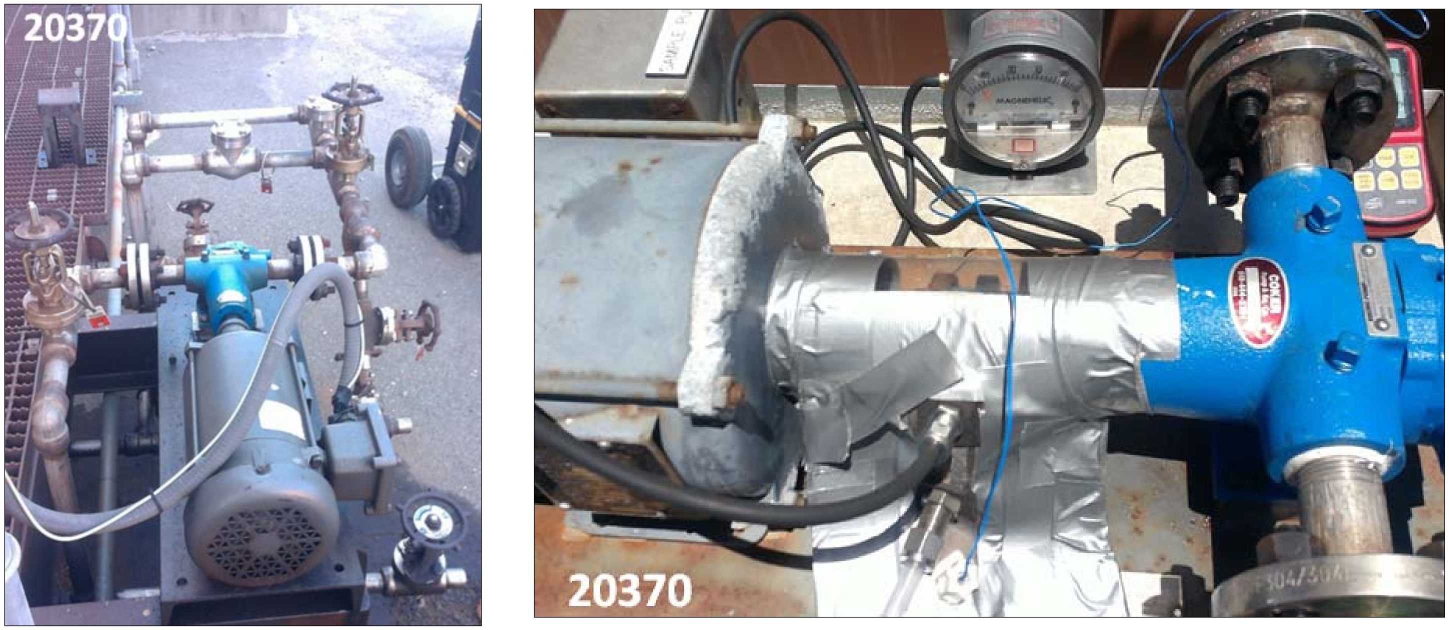

Figure 0.69. Sample C040: a) pre-bag, b) bagged

Figure 0.70. Sample C043

Figure 0.71. Sample C045

Figure 0.72. Sample C047

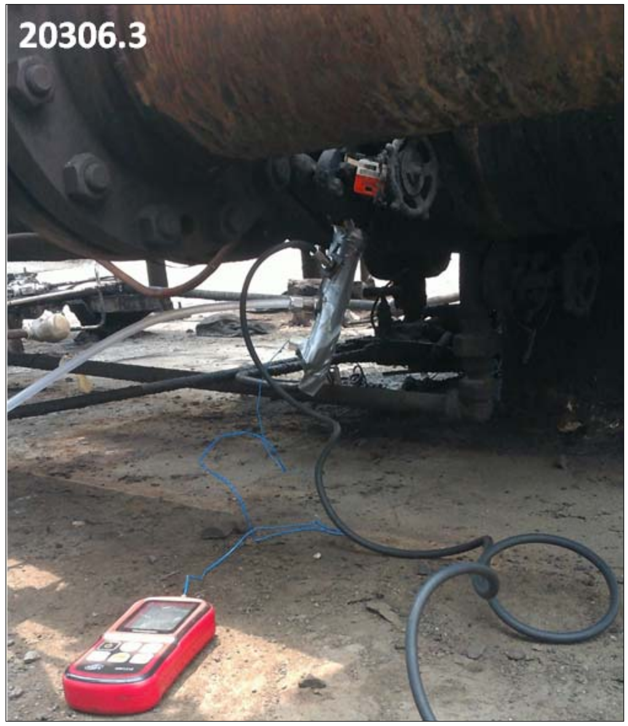

Figure 0.73. *Sample C049*

Figure 0.74. *Sample C052: a) pre-bag, b) bagged*

Figure 0.75. Sample C054

Refinery D Samples

Figure 0.76. *Sample D01: a) pre-bag, b) bagged*

Figure 0.77. *Sample D03: a) pre-bag, b) bagged*

Figure 0.78. Sample D05: a) pre-bag, b) bagged

Figure 0.79. Sample D07: a) pre-bag, b) bagged

Figure 0.80. Sample D09: a) pre-bag, b) bagged

Figure 0.81. Sample D011: a) pre-bag, b) bagged

Figure 0.82. Sample D015: a) pre-bag, b) bagged

Figure 0.83. Sample D017: a) pre-bag, b) bagged

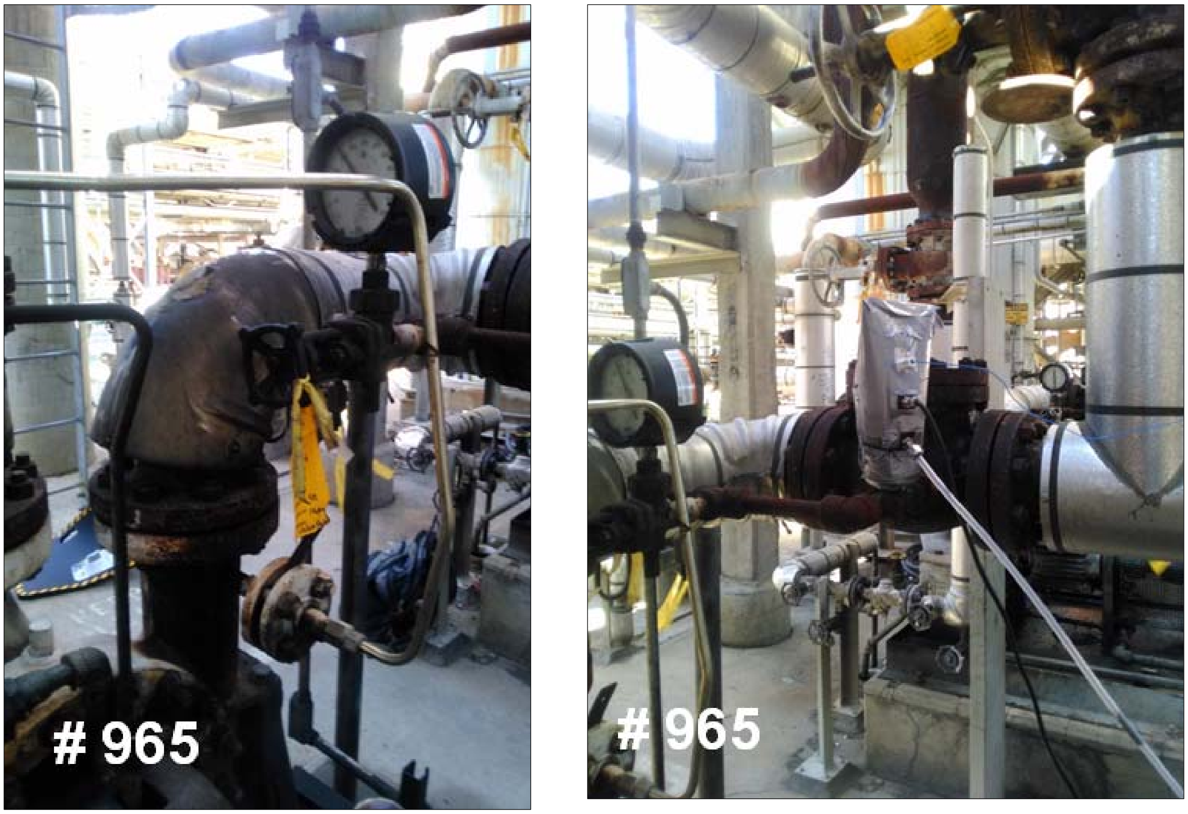

Figure 0.84. *Sample D019: a) pre-bag, b) bagged*

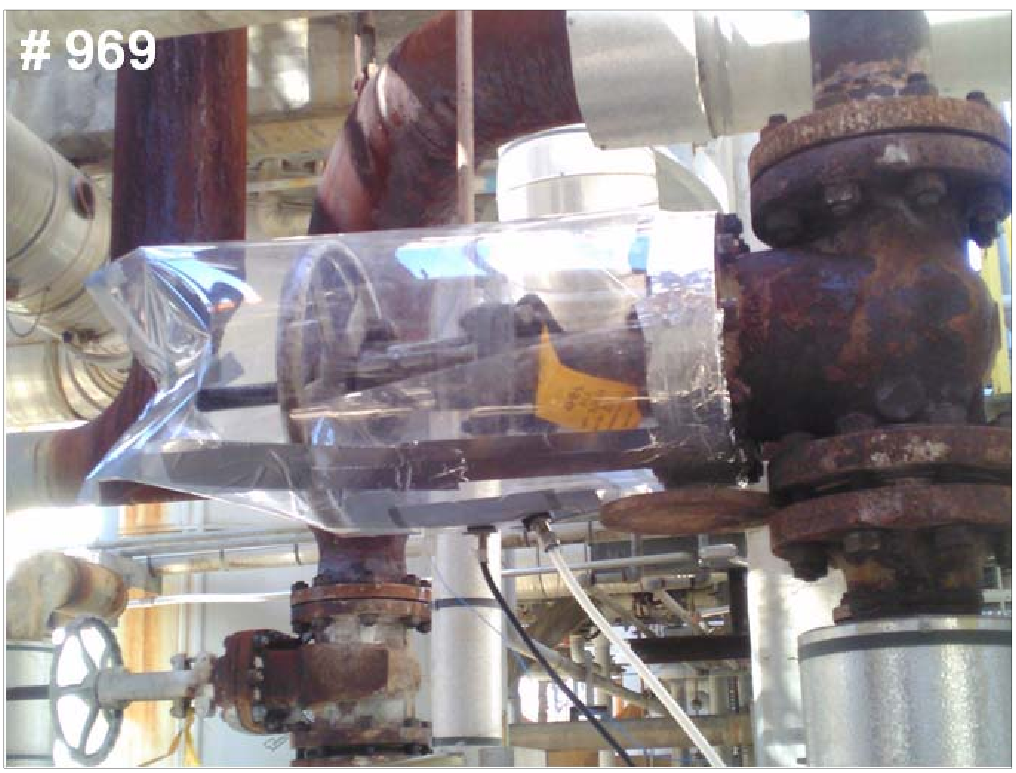

Figure 0.85. *Sample D021*

Figure 0.86. *Sample D023: a) pre-bag, b) bagged*

Figure 0.87. *Sample D025: a) pre-bag, b) bagged*

Figure 0.88. Sample D027

Figure 0.89. Sample D029: a) pre-bag, b) bagged

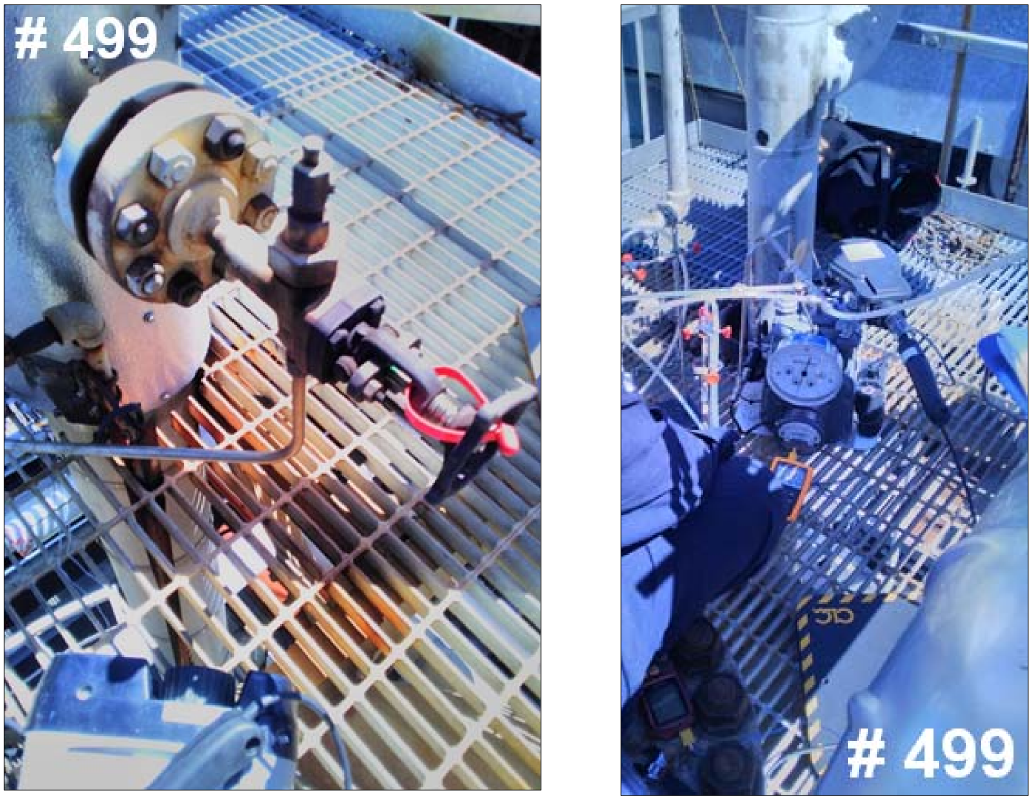

Figure 0.90. *Sample D032: a) pre-bag, b) bagged*

Figure 0.91. *Sample D034*

Figure 0.92. Sample D036: a) pre-bag, b) bagged

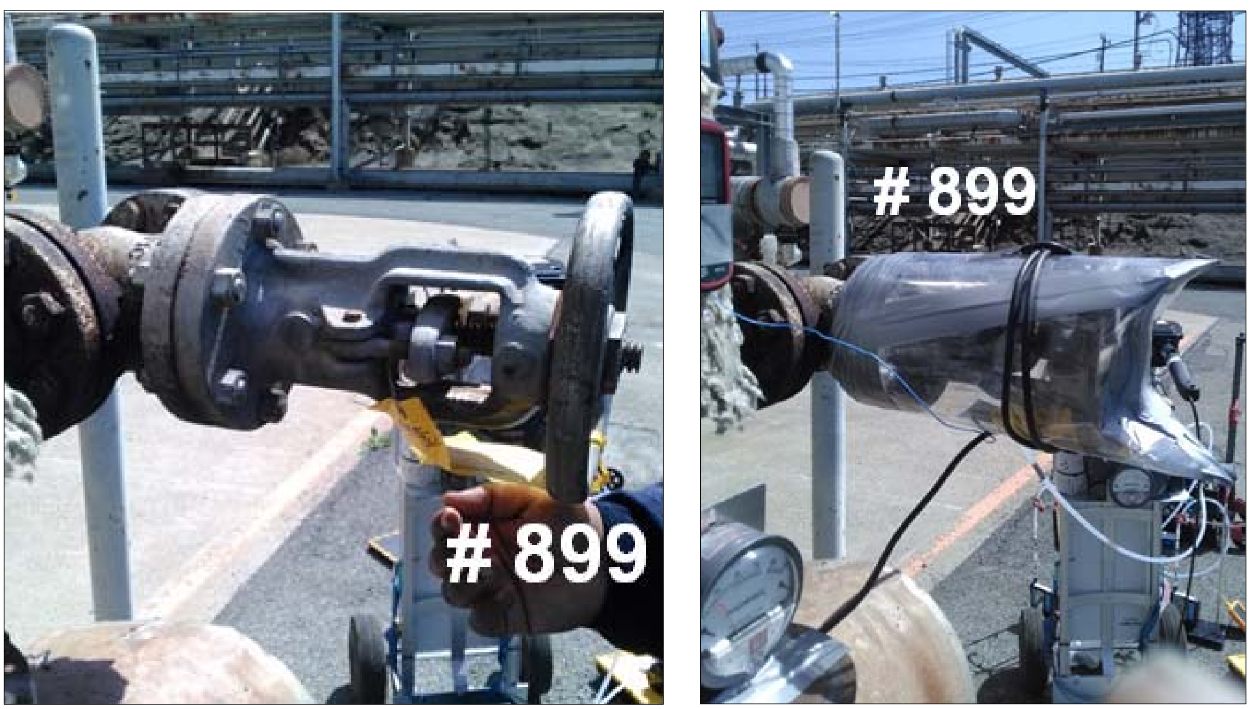

Figure 0.93. Sample D038: a) pre-bag, b) bagged

Figure 0.94. Sample D040

Figure 0.95. Sample D043

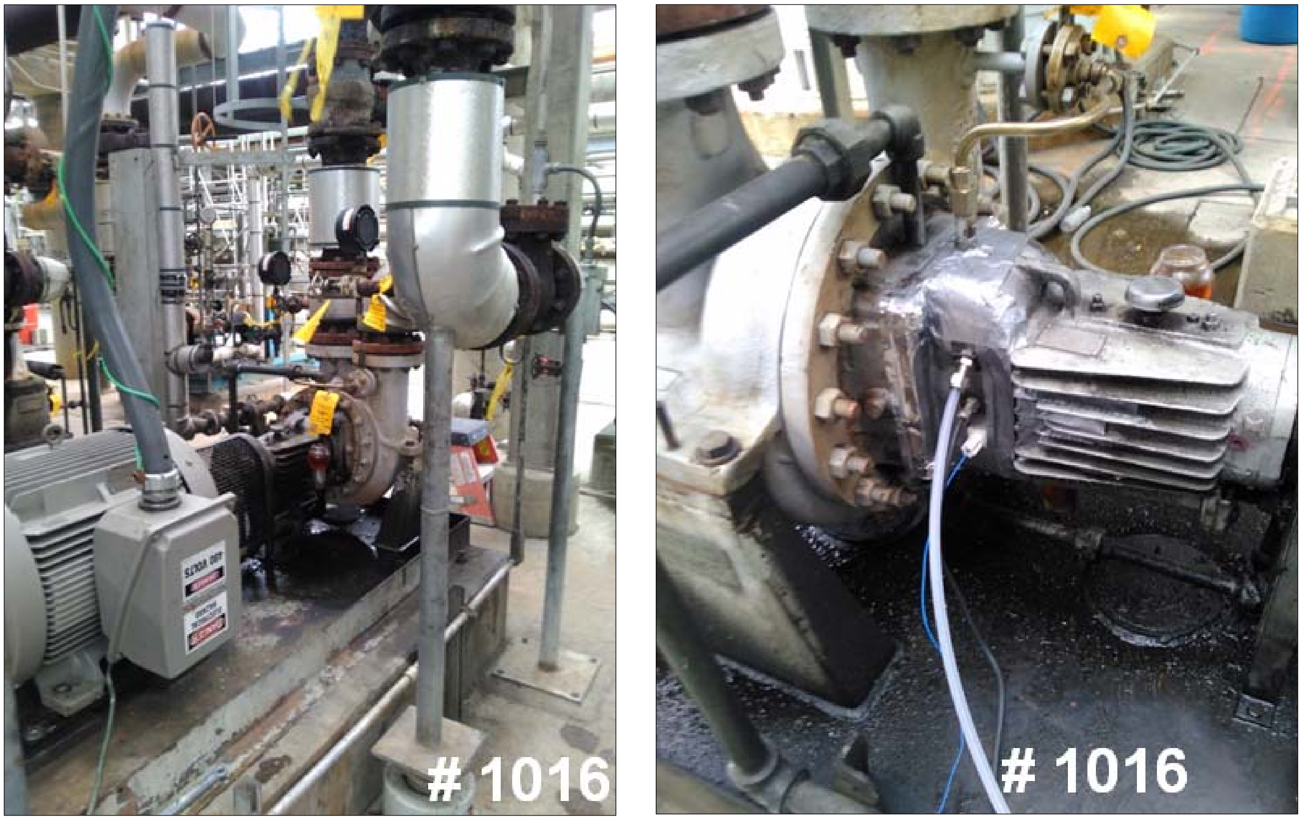

Figure 0.96. *Sample D045: a) pre-bag, b) bagged*

Figure 0.97. *Sample D047: a) pre-bag, b) bagged*

Figure 0.98. Sample D050

Refinery E Samples

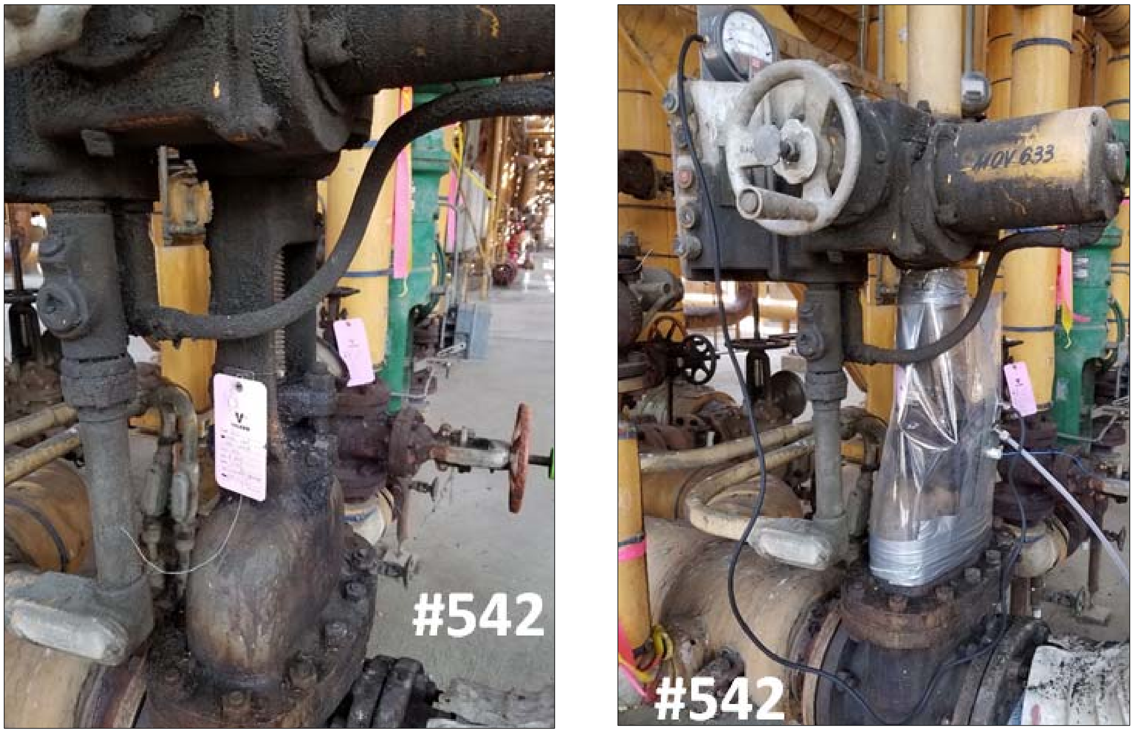

Figure 0.99. *Sample E001: a) pre-bag, b) bagged*

Figure 0.100. *Sample E003: a) pre-bag, b) bagged*

Figure 0.101. *Sample E005: a) pre-bag, b) bagged*

Figure 0.102. *Sample E007*

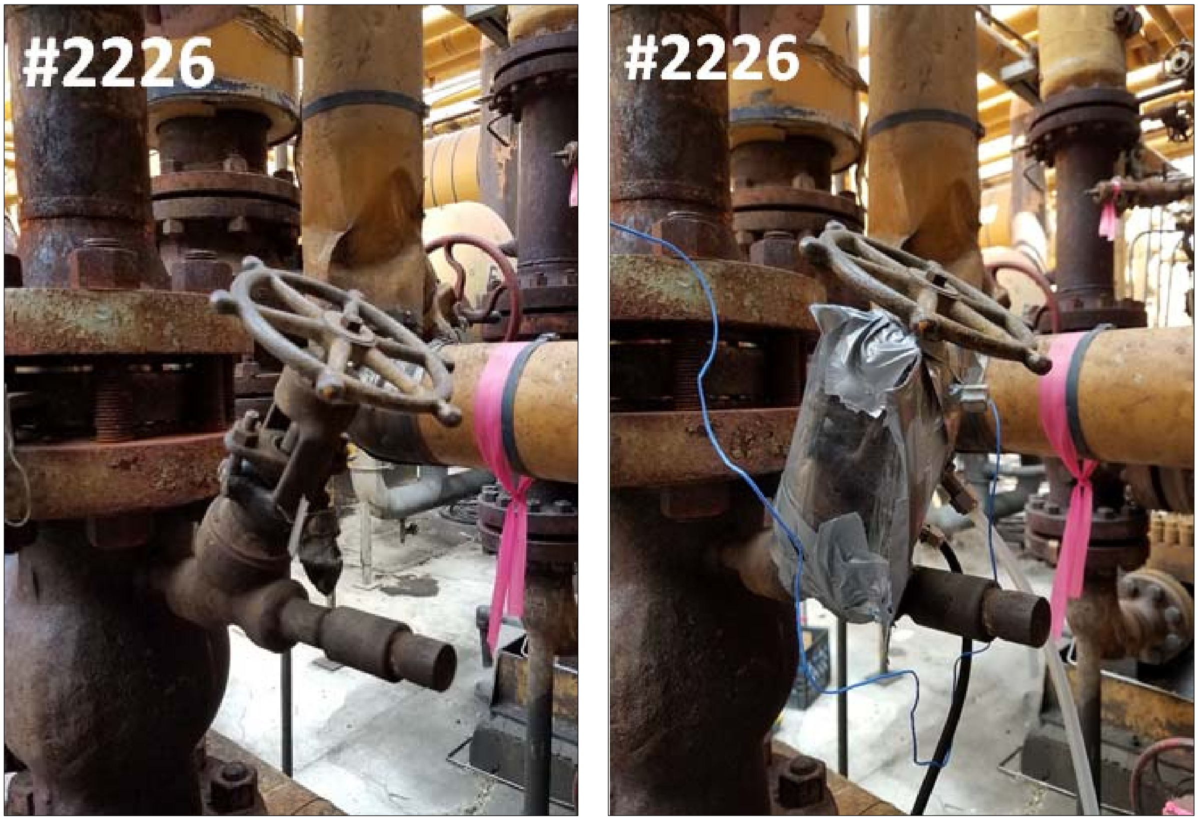

Figure 0.103. Sample E010: a) pre-bag, b) bagged

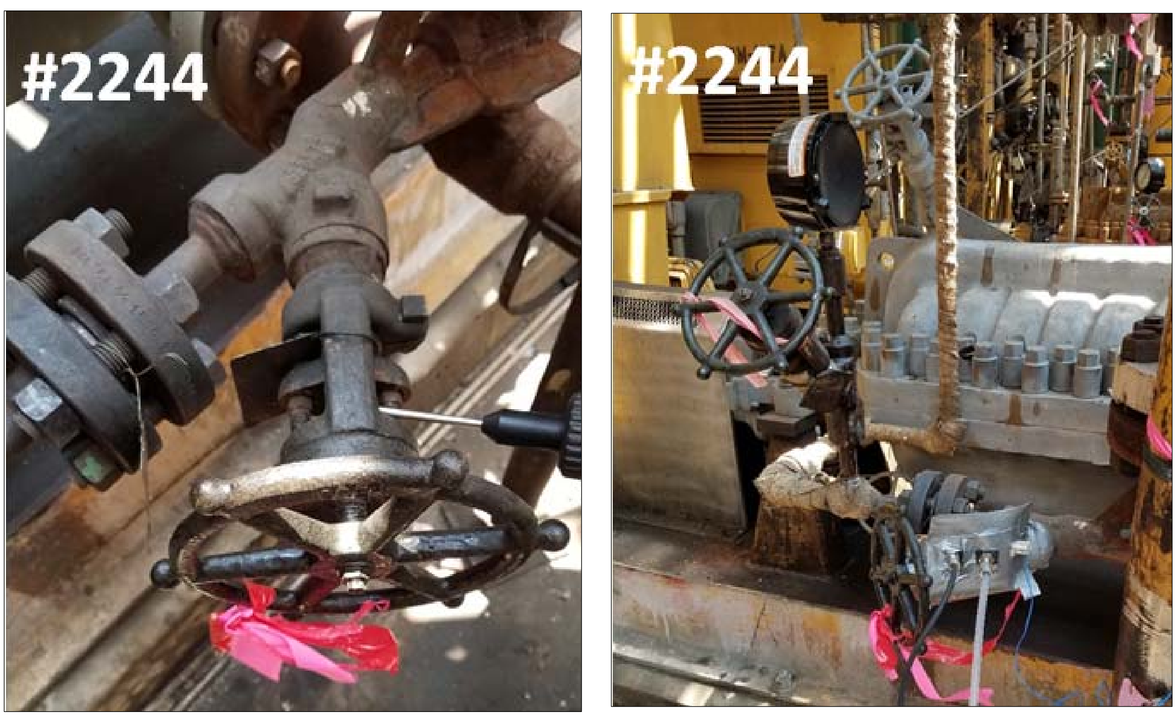

Figure 0.104. Sample E013: a) pre-bag, b) bagged

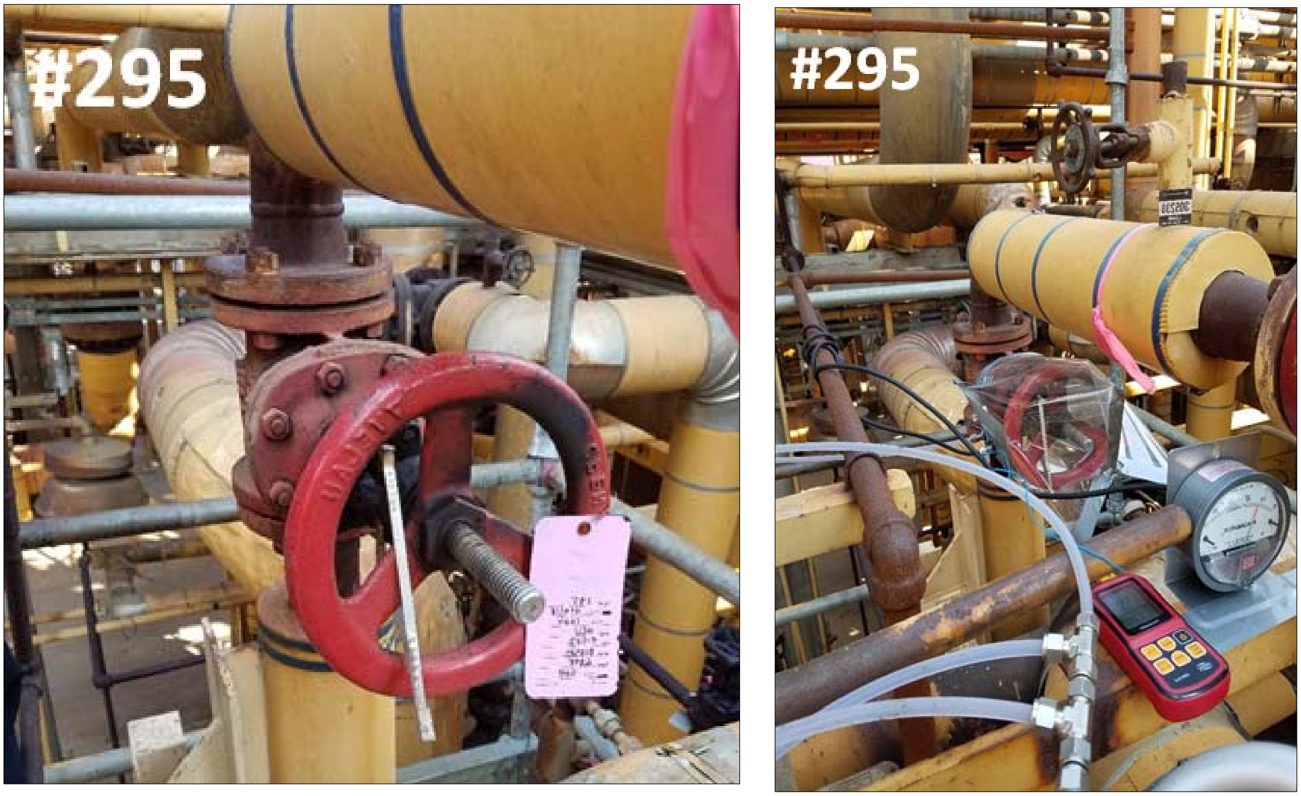

Figure 0.105. Sample E016: a) pre-bag, b) bagged

Figure 0.106. Sample E018: a) pre-bag, b) bagged

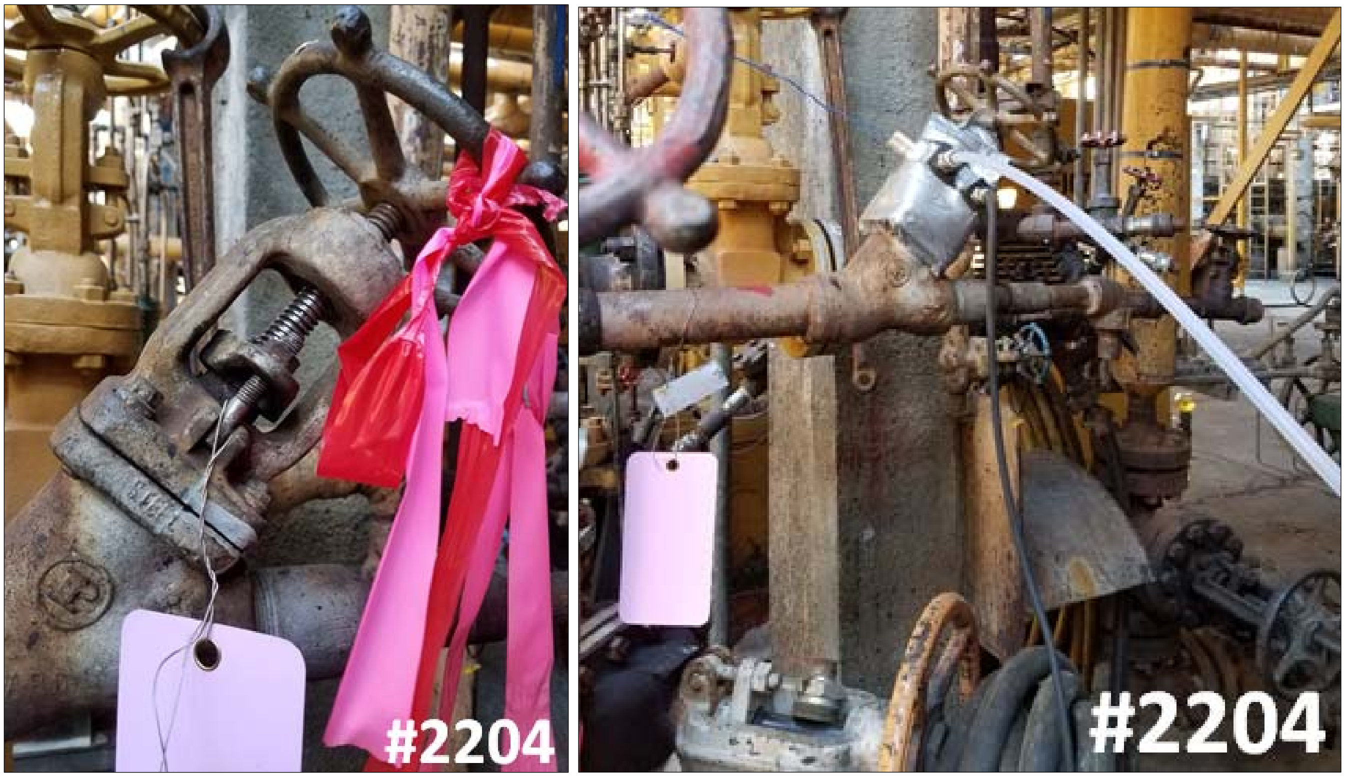

Figure 0.107. Sample E021: a) pre-bag, b) bagged

Figure 0.108. Sample E023: a) pre-bag, b) bagged

Figure 0.109. *Sample E025: a) pre-bag, b) bagged*

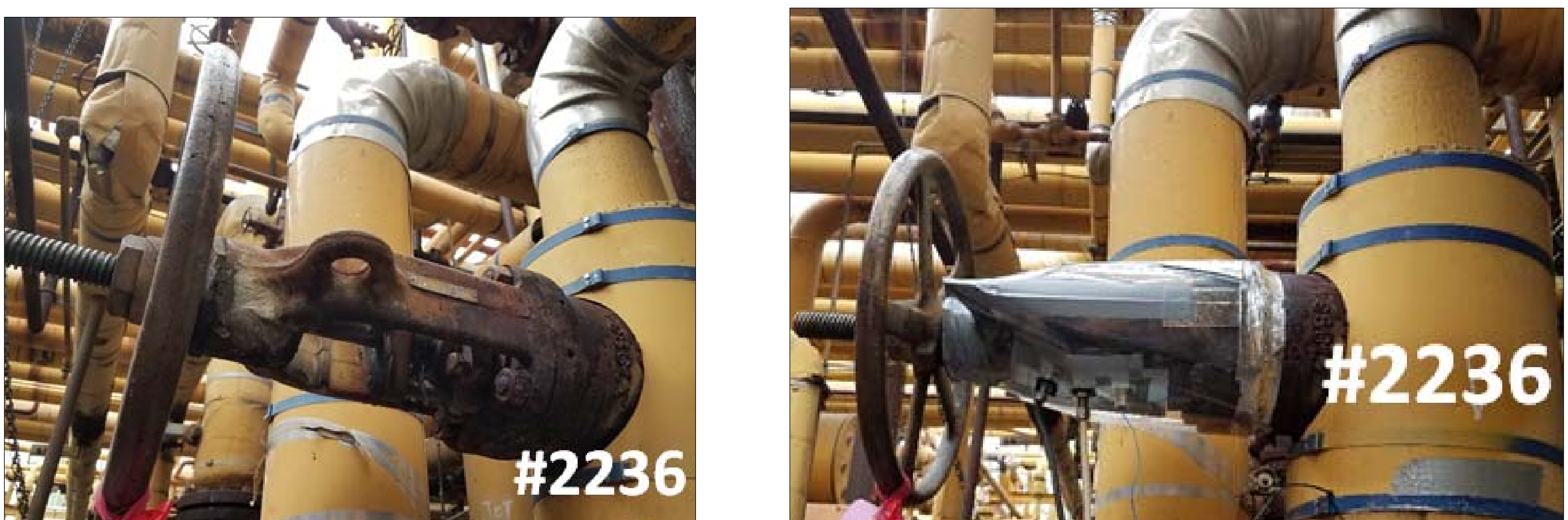

Figure 0.110. Sample E027: a) pre-bag, b) bagged

Figure 0.111. Sample E030: a) pre-bag, b) bagged

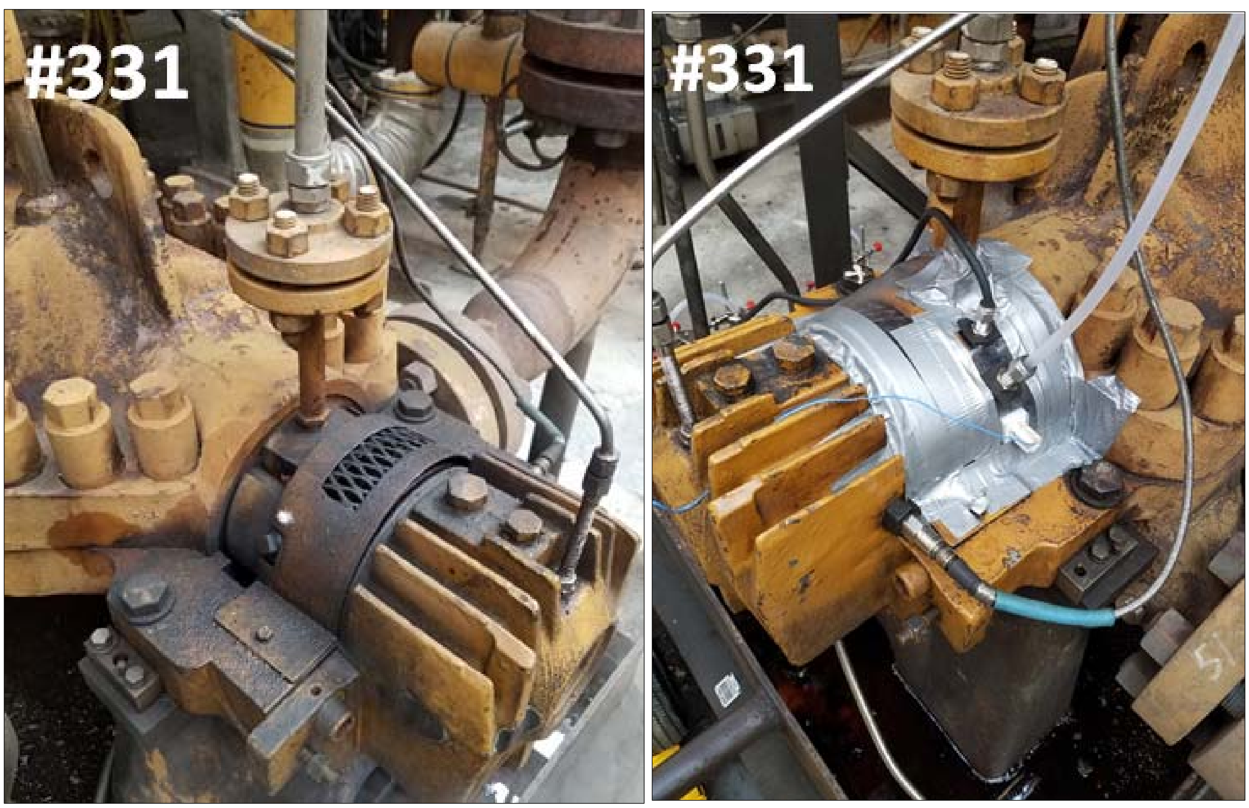

Figure 0.112. Sample E033: a) pre-bag, b) bagged

Figure 0.113. Sample E036: a) pre-bag, b) bagged

Figure 0.114. Sample E038: a) pre-bag, b) bagged

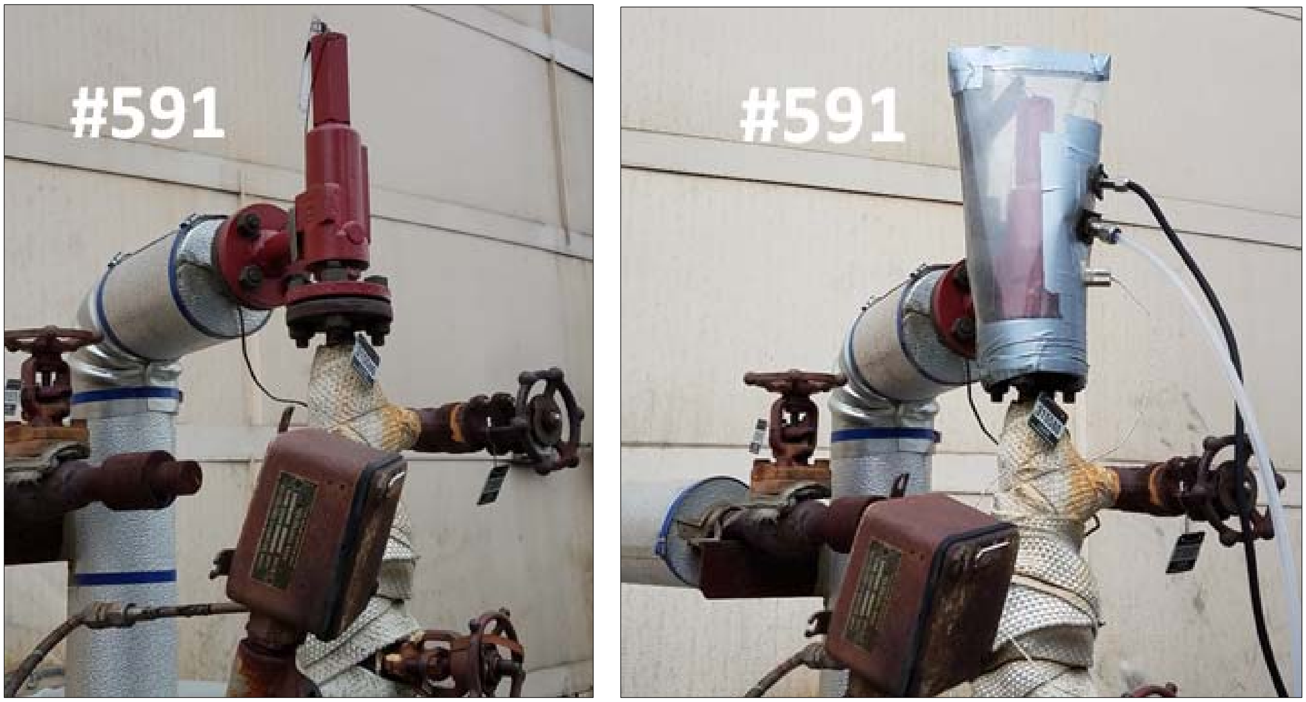

Figure 0.115. Sample E040: a) pre-bag, b) bagged

Figure 0.116. Sample E042: a) pre-bag, b) bagged

Figure 0.117. *Sample E044: a) pre-bag, b) bagged*

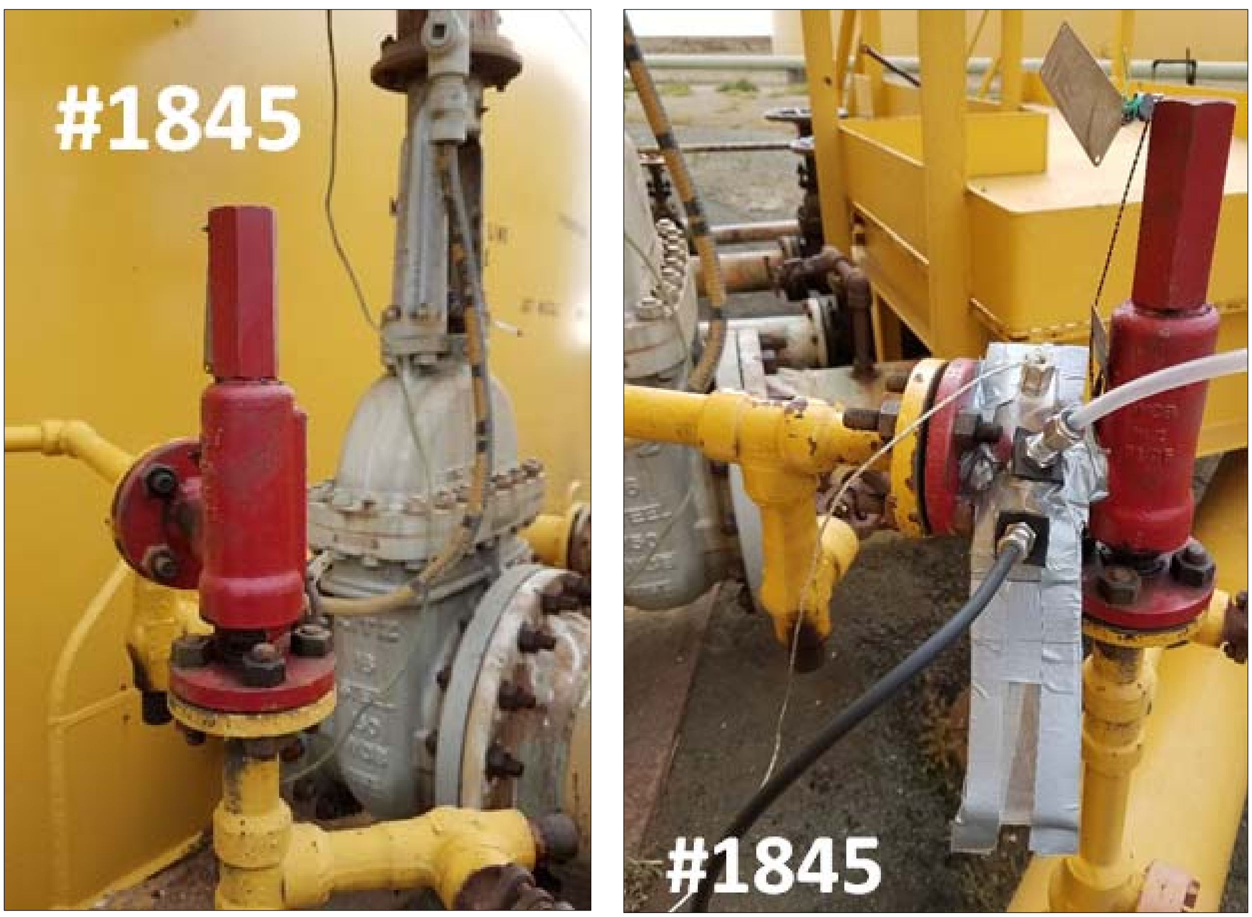

Figure 0.118. *Sample E046: a) pre-bag, b) bagged*

Figure 0.119. *Sample E048: a) pre-bag, b) bagged*

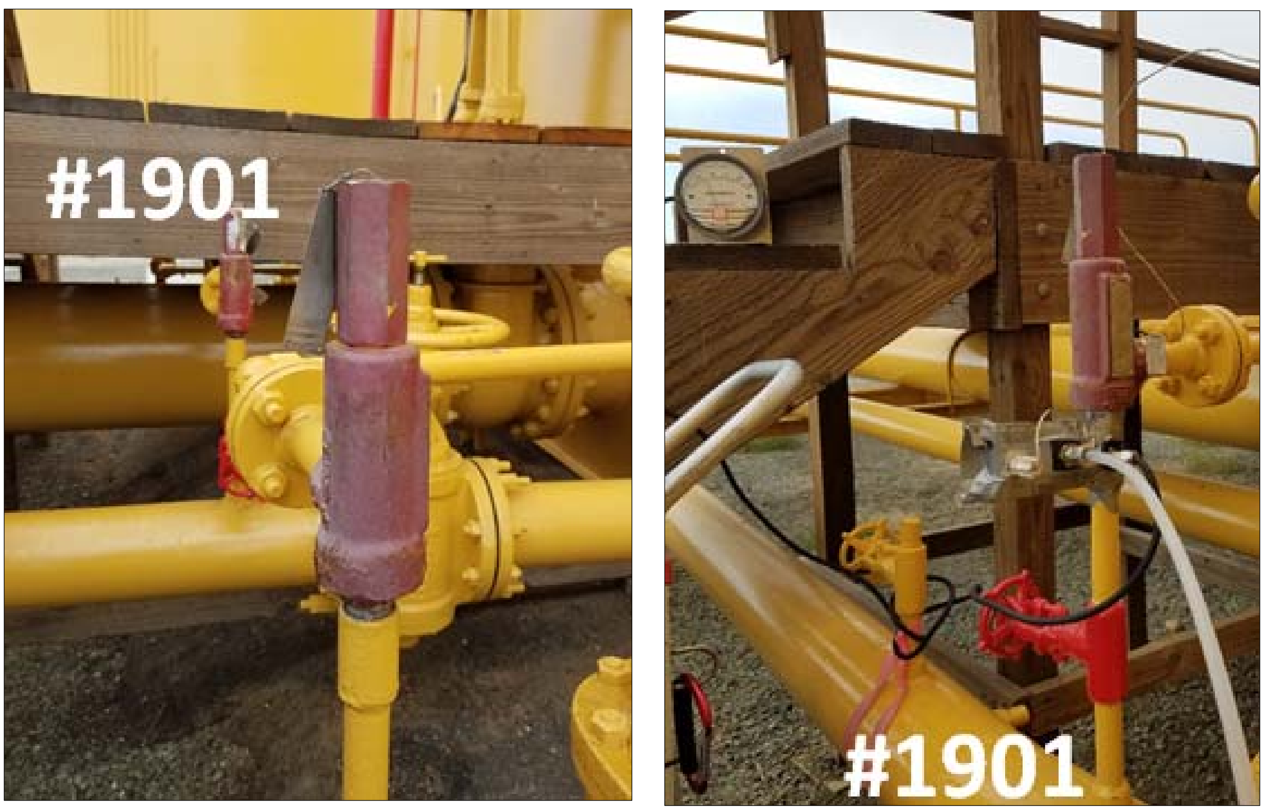

Figure 0.120. *Sample E050: a) pre-bag, b) bagged*

Figure 0.121. Sample E052

Figure 0.122. Sample E054: a) pre-bag, b) bagged

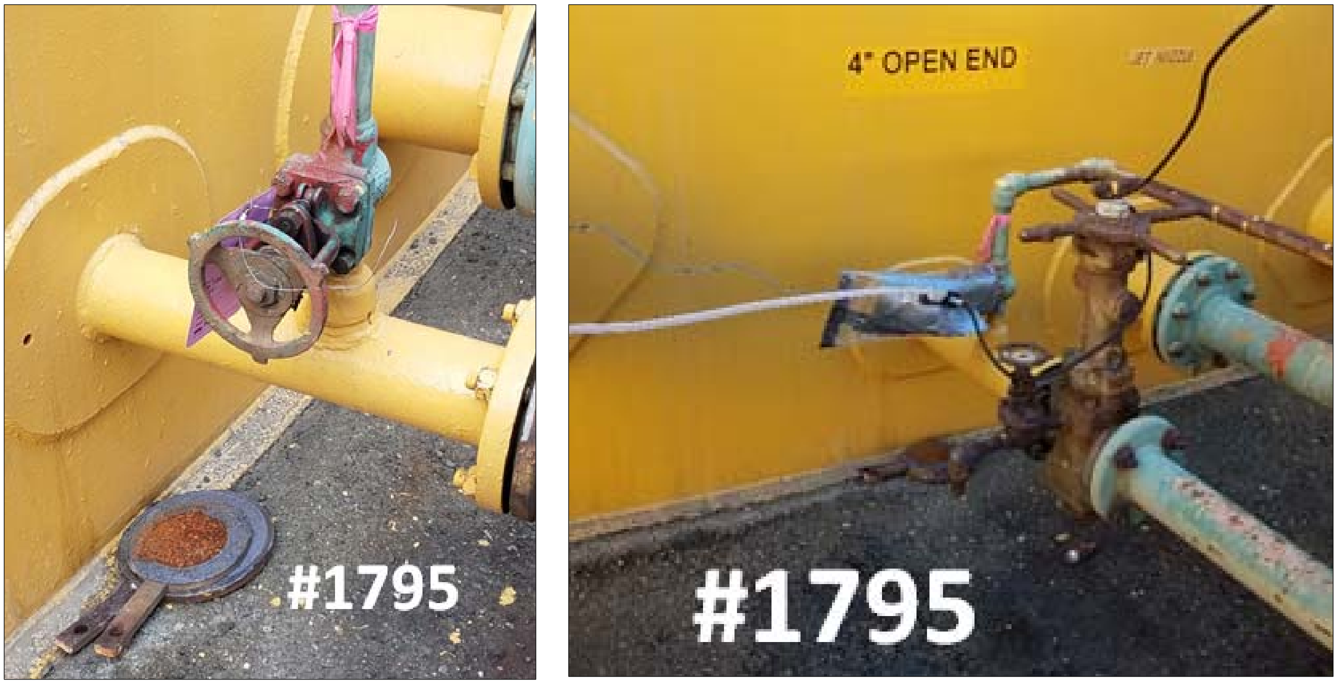

Figure 0.123. *Sample E056: a) pre-bag, b) bagged*

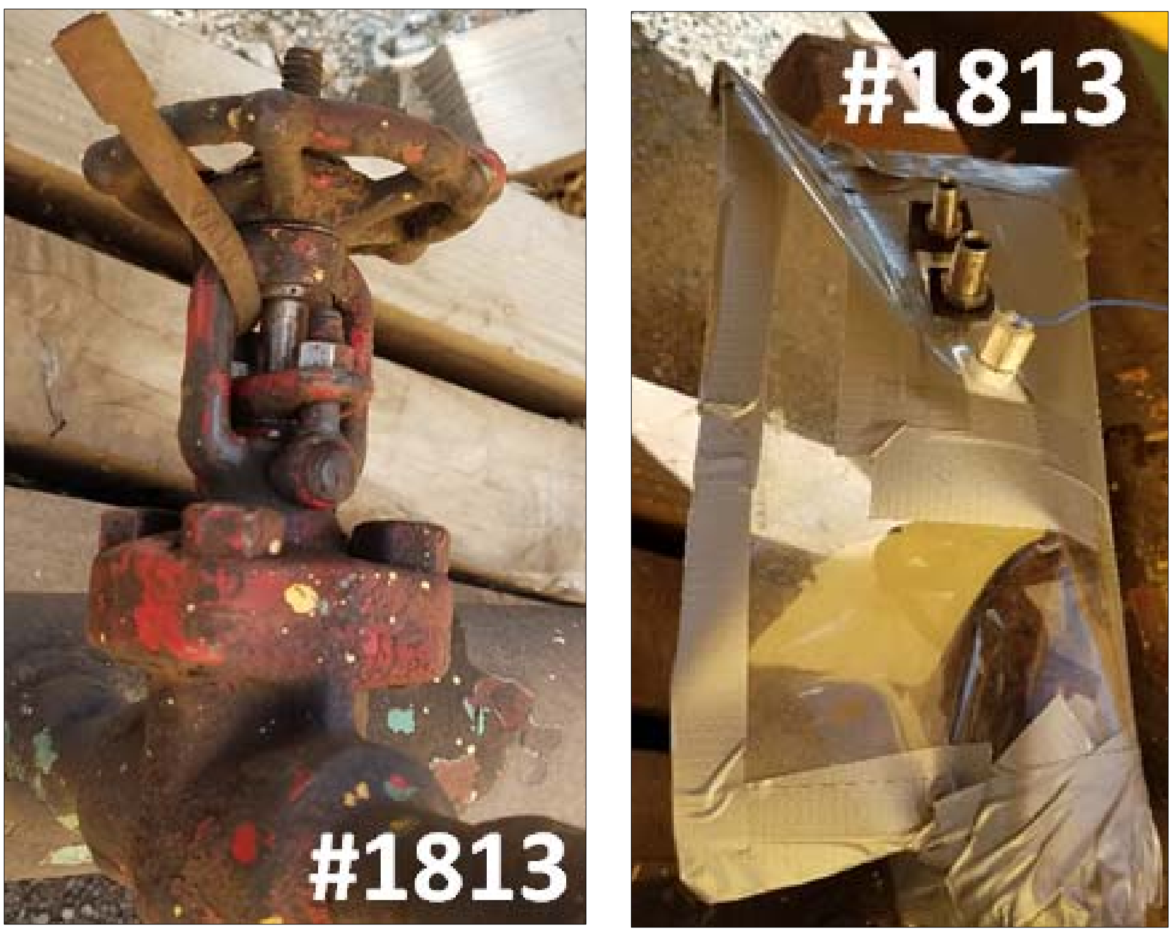

Figure 0.124. *Sample E058: a) pre-bag, b) bagged*

Figure 0.125. Sample E060: a) pre-bag, b) bagged

Figure 0.126. Sample E062

Figure 0.128. *Sample E064: a) pre-bag, b) bagged*

Figure 0.127. *Sample E066: a) pre-bag, b) bagged*

Figure 0.129. *Sample E068: a) pre-bag, b) bagged*

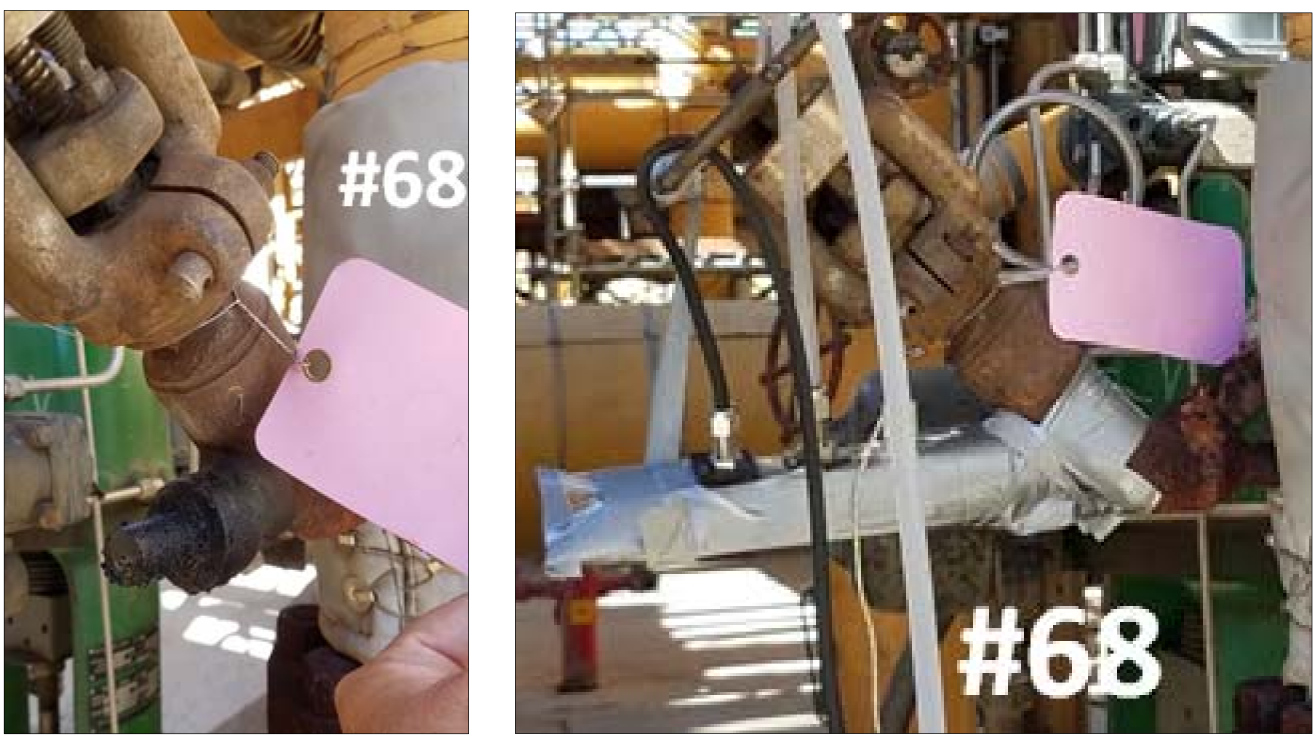

Figure 0.130. *Sample E070: a) pre-bag, b) bagged*

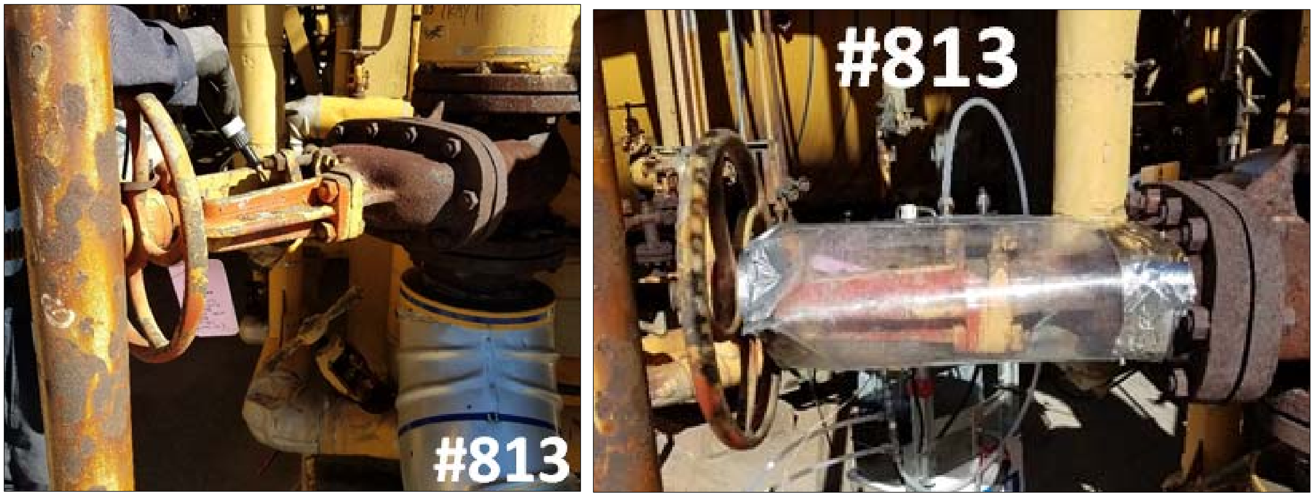

Figure 0.131. *Sample E072: a) pre-bag, b) bagged*

Figure 0.132. *Sample E074: a) top, pre-bag, b) bottom, bagged*

Figure 0.133. Sample E078: a) top, pre-bag, b) bottom, bagged

Figure 0.134. *Sample E080: a) pre-bag, b) bagged*

Figure 0.135. *Sample E082: a) pre-bag, b) bagged*

Figure 0.136. *Sample E085: a) pre-bag, b) bagged*

Figure 0.137. *Sample E087: a) pre-bag, b) bagged*

Figure 0.139. Sample E089

Figure 0.140. Sample E091

Figure 0.138. Sample E093: a) top, pre-bag, b) bottom, bagged

APPENDIX F
Comments and Responses

APPENDIX F-1

Email Transmittal dated December 17, 2021, from Kevin Buchan, Senior Manager of Western States Petroleum Association, Re: WSPA Comments on “Fugitive Emissions from Petroleum Refinery Equipment in Heavy Liquid Service” Draft Report, November 2021

Kevin Buchan
Senior Manager
Bay Area Region Regulatory Affairs

December 17, 2021

Pam Leong
Director, Engineering Division
Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105

sent via email: PLeong@baaqmd.gov

Re: WSPA Comments on "Fugitive Emissions from Petroleum Refinery Equipment in Heavy Liquid Service" Draft Report, November 2021

Dear Ms. Leong,

The Western States Petroleum Association (WSPA) is a non-profit trade association representing twenty-six companies that explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in California, Arizona, Nevada, Oregon, and Washington. Our members in the Bay Area have operations and facilities regulated by the Bay Area Air Quality Management District (BAAQMD or District).

WSPA appreciates the opportunity to review the District's November 2021 draft report, "Fugitive Emissions from Petroleum Refinery Equipment in Heavy Liquid Service" (draft HLS report).

WSPA acknowledges that the draft HLS report's average emission factors appear to be reasonably consistent with the data collected during the study and qualitatively consistent with other studies done since 1980[1]. The factors are much more realistic than the 1980 factors that the District started requiring all of the refineries to use for inventory and fees in 2013 and 2014.

The District has stated that it will have the response to WSPA's comments completed by the end of January 2022. WSPA has asked for a meeting in February 2022 to allow for WSPA and

[1] Specifically, the 1996 API study showed average emission factors that were substantially lower than the factors estimated in 1980, and the statement in the 1999 CAPCOA/CARB statewide guidelines that components in heavy liquid service "not [be] included in component counts used for the quantification of fugitive emissions".

the District to discuss any issues highlighted through the District's response to WSPA's comments. After participating in this five year study, WSPA expects the opportunity to meet with the District and discuss the District's draft response to WSPA's comments.

Within the HLS we have noted several statements that are unclear. We have also identified errors and omissions, numerical calculations and graphs without much explanation of their significance (making it unclear what exactly the District intends to infer from them), and critical information mixed in with minutiae without a clear delineation between them. We also noticed there are many concepts which are repeated throughout the study yet the reason for repeating the information is not clear and does enhance the report readability and/or purpose. And as agreed upon, the data should be blinded.

WSPA has organized many of its primary comments below by subject; additional detailed comments are included in Attachment A to this letter.

A. Context of Emission Factors

Given that the emission factors are very small numbers and the number of components is very large, WSPA recommends that some context be provided. For example, applying the emission factors to the listed equipment counts shows that total emissions from the 368,795 valves, pumps, and connectors in heavy liquid service at the refineries is approximately 36 tons per year (TPY). This is obviously substantially lower than the emissions reduction estimate in the District's staff report that was used to justify promulgation of the 2015 Rule 8-18 amendments.

Specifically, the District estimated in the Staff Report that 1,227 TPY of emissions reductions could be obtained from that same equipment by removing the District's exemption of this equipment from leak detection and repair (LDAR) requirements.[2] The data shows that the District's estimate was clearly incorrect.

B. "Joint Study" Characterization

While we appreciate the acknowledgement that WSPA, its member companies, and their contractors have contributed a great deal of their time and expertise to this study. However, WSPA has raised concerns with transparencies issues during the report development process, such as: not allowing WSPA to communicate directly with the District's field personnel and statistician with regard to technical matters pertinent to the field work and statistical work, being responsive to WSPA's comments, and sharing its reasoning/thoughts regarding the discussion and conclusion sections of the draft HLS report prior to issuing it.

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[2] BAAQMD, "Petroleum Refinery Emissions Reduction Strategy: Staff Report", October 2015.

C. Study Purpose

The purpose of the study is a function of the background. The draft HLS report presents background information in Section I.i, but mischaracterizes the information. For example, the District incorrectly states that District staff used 1980 emission factors *as "required"* by the CAPCOA Guidelines, and incorrectly identifies the Board's adopting resolution direction regarding the HLS as being "to conduct a joint study with affected refineries to measure mass emissions from components in heavy liquid service and re-visit the cost effectiveness determinations made with the revised rule".[3]

The study's actual background is as follows:

- In 2014, at the time of permit renewal, District staff began requiring that emissions from components in heavy liquid service be based on 1980 average emission factors, in spite of the fact that the 1999 CAPCOA Guidelines stated that such components "are not included in component counts used for the quantification of fugitive emissions"[4] and that the District's own guidance did not (and still does not) say to include components in heavy liquid service.[5]

  This unsupported direction from the District substantially increased emissions inventories at several refineries. District staff required refineries to agree to the change and pay the associated increased permit renewal fees or else risk not having their permits renewed.

- In late 2014 and early 2015, there were multiple meetings between WSPA, its member companies, and District staff regarding this issue. WSPA identified concerns that use of the 1980 factors did not reflect good engineering judgment. On March 9, 2015, District staff acknowledged that in the past, different District refinery permit engineers had not interpreted the methodologies consistently, and identified that the District would

[3] The actual wording of the Board's adopting resolution (No. 2015-12, "A Resolution of the Board of Directors of the Bay Area Air Quality Management District Adopting Proposed Amendments to District Regulation 8, Rule 18: Equipment Leaks; and Adopting a CEQA Negative Declaration for the Project," Dec. 15, 2015) was for staff to "examine emission reduction and cost effectiveness issues related to the inclusion in Regulation 8, Rule 18 of requirements for monitoring of components in heavy liquid service, and to report back to the Stationary Source Committee prior to July 2017 regarding the results of the examination together with recommendations for modifying the rule if appropriate based on the results".
[4] CAPCOA/CARB, "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities", February 1999, p. 23.
[5] BAAQMD, Source-Specific Guidance for Petroleum Refinery Fugitive Emissions, Section 3.4 of the Permit Handbook (various revisions, since at least as far back as 2015).

prepare a proposal to conduct actual measurements at Bay Area refineries to resolve the disagreement and submit a draft within two weeks.[6]

- District staff subsequently used the 1980 emission factors to justify proposed revisions to Rule 8-18, making these revisions the most significant portion of staff's Refinery Emissions Reduction Strategy.[7]
- On December 15, 2015, the Board promulgated those rule revisions.
- On December 17, 2015, the District e-mailed WSPA the first draft of the 43-page measurement protocol that had been mentioned in the abovementioned meeting on March 9. Clearly, the origin of this protocol predated the Board's adoption of the rule revisions.

WSPA and its member companies filed suit (over Rule 8-18 and other related rules), and the ensuing settlement agreements with the District refer to this Heavy Liquid Study. Details in the settlement agreements include the following:

- "Parties agree that pending completion of the Heavy Liquid Study and the establishment of new emissions factors based on the results of the Heavy Liquids Study, the interim Heavy Liquids Emissions Factors depicted [below] will be utilized for purposes of complying with and enforcing Rule 12-15, as well as for all other District purposes, including but not limited to, emissions permit fees and rule-making."[8]

  The table of emission factors lists eight component types, and all eight should be identified in the HLS report along with a clear explanation of which are and aren't being covered by the study, given that the HLS is redefining some of the types (e.g., flanges as a subset of connectors), subdividing others (non-process lube oil service vs not), not addressing all of the eight types, and (in the current draft) recommending some but not all of the remaining types for further study. The District also needs to explain what it is proposing to do with regard to emission factors for component types listed in that agreement that are not addressed in the study.

- Following completion of the data collection activities at each refinery, the District was supposed to "meet with the refinery managers and/or other designees of the Petitioners at each refinery participating in the Heavy Liquids Study to discuss the data collection process, any issues encountered, exchange lessons learned and best practices

[6] Notes from this meeting were e-mailed from Guy Bjerke (WSPA) to BAAQMD staff on March 16, 2015.
[7] Staff estimated 1,227 TPY of TOG reductions from the Rule 8-18 amendments, out of 2,224 TPY of TOG reductions from the entire suite of rules (BAAQMD, "Estimated Emissions Reductions and Costs for Rule Changes in Phase One", Table 8 of the Petroleum Refinery Emissions Reduction Strategy: Staff Report, October 2015, p. 13).
[8] Settlement, Enforcement, and Release Agreement for *WSPA, et al. v. Bay Area Air Quality Management District*, case number N16-0963 (regarding Rule 12-15), March 2018, pages 3 and 11.

related to data collection from equipment in heavy liquid service, and work to mutually resolve any issues in order to facilitate completion of the Heavy Liquids Study", and the HLS report was supposed to document that.[9]

Particularly, the draft HLS report does not reflect the issues encountered and lessons learned from that field work. This information should be accurately documented in the next revision of the HLS report. WSPA sees the accurate sharing and written documentation of this information to be a key step towards furthering scientific study and minimizing future misunderstandings of technical issues.

D. Pejorative Statements/Misrepresentations

The draft HLS report contains several unsupported statements that cast aspersions and mention or infer a substantive bias, that are at best misleading and at worst completely false. Accordingly, WSPA requests that these statements either be substantially revised to be accurate or removed from the report altogether. These include the following:

1. The statement on page 46 that industry's request to monitor components in lube oil service at the first refinery "introduced a potentially significant bias into the Study" is completely false.[10]

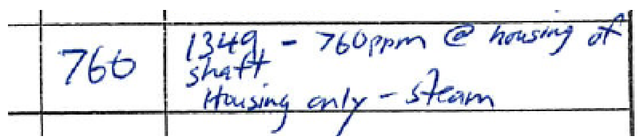
   None of the components that the District wanted to have screened were omitted, and all of the lubricating oil screenings were (a) explicitly identified as such and (b) listed out individually in WSPA's subsequent 2017 "Low Volatility Finished Products Protocol" that was approved by the District. WSPA's consultant has previously reminded the District to exclude these components, but it does not appear that these were entirely excluded from the District's analysis.[11] We realize that given the relatively small number of points, the average emission factors will not be significantly affected by revising the analysis to exclude them. However, if the District is now asserting

[9] Enforcement Agreement and Agreement to Stay Litigation for *Valero, et al. v. Bay Area Air Quality Management District*, case number N16-0095 (regarding amendments to Rules 6-5, 8-18, and 11-10), March 2017, p. 4.
[10] It was recognized in early 2016 that lubricating oils are less volatile than most other substances, but had not been exempted from the District's 8-18 revisions or subsequent 8-18 implementation plans. Prior to and during the beginning of the study, WSPA had repeatedly sought clarification from the District as to whether components in lube oil service were going to be excluded from the emissions inventory, and the District was nonresponsive. As the study was progressing throughout the first refinery, WSPA's concern was that the District was going to presume that the work it was doing on process units—often at higher temperatures and containing more volatile streams than lubricating oils—was applicable to lubricating oils as well, and that the District was going to complete work at the first refinery without actually screening any components in lube oil service.
[11] Appendix B-1 does not identify which screening values were excluded, but the latest data spreadsheet that WSPA received from the District in September 2021—which does show exclusions—did not appear to have excluded all of the components listed in the "Low Volatility Finished Products Protocol".

"potentially significant bias" as a result of these points, all they need to do is exclude them completely and redo the analysis, which would then eliminate that concern.

2. On page 99 and several other places in the report, there is mention of the steam-quenched pump screened at 760 ppm from "a foot or more" or "over a foot" away that is alternately described as "dripping" (p. 99), leaking a "steady stream" (e.g., p. 221, 228, 234), and sometimes "spewing" (p. 103, 179) "liquid hydrocarbons" that were "pooling at the base of the pump".

   This is not consistent with what personnel who were on-site recall, nor is it reflected in the District's actual field notes that were shared with WSPA at the time, which state only that 760 ppm was measured[12] "@ housing of shaft" and that there was "steam" (which often drips and forms pools):



760	1349 - 760ppm @ housing of shaft Housing only - steam

   A leak/pool of liquid *hydrocarbons* also seems unlikely for several reasons: i.e., if there was truly a liquid hydrocarbon leak of this magnitude, (a) District field personnel should have attempted to capture some of it, estimate the liquid leak rate (which would have been easy if it were that large a leak), and had the sample analyzed; and (b) this would have presented a safety concern that the refinery would have wanted to address. These unsubstantiated characterizations should be deleted from the report.

3. Pages 46 and 146 refers to 39 times in which the contractor had to make holes in the bag, and identifies that "In these cases, either ambient air was pulled into the tent and through the sampling media or component leakage was emitted out of the tent". Page 223 of the draft HLS report refers to those same 39 cases and states that "If ambient air was drawn into the enclosure, it may have introduced a bias to the sample."

   EPA's vacuum method is <u>supposed</u> to draw ambient air into the enclosure, regardless of whether a hole is cut or not, because a vacuum pump is being used.[13] Usually, the bags are not airtight; however, if they are (or are close to it), the vacuum pump could collapse the bag onto the component. Testers alleviate this by cutting a small hole, as specified in EPA's method.

[12] Refinery personnel's check of the reading with their own TVA was recorded minutes later as 258 ppm, but did not identify the exact monitor location.

[13] As WSPA pointed out as far back as 2016, there is potential <u>high</u> bias associated with using the EPA vacuum method <u>in general</u>, when contaminated air is drawn in, but that bias is independent of whether holes needed to be cut.

4. The first of the four “issues uncovered” in the Executive Summary (p. ES-4) and Conclusions (p. 243) is that “Study design may have impacted results (there is a greater probability of missing larger leakers)”. This statement requires more explanation, including but not limited to specifying what this is relative to; i.e., there is a greater probability of missing large leakers with this study than with….what? It appears to be referring to a statement on page 230 (which in turn refers to Appendix D-1) that “there is a high probability that the Study did not capture large connector or valve leaks (i.e., the distribution of screening values for the screened connectors and valves does not reflect the actual distribution).

   This may be attributed to the selection process for connectors and valves.” However, WSPA did not find this discussion in Appendix D-1, it is not clear what “actual distribution” is being referred to, and it is not explained why such a discrepancy would be attributed to the selection process (as opposed to simply a very small number of high leakers), all of which needs to be corrected.

5. The second of the four “issues uncovered” in the Executive Summary (p. ES-4) and Conclusions (p. 243) is that “Screening of heavy liquid streams causes screening instruments to drift low (measured screening values are lower than actual).” There is no mention of the fact that the District analyzed the extent of that drift and showed that it had a very minor impact (pp. 199-208), and therefore was not corrected for (p. 222).

   If the District thinks that this is such a significant issue, it should correct for the bias; if not, this should either be removed as a “key issue uncovered” or the District should either reference the magnitude of the impact where this is mentioned in the Executive Summary and Conclusions – e.g., “ Screening of heavy liquid streams causes screening instruments to drift low (measured screening values are lower than actual), but the degree of drift was predominantly within pre-established criteria and was not considered to be significant enough to warrant quantitative drift correction”.

6. The third of the four “issues uncovered” in the Executive Summary and Conclusions is that “Screening pace was faster at Refineries B, C, D, and E, which may have impacted measured screening values (and resulting estimated emissions).” Again, this sounds speculative, and necessitates more explanation.

   Screening values can be impacted by screening pace, but emissions (measured by bagging) are not. Pace at the beginning of the Refinery A screening survey was slower than during the screening that was subsequently done immediately prior to bagging, which means that the emissions analysis biases emissions from the initial Refinery A components high (as opposed to biasing emissions from the other components low).

7. The Executive Summary identifies a “safety stand down” as the reason why the District stopped using its own screening inspectors and using the refineries’ instead, which is discussed further with several unsubstantiated statements on page 60 that are not germane to the study. WSPA requests that such statements be removed.

8. This statement on page 100 reads as though the District is biasing the results low, and does not appear to be accurate: “Although screening instruments had the capability of and did show concentrations greater than 10,000 ppmv, because instruments were not calibrated with a standard gas above 10,000 ppmv, the maximum screening value shown in results is 10,000 ppmv.”

   In fact, it appears that all of the actual screening values that exceeded 10,000 ppmv values are shown in Appendix B (none were truncated to 10,000 ppmv), and several tables also show a column for “> 10,000” ppmv.

9. On page 233 there is a statement that “the minimum bag vacuum requirement (0.001 inches H_2O) was met by all samples. However, a pressure gauge with a resolution of 0.005 inches H_2O was used in sampling. It is not clear how lower measurements were identified.”

   This statement infers that the District may not understand this process. It is important to understand that the gauge was an analog gauge with tic marks every 0.005 inches of water column (which is not the same as “resolution”); when the gauge needle is in between tic marks, the tester visually interpolates, as is typical for analog gauges.[14]

E. <u>Screening Methodology/Observations</u>

As recognized by the draft HLS report, screening value measurements can depend on a number of methodological factors, which include but are not limited to the speed at which the screening monitor is moved, the length of time it is held in one spot, and the proximity of the probe tip to the source. These factors, along with the requisite frequency of calibrations and drift checks, also significantly impact the cost of monitoring that the District is going to be evaluating.

The District’s initial screening was problematic, with very slow movement and hold times, multiple monitor breakdowns (list prices for new monitors can be in the neighborhood of $10K-

[14] We would agree that these are not *precise* readings; however, our understanding of field practice for this method has been that they strictly look for a sustained movement in the needle off of zero. Accordingly, we did not find mention of this “minimum bag vacuum requirement” in either the EPA method or the original version of the BAAQMD Protocol; and it was added – based on the values that had been recorded at the first refinery – to a revised version of the Protocol in 2017.

$20K),[15] monitors sometimes taking hours to return to background levels after monitoring (not just the much shorter times shown in Table II-12 of the draft HLS report), and some very large discrepancies between readings taken by different people monitoring the same component. The District subsequently modified its methodology over the course of the study[16] to at least partially mitigate those problems – including changes in monitoring speeds and automatically swapping out monitors if elevated concentrations were found (another added cost)—but these changes and their timing are not divulged (and in some cases are inaccurately stated) in the draft HLS report.[17] The HLS report needs to divulge the details of these issues, both for purposes of cost implications and improving future studies.

The draft HLS report also omits mention of a key concept associated with the screening methodology that explains several of the findings in this study and therefore is important to include in the revised report, both for purposes of analyzing the results of this study and planning future ones. While the report recognizes the problems associated with steam condensing in the monitors (for steam-quenched pump seals), it fails to point out the much more widespread issue that heavy hydrocarbon liquids at high temperatures are prone to condensing in screening monitors and their probes.[18]

This is the reason for the slow response times and "clear times" noted on pages 49-50, 67-71, 99, and 220, and may also contribute to the apparent "drift" issues mentioned on pages 68-69 and 222 (which can result from calibration gas getting adsorbed by heavy liquids that are adsorbed on the probe wall and/or recalibrating instruments with zero gas when they still have some residual adsorbed hydrocarbon, rather than true "drift"). This deposition is also why monitors needed to be swapped out after readings higher than specified values (something that should be mentioned in the draft HLS report): i.e., people sometimes had to flush the monitor for hours to clear out the deposited material. On the other hand, if there is insufficient cooling in the probe, hot material can reach the detector and damage the monitor, which only has an

[15] See, for example, https://www.ierents.com/category-s/480.htm and https://www.cbrnetechindex.com/Print/6196/thermo-fisher-scientific-inc/tva-2020-toxic-vapor-analyzer.

[16] The protocol used at the beginning of the study was dated November 2016; revised versions were dated February 9, 2017, April 28, 2017, July 21, 2017, and November 15, 2017. Additional details were provided at the beginning of 2018 in the form of request for bids for 3rd party contractors and in-person training February 26, 2018, but less formal communications made over the course of the study, including but not limited to several decisions made at the beginning of the study (in 2016) and e-mails from Linda Duca on March 8, 2018 and March 16, 2018.

[17] There is recognition on p. 199 that "The number of unique screening instruments used at each refinery varied from seven to twelve instruments" (for two screening teams), but the text does not explain why so many instruments were needed.

[18] See, for example, US EPA, "Inspection Manual: Federal Equipment Leak Regulations for the Chemical Manufacturing Industry, Volume I: Inspection Manual", EPA/305/B-98/011, December 1998, p. 4-8.

operating range of -10 to 45 °C (14-113 °F).[19] These problems were exacerbated by the study's specification to always hold the monitor's probe tip closer to components than required by Method 21 (exposing it to the hottest temperatures) and hold it in place for an extended period of time, and that should be recognized in the report.

This does not impact the accuracy of the ultimate mass emissions results, given that the screening values are just indicators; i.e., the factors that influenced the screening survey values also influenced the screening values that were taken immediately prior to bagging, so factors that influence the screening values "cancel out" as long as the survey screening methodology was reasonably consistent with the pre-bagging screening methodology. And the fact that there is a correlation between the measured emissions rates and the screening values immediately prior to bagging also validates the concept of estimating emissions using screening values (even if the screening values are influenced by a number of variables).

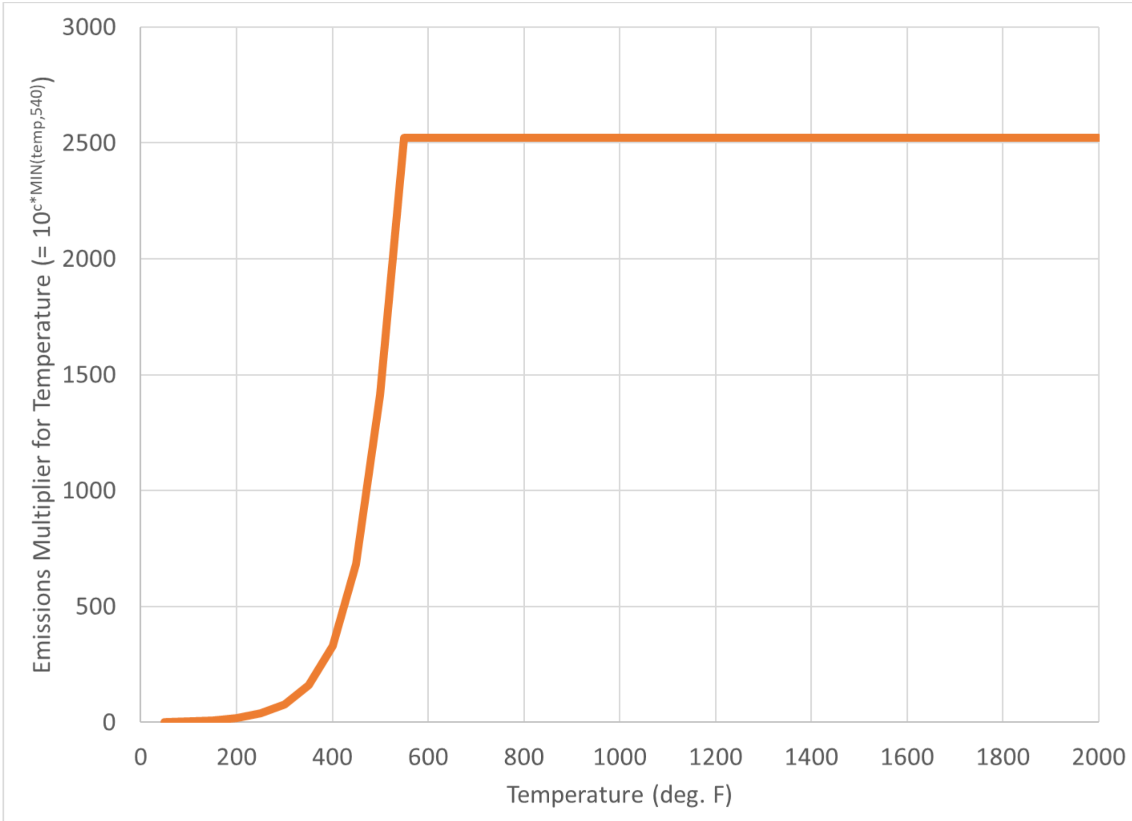
F. Analytical Approach

Correlation equations are needed to estimate the mass emissions rates that correspond to each of the measured screening values which are then combined to determine average emissions rates. The need for correlation equations was mentioned extensively by the District between 2016-2020, and while the abstract to the draft HLS report refers to correlation equations, those equations are not identified in the report.

As shown previously by EPA, WSPA, and CARB, the first step towards developing correlation equations is to do linear regression in log-log space, which the District did. The District added an additional term for temperature because there was a statistically significant dependence and including that term reduced residuals. WSPA understands why this was a first step, but repeatedly asked the District to reconsider or refine that inclusion. There are several reasons that WSPA is still asking for the inclusion of correlation equations:

- While the portion of the equation that includes temperature is a simple line in log-log space, when the equation for emissions (as opposed to the log of emissions) is written, temperature is an exponent, and that form of the emissions equation shows an unrealistic dependence on temperature that is not sufficiently supported by the data or scientific principles. As WSPA has stated previously to the District, and shown below for the temperature exponent c = 0.0063 shown in Table III-61: i.e., for a given screening value that occurs at different temperatures, the District's equation identifies that the emissions are proportional to the factor on the y-axis.

[19] Thermo Fisher Scientific, "TVA2020 Instruction Manual, Toxic Vapor Analyzer, Part Number 11755-00, 15Dec2014".



- The component temperature data themselves are not very high quality. There was no guidance regarding the specifics of temperature monitoring in the protocols provided to the screeners, baggers, and 3rd party observers,[20] and the District appears to have filled in missing component temperature data by simply setting them equal to "operating temperature" data (even though there is considerable scatter in the correlation between those temperatures, and Figure III.i.2.6 of Appendix D.1 illustrates a difference between "operating temperature" and component temperature).

- The addition of the temperature dependence adds complexity and makes the equation less useful for purposes outside of this study (i.e., it could only be used to calculate mass emissions if screeners also had the time to collect temperature data).

[20] These details include the fact that (1) the laser "spot" is a guide but not necessarily right where the temperature is being read from, (2) readings depend on what kind of metallic (or insulating) material the temperature gun is pointed at (and its thickness), (3) it matters whether the temperature gun is pointed at the surface where a leak is (i.e., the part that would be exposed to the ambient air), some component upstream, etc. Page 50 of the draft HLS report mentions pointing the temperature gun "at the innermost point of [a] flange" (as shown in Figure II.3), but this was not in the protocols and appears to be impossible to follow, given that the actual in-use flanges are bolted together, and the point shown in the figure would not be accessible (i.e., it would be obscured both by the flange lip and the gasket).

- The temperature correlations appear weak (as shown in Figure III.i.2.6 of Appendix D.1 below) – in particular, too weak to support the current form of the equation over other forms for temperature that might make more sense (e.g., ones where the effect of temperature changes with screening value) – and it does not appear that they appreciably improve the results.

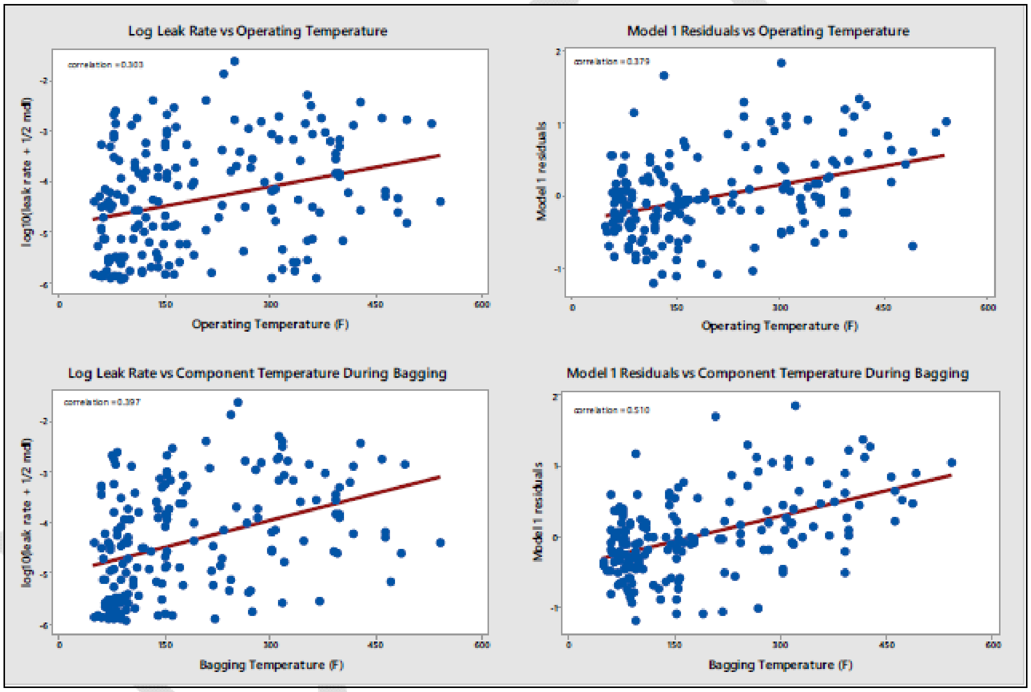


Figure III.i.2.6. Temperature Compared with Measured Leak Rates and Model 1 Residuals

The second step towards developing correlation equations – in previous studies by EPA, WSPA, and CARB – was then to adjust the linear regression lines for the scale transformation The District opted to not adjust for scale transformation explicitly—in part because of a claim that a certain distribution was necessary, and use a bootstrapping approach instead. WSPA finds the writeup in Appendix D.1 confusing and the draft HLS does not clearly identify,

- Which of the eight scenarios shown in Tables IV-4 and IV-5 was eventually used to determine average emissions (page D-1-27 identifies which ones had "the highest adjusted R2 and lowest sigma", but does not specify that these were the scenarios used, and none of the parameters match those shown in Table III-62 on page 177); or

- Any quantitative intermediate calculations/sample calculations showing how the District arrived at the emission factors using the regression equations.

Because there are several calculations being made, a key check that was explicitly discussed and agreed to by the District in 2018, was to make sure than when each correlation equation was applied to the corresponding screening values measured prior to bagging, it agreed reasonably well with the actual measured emissions rates for those bags. (It could also be compared to other studies' correlation equations.) Although the District appears to have predicted emissions rates for each component, the draft HLS report appears to be missing this validation check.[21] We ask the District to provide in the HLS report the correlation equations used to estimate the mass emissions rates from screening values, provide the estimated mass emissions rates, and do the validation check.

Another key aspect of the study was that components in gas-phase service were supposed to excluded. The whole purpose of that agreement was technical in nature, pointing out that a vapor leak is very different from a liquid leak and can potentially have a nearly unlimited flowrate whereas a nondripping leak from a component in liquid service is limited by the rate at which the liquid volatizes.

Accordingly, the understanding was that the District would exclude components in vapor service from the analysis of components in heavy liquid service if the refineries agreed to classify these as components in "vapor" service (and included in their existing LDAR programs), and that is reflected in the draft HLS report text. However, it is not clear that the District has actually excluded those points from the analysis: i.e., both the data table in Appendix B-1 and several of the data summaries appear to include these components—two of which had screening values of over 10,000 ppm and two of which had screening values of 2,263 ppm and 1,749 ppm[22]--while others (such as Table III-64) seem to have excluded them.

Please provide the table of mass emissions rates that were calculated for the screening values in the valve/connector category that were used to calculate the average emission factor for valves.

G. Summarized Conclusions

WSPA appreciates the fact that the District did generate average emission factors for connectors, valves, and pump seals (excluding steam-quenched pump seals) in heavy liquid service (except non-process lubricating oil service) that appear to be reasonably consistent with the data. However, given how low the emissions are, we do question the conclusion that there

[21] We recognize that there is a comparison of the applying the regression equation to the screening values; however, as expected, this results in a predicted value that is biased low, and the regression equation alone does not incorporate the bootstrapping.
[22] The District was provided with a list of components in vapor service that had been screened (and in some cases bagged), and these included D-178, -192, -491, -499, -796, -802, -806, -808, -810, -864, -868 and -915. (D-499, which is one of the over-10,000 ppm components, is also misclassified as a "valve" when in fact it was a pilot-operated PRV.)

is a “need” to develop methodologies for estimating relatively small numbers of these components.

Most of the other listings of “Results”, “Issues Uncovered”, and “Recommendations” seem like odd choices for section headers, several of which are not described by the headers they are under. WSPA would be interested in the “improvements…in…screening, and sampling techniques”, but the “improvements” listed in Section IV.viii are not supported and do not reflect the lessons that should have been learned with regard to those techniques (see “Methodology” comments above). Several of the recommendations in that section appear to focus on things that provide more data and reduce some aspect of variability (such as screening distance or response time) without having acknowledged the overarching lessons from this study, such as:

- Clear and unambiguous communications and decision-making are imperative for complex studies involving multiple parties.
- Definitions are important to identify clearly and unambiguously in advance; confusion on this point can get compounded. We have had numerous discussions regarding how to categorize bonnet flanges on valves, what kinds of equipment counts as a PRD for purposes of air emissions, what counts as being “heavy liquid” versus “vapor” service, whether to record one screening value per pump assembly (including connectors), per pump (highest value taken for all seals), or per pump seal, etc., what counts as a “steam-quenched” pump, and what the “non-process lube oil” category that the District exempted from the study explicitly includes.

  Page 85 also notes that “Because of the number and diversity of component subtypes, a standardized listing of subtypes was not identified or provided to field personnel and subtype categorizations were left to the field personnel completing the standardized field data sheets.” Lack of consistency in definitions results in lack of consistency in data and analysis. Clear definitions for component types should have been included in the District protocol. And if subtypes are too diverse/numerous/specialized to be consistently categorized, that begs the question of (1) the validity of any analysis based on recorded subtype information and (2) why that information was even recorded.

Given that the instruments are not designed for heavy liquids at high temperatures, and because of the deposition problem mentioned in our comments above and the variability in the liquids being monitored, it is not feasible to develop uniform “instrument response times to various materials at different temperatures before study” to “provide to screening personnel for use in screening” as identified in the draft HLS report. Response times will depend on a wide array of variables, including not just material type (which will vary), but also concentration, how long the equipment probe is held at that concentration, etc. This will make it infeasible to simply have an easy "look up table" of precise response times. Instead, it should be recognized that handheld monitors are screening tools, that can be used to distinguish between leaks of different orders of magnitude, but for which there are no "true" values (e.g., to the extent they depend on wind speed at the location of the component) and for which the consistency in readings is going to be limited for a number of reasons beyond the things that can reasonably be controlled.

We have provided additional detailed comments in Attachment A and welcome follow up discussions on our comments with your staff. Thank you for the opportunity to comment on this important matter.

Sincerely,

Kevin Buchan

Enclosure: Attachment A, Additional Detailed Comments

ATTACHMENT A. ADDITIONAL DETAILED COMMENTS

1. Abstract page ii. The objective identified in the abstract (p. ii), on page 1, and on page 5 are all worded slightly differently, with the first two mentioning an objective to "understand" emissions and the last more specifically stating that the primary objective is to answer the question, "What are the average emission rates for the Bay Area refinery components in heavy liquid service?" The first two explain the recommendations of "improvements…for future studies" including things such as vibration monitoring. However, the Board directive focuses upon specific objectives, and does not mention a need to try to "understand" component fugitives. The statements of objective should be made consistent, and should reflect applicable language in the Board direction and agreements between the District and WSPA as mentioned in our comment letter.

2. Abstract pg ii identifies that "measurements were used to develop correlation equations using linear regression analysis", but as mentioned in our letter, the correlation equations are not identified in the report. If equation [III-2] on page 176 is the correlation equation and the parameters that are in Table III-61 are the parameters for that correlation equation, then they should be identified as such; and if they aren't, the correlation equations need to be shown.

3. The abstract (p. ii) identifies that "the emissions averages resulting from this study are lower than commonly used emission factors developed by the United States Environmental Protection Agency for components in heavy liquid service", with the implication that this was the latest word on the subject. It should also mention the more recent and relevant fact that (1) the 1999 CAPCOA/CARB "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities" (cited by the District's own Permit Handbook) identified that components in heavy liquid service "not [be] included in component counts used for the quantification of fugitive emissions", and that accordingly the District's Permit Handbook doesn't list average emission factors for components in heavy liquid service.

4. (Pg xiii) The Glossary should include a definition of "in Heavy Liquid Service" (separate from just "Heavy Liquid") to document that this means the component is in contact with the heavy liquid itself, not the vapor coming off of it.

5. (Page xiv) The Glossary definition of "Pressure Relief Valve" has two pictures and the bottom one appears to be incorrectly pointing to a bonnet flange as a connector. The report appears to goes back and forth between the terms PRV and PRD interchangeably – it should be consistent as much as possible, and generically use the more generic term (PRD) to avoid missing any PRDs that are not PRVs.

6. The Glossary should include a definition of "steam-quenched pump" to avoid confusion. Given that the District was unwilling to base this on observation, we had previously mentioned API Schedules 61 and 62. However, if the District is interested in defining the status pump seals, there are some cases in which there are pumps with two seals where one of the seals appears to be steam-quenched and one does not.

7. Page ES-1 of the Executive Summary states that "The Board's adopting resolution directed Air District staff to conduct a joint study with affected refineries to measure mass emissions from components in heavy liquid service", and there is a similar statement on page 4. The adopting resolution does not state that; it only states that "the Board of Directors directs staff to examine emission reduction and cost effectiveness issues related to the inclusion in Regulation 8, Rule 18 of requirements for monitoring of components in heavy liquid service, and to report back to the Stationary Source Committee prior to July 2017 regarding the results of the examination together with recommendations for modifying the rule if appropriate based on the results."[23]

8. The Executive Summary (p. ES-2) shows Table ES-1, "Estimated Population by Component Type".

    a. This appears to be the population that was in Heavy Liquid Service and should be labeled as such.

    b. This also appears to be the population estimate from 2015. Given the amount of detailed information that the District has received in each refinery's 2016-2020 Rule 12-15 submittals, a more recent estimate should be provided.

    c. Given the confusion that has been previously discussed it is not clear if the "pump" count is the number of pumps, or the number of pump seals.

    d. For consistency with the rest of the Report, the pressure relief device (PRD) count should exclude the count of PRDs that are in vapor service (where the vapor is coming off heavy liquids). Information in the report indicates that 30 PRDs were screened and it is not clear if that number reflects PRDs that are actually in heavy liquid service.

9. The Executive Summary (p. ES-3) mentions that "Process units were first selected using process flow diagrams provided by each petroleum refinery. After selecting process units, individual process lines were identified from petroleum refinery-provided piping and instrumentation diagrams." It should clarify that the District selected both the process units and the process lines.

[23] BAAQMD Resolution No. 2015-12, "A Resolution of the Board of Directors of the Bay Area Air Quality Management District Adopting Proposed Amendments to District Regulation 8, Rule 18: Equipment Leaks; and Adopting a CEQA Negative Declaration for the Project," Dec. 15, 2015, p.4.

10. On page ES-5 (and page 244), the section titled "Recommendations" states that "There were several component types for which average emission rates could not be derived either because there were insufficient numbers, their emissions could not be evaluated, or they are recommended for inclusion in a future study" – pressure relief valves that relieve to atmosphere, pump seals with steam or hot oil quenching systems, and components handling non-process lube oil. It should be clarified which ones are which: e.g., that the PRVs had insufficient numbers, the steam-quenched pumps could not be evaluated, and the lube oils were recommended for inclusion in a future study. For steam-quenched pumps, it should be acknowledged that WSPA did propose to get the best information possible with available monitoring equipment; however, the District identified that they did not agree with this, and also declined to specify what they would recommend.

11. With regard to the "future study" of components handling "non-process lube oil", the Report should recognize that WSPA developed the protocol, the District approved it, and the emissions data were provided to and quality-assured by the District in 2019. In addition, definitions continue to be important: "non-process lube oil" is shorthand for "low-volatility finished products", which were explicitly defined as

    > "finished products having an initial boiling point greater than 302° F that are being used for their intended purpose including, but not limited to, hydraulic fluids, glycol in transmitter loops, seal fluid, MEA, DEA, and lubrication oil used to lubricate, including but not limited to pumps, compressors and other rotating equipment"

    or

    > "finished lubricants and base oils that require no further processing, other than blending, to produce finished lubricant products, and are at an operating temperature of less than 200° F".

    To prevent confusion, this explicit definition should be included in the HLS Report (i.e., the Glossary).

12. Pages 7-13: This historical information prior to 1980 seems too outdated to be relevant to this study and is not referenced anywhere else in the Report and should be deleted.

13. The background information in Section I.i identifies the District's assertions that (1) with regard to CAPCOA's 1999 exclusion list—i.e., CAPCOA's language was that "the following components are not included in the components counts used for the quantification of

fugitive emissions"[24]—the exclusion only pertained to *regulatory inspection programs*, and that (2) "By default, those components would be required to use [the 1980] average emission factors" (p. 5). The District's assertions here are,

- contrary to the abovementioned language used in the CAPCOA document (as well as the language at the beginning of that section, which states that "In order to accurately calculate fugitive emissions from leaking equipment using the new correlations **and emission factors**, it is essential that users identify and count components in the same way. This section defines and illustrates how components are to be counted for use with the new **emission factors**." [emphasis added];
- not supported by any language in the CAPCOA document; and
- not supported by any language in the relevant section of BAAQMD's own Permit Handbook that cites the CAPCOA document ("Petroleum Refinery Fugitive Emissions/Emission Calculations").[25]

In addition, if the District's asserted interpretation were accurate, that would imply that the District would be required to use the 1980 average emission factors for the other 12 types of components in the CAPCOA exclusion list as well, which it does not.

14. Section I.i mentions the 1996 study on emissions from components in Heavy Liquid Service but fails to divulge any of the conclusions from that study. It should divulge the emission factors from that study, or at least the fact that the emission factors that were well below the 1980 emission factors.

15. Section I.iii identifies the previous studies, and there are subsequent comparisons with the 1980 study with regard to average emission factors, but there does not seem to be a comparison with regard to all the evaluations the 1980 study made with regard to the effect of temperature, pressure, diameter, etc. It would be particularly useful to both (a) make those comparisons and (b) summarize that information, so that future studies might not have to re-look at "everything under the sun" as potentially impacting the results.

16. On page 31, Table II-2, the ownership history of the refineries, has no relevance to the Study and should be removed.

17. On page 46 and elsewhere, refinery A is referred to as the "pilot refinery", and there are inferences that procedures were the same throughout the testing of that refinery. In fact, the procedures were changed very early on at that refinery, such that at the end of the testing they were much more similar to those at refineries B-E than at the very

[24] CAPCOA/CARB, "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities", February 1999, p. 23.
[25] BAAQMD Engineering Division, "Permit Handbook" (various revisions), Section 3.4.

beginning. At the time, there was no indication that this refinery was going to be a "pilot", nor are the data being treated any differently (i.e., the District's analysis of average emission factors lumps all the data together), so please remove this term. "First refinery" would be adequate.

18. Section II.i.6 should include the information in the March 8, 2018 and March 16, 2018 e-mails from staff (i.e., Linda Duca/BAAQMD), which were helpful to field personnel and provided useful clarifications. It should also clarify that sampling was called off when it was raining. WSPA can provide copies of these emails if the District does not have them.

19. Section II.ii. is titled "Sampling Methodology" but describes both screening and sampling and should be titled accordingly.

20. Page 50 shows an IR temperature gun being aimed inside a flange between the gasket and the flange face. There are several issues with this:

    a. This specific direction of where to aim the gun on a flange was not specified in the protocols that were in place at the time that the District inspectors did their work, or in the 2018 protocol that was in place at the time that the refineries/contractors did their work, nor did WSPA observe it in the field

    b. It is unclear how a person would be able to point the laser at such a spot, given that the flange ends are bolted together tightly over the flange (see, for example, Figure II.1 on p. 34).

    c. It should be recognized that the laser spot is an approximation of where the temperature is being measured from; it is not exact (i.e., the temperature is not being read from the exact spot where the beam hits).

21. The precise changes in screening time that were made are not documented in the draft HLS report and need to be.[26] Other changes that were made in the study over time included changing the leak threshold of 2.5 ppm (identified on p. 51) and swapping out monitors whenever a concentration over a specified value was detected.

22. On page 68, a key monitor specification that is not identified is operating temperature range. This should be identified; the TVA has an operating range of -10 to 45 °C (14-113 °F).[27]

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[26] Page 50 has a statement that "screening personnel were informed that monitoring pace may be dictated by the specific streams being monitored and their operating conditions", but it is still not clear how exactly the personnel used information about the streams and operating conditions to adjust monitoring pace.

[27] Thermo Fisher Scientific, "TVA2020 Instruction Manual, Toxic Vapor Analyzer, Part Number 11755-00, 15Dec2014".

23. In several parts of the Report it is mentioned that "Method 18" was used—including for the evacuated canisters, for which it does not apply—and US EPA Method 18 is included in an appendix; page 62 states that samples were analyzed "following the procedures specified in Section 8.2.4 (Adsorption Tube Procedure)". There is actually very little analytical detail in that Section (or in Method 18 as a whole), and typically not all of the procedures are followed. Among analytical laboratories, the term "Method 18" is often used colloquially to refer to GC work in general. Details of the actual analytical work conducted were provided to and reviewed by the District's source test division. At a minimum, Method 18 should be removed from the appendix, and canister analysis should only reference the relevant "TO" method.

24. Page 72 states that "A Thermo Fisher Scientific TVA1000B was used at the pilot refinery (Refinery A) while a Thermo Fisher Scientific TVA2020 was used at the other refineries." That statement is not accurate – i.e., TVA2020's were used at Refinery A as well (as the District specified in their protocol) - but we are not completely sure whether they were used 100% of the time. This can be confirmed from the District's field sheets, which identified all the TVA #'s used.

25. There is no indication that the "sample train recovery tests" mentioned on page 74 were done – e.g., no data is provided – and this sentence is unclear: "The theoretical amount of methane introduced into the system was calculated using the measured concentrations (introduced and bag measured) and gas flow rates and compared to the amount calculated as collected in the bag, correcting for pressure and temperature." If they were done, please clarify (i.e., how is gas flow rate pertinent) and if they were not done, please remove reference to them.

26. Page 77 states that "a select few [samples] were taken with a XAD tube in series with the charcoal tubes with the XAD tube closest to the component leak". To be clear, all of the initial samples were taken with XAD tubes to comply with the District's original protocol. The test protocol was subsequently revised when it was realized that these tubes (a) were not necessary and (b) created excessive pressure drop. District source test personnel had a good explanation for why the XAD was originally specified, and why they were subsequently dropped and this information should be included in the writeup. Similarly, page 79 indicates that lab results went to only C24, but C30 for condensate; the original version of the District's protocol mentioned taking all analysis out to C30, but this was subsequently scaled back when it was recognized that this was not necessary.

27. Page 85 contains the text that "Component subtype categories were identified for connectors, valves, and pressure relief devices. Because of the number and diversity of component subtypes, a standardized listing of subtypes was not identified or provided to field personnel and subtype categorizations were left to the field personnel

completing the standardized field data sheets. Proper identification and categorization of a component subtype depended upon the familiarity and knowledge of field personnel." Since "proper" identification and categorization is not standardized and is acknowledged as having not been identified, the last sentence should be removed. This is also pertinent to the subsequent analysis of information by subtype; the subsequent tables and figures should be footnoted accordingly.

28. On page 145, there should be some discussion regarding the fact that the act of bagging itself can increase the temperature around the component (compared to when it is open to air; i.e., heat trapping) and cause more emissions than would have otherwise been present, as illustrated by the photos and associated text that WSPA's consultant provided to the District in the past. This also seems to be born out by the results for A09 mentioned on page 212, where a component that was bagged for an extended period of time showed two orders of magnitude more emissions from the bag at the end of the time period than at the beginning of the time period.
29. Page 150 shows how TO-15 results were biased low compared to tube results, and states that "The difference between two figures for the same component is attributed to the difference in sample volumes for the canisters as compared to the sorbent tubes." This statement appears to be flawed. What it should instead identify is that (1) there was a knockout upstream of the canisters and (2) the TO- method is more suited to more volatile components, as less volatile components may stay adsorbed on the canister walls.
30. There does not seem to be any discussion of the graphs on and around page 156, and the casual reader might erroneously infer that (for example) hydrotreaters have more leakers, etc. In fact, what seems more appropriate to conclude—given this study and previous ones—is that (a) there are very few leakers and (b) their location cannot be predicted a priori.
31. Page 179 states that "The five petroleum refineries have agreed to incorporate any components handling a heavy liquid stream in the gaseous phase within their LDAR programs. As such, it will be necessary to have separate average emission factors with and without gaseous phase components." If the components are subject to LDAR, there is no need to have an average emission factor that includes both them and components that are not subject to LDAR. More appropriate language addressing this issue is on page 229 and the language on page 179 should be corrected.
32. At the bottom of page 192, there is a statement that "Using the regression estimates and cumulative probability theory (see Appendix D-1 for a detailed analysis), a cumulative distribution of the maximum emissions by component type was derived and shown in Figure III.66." It is unclear what is meant by "maximum emissions by

component type"—i.e., does it mean maximum measured in this particular study? The subsequent statements that "there is a 70 percent chance of one of the petroleum refineries' connectors leaking more than 0.1 kg/hour and a 40 percent chance of the maximum being greater than 0.2 kg/hour" and "For valves, there is a close to 50 percent chance of leaking more than 0.1 kg/hour and a 20 percent chance of leaking more than 0.2 kg/hour" are also unclear. On the face of it, these seem to be substantially different from the other study results (i.e., if there was really this much leakage, the average emission factors would be orders of magnitude higher). If what was instead meant was e.g. that "at a given refinery, there is a 70 percent chance of at least one connector leaking 0.1 kg/hour", the sentence should be worded that way.

33. On page 196, the conclusion that including the LDAR components actually increases the emission factor rather than reducing it is interesting, but there is probably little to conclude from this more generally given the small number of components in LDAR service that were evaluated (e.g., just one or two leakers could skew the average factor for them).

34. Page 196 incorrectly identifies that the scenarios exclude gaseous phase components and components handling non-process lube oil; as identified by our other comments, they appear to actually <u>include</u> both the components in gaseous phase (which has a significant impact on the results, given the high screening values for several components handling gaseous phase material) and components in "non-process lube oil" service (though these are all very low emitters).

35. Page 200 shows drift check results for calibration gases. However, what would be particularly interesting to know would be (1) what the drift results for the <u>zero</u> gases were (obviously, those can't be expressed as %) and (2) what sequence the drift checks were done in (e.g., was 10 ppm always first). This might potentially shed more light on results.

36. On Page 212, the quotient (primary results – replicate results / average of the two) is not "absolute" difference but the "relative" difference. And the problem with using only this as a metric is that two results that are wildly different—e.g., by an order of magnitude, two orders of magnitude, or three orders of magnitude—will have very similar quotients (close to 200%, because the denominator will be approximately equal to half of the higher value).

37. Page 220 defines screening instrument "response" as "the difference between the measured concentration and the actual concentration of a leak", but there is no "actual concentration of a leak". The actual concentrations in the vicinity of the leak vary spatially and temporally and depend on many factors, including the size of the wetted surface exposed to the air, airflows around that wetted area (including those due to

wind and those due to a monitor's sampling pump), temperature (at the liquid-air interface), and the equilibrium vapor pressures and vaporization rates of the various components of the liquid as a function of temperature. What is going to be recorded by the instrument is going to be a function of those actual concentrations, the sampling pump flowrate, the location and orientation of the probe tip (and the extent to which that location and the pump speed influence the actual concentrations), instrument response time and response factor[28] (both of which can also depend on the substances in the liquid being monitored), the extent to which you have a steady-state situation between the volatization rate from the leak point and the flow going into the probe tip, the extent to which you are outside the monitor's temperature range, and the extent to you lose material due to deposition in the probe and instrument or gain it due to the revolatization of material that was previously adsorbed on to the probe wall/instrument surfaces (both of which are affected by temperature, equilibrium vapor pressures, and volatization rates).

38. The discussion of the justification of the screening methodology on page 220 of the draft HLS report appears to be most focused on obtaining the highest screening value possible, rather than recognizing that these are truly <u>screening</u> instruments – especially in heavy liquids application – where it may be better to do a larger number of screenings quickly than do a smaller number slowly. The report should recognize and acknowledge that for purposes of <u>emissions</u>, what is most important is that the screening methodology used to screen components and the screening methodology used prior to bagging (that is used to relate screening values to emissions rates) are consistent.

39. Pages 221-222 attempt to define the terms screening time and screening pace, but are still ambiguous. The sentence "Screening time is not expected to impact the actual leak concentration but rather what is measured" is unclear, given that there is no "actual" leak concentration – that is purely a function of how the measurement is taken. The Report needs to clarify that in the relatively simple case of something like a flange, the total time needed to screen it is going to be the sum of (1) the time needed to move the probe all the way around the flange (which is in turn a function of the diameter of the flange lip, not the line size) and what would often be referred to as the "pace" (speed of movement around the flange), as well as any obstructions that might require the screener to have to move to a different spot to screen and any other potential interferences; and (2) any additional time needed as a result of finding an elevated concentration: i.e., time needed to locate the point of maximum concentration, and hold it at that point. Our understanding—though it is not clarified in the report—is that this "total time" is the difference between the beginning and end times recorded by the

[28] "Response time" and "response factor" are as defined by EPA Method 21.

screeners for each component. Accordingly, if "pace" as calculated in the Report is that total time by an estimated circumference (i.e., not the same as "pace" as defined above), the "pace" itself is a function of the extent to which a leak was found, and the graphs that seem to imply the difference that the pace makes on the emissions/screening value (p. 144) need to also have some discussion identifying that the emissions/screening value also affects the "pace".

40. On page 226, when providing details regarding sample C004, please add that the vapor was obviously not from a heavy liquid – i.e., this was the sole component for which the overwhelming majority of the sample was C5.

41. Page 227 states that "Typically, the valve bonnet flange is considered by the Air District as a connector." For emissions inventories, this would go against both CAPCOA's statewide guidelines and EPA guidelines (which state the opposite) and the corresponding analyses used to generate the emission factors. If the District did not intend this assertion, a more accurate statement would be that "For purposes of the Air District's leak monitoring requirements in Rule 8-18, the bonnet flange is classified as a connector, as currently specified by Section 8-18-204."

42. Page 227 states that "if a sample only included a bonnet flange and did not include the valve stem, this sample was considered a connector as the valve stem is considered the defining feature of a valve and the location where leaks most often occur". This was never discussed with WSPA, and we were not made aware if this situation ever occurred. A bonnet flange is a flange that is part of a valve, the CAPCOA Guidelines and this study clearly identify that "valve" includes both the stem and any bonnet flanges on the valve. If the District reclassified a valve's bonnet flange as a connector, that would be contrary to the what was agreed upon and this needs to be changed.

43. On page 229, there is a statement that "During the Study, there was a concern that because of the Study design (only two process units were initially selected for screening of connectors and valves), the screening portion may not adequately represent the true distribution of leaks and may exclude potentially significant leaks resulting in lower emissions estimates than actual." Regardless of what was "initially" selected, Table III-63 on page 180 indicates that several process units were sampled from.

44. On page 229, there is a statement that "At Refineries B, C, D, and E; separate entries were made for pump seals". That is false, as we have repeatedly identified. Refinery D made separate entries for each pump seal, but refineries B, C, and E made one entry per pump (highest seal) regardless of how many seals were present. We have provided supporting information to the District previously.

45. On page 230, there is mention of use of a FLIR camera that was terminated "when the petroleum refinery personnel determined more process lines than expected would be

affected and it became a daunting task" that is then followed up with an alternative explanation that "this effort ceased once several components with leaks were discovered with screening values above 10,000 ppmv were identified". The latter is an unsubstantiated statement that appears to be a gross mischaracterization of the fact that FLIR camera readings are often interfered with by heat. In addition, FLIR cameras do not measure either concentrations or screening values. Accordingly, this statement should be removed.

46. On page 232, Table IV-1 is titled "Comparison of Number of Components Screened and Sampled Between 1980 Study and Heavy Liquids Study", but this is inaccurate; i.e., for the 1980 study, this is only the number of components <u>in heavy liquid service</u> that were screened and sampled. The table also mentioned that "The specific number of flanges in heavy liquid service that were screened is not known", but this information appears to be available in Table B2-21 on page 230 of the 1980 EPA study.

47. Page 235 mentions "eight different regression scenarios" but does not identify what those scenarios are, or why they were chosen. It should include the description of the scenarios from page D-1-25 and provide an explanation of why these eight scenarios were chosen. There was a lot of discussion about this topic and yet there seems to be no information in the Report about it; there should be, as this was an interesting topic that might be of some relevance to future studies. One key reason those scenarios were developed was that there appeared to be a substantive difference between emissions rates measured by the District's bagging team and emission rates measured by Tricord, with the former being lower. This was analyzed by the District in Spring 2017 and by others in 2018-19, yet we could not discern a reason for the difference, or assess which sampling crew was likely to be getting the more correct result. Accordingly, when assessing how to deal with duplicate samples taken on the same component, the question arose as to whether to disregard all of the District's sampling entirely (scenarios #3, 4, 7, and 8) or to simply take the first result, whether the District took the data or Tricord did (scenarios #2 and #6). WSPA was against double-counting a component just because multiple samples were taken from it, and so never agreed to scenarios #1 and 5. The other key reason those scenarios were developed was that WSPA had pointed out that the data in the 0-10 ppm range were pretty imprecise (as were many of the results for the 10 ppm cal gas), so it might not make sense for those data to be influencing the regression lines as much as the higher data. So scenarios #1-4 were for linear regression across the full range of data, and #5-8 were for linear regression across just the screening values of 10 ppm and higher. We believe it is more justifiable to make a consistent decision. It appears that the District may have chosen different scenarios for pumps versus other components, and made that choice based on statistical correlation parameters.

48. The District goes through several comparisons of its log-space regression equations with those of the 1980 study – which nobody has been using the regression equations from – and then declines to compare to the regression equations in the 1993 API study (which is also the backbone for the correlation equations in the 1995 EPA Protocol and 1999 CAPCOA guidelines) because "because the intent of the 1993 Refinery Study was to derive new correlation equations rather than average emissions, a random sampling of components was not done. Rather, components within given screening ranges were located and then sampled. Therefore, the 1993 Refinery Study screening results would not be a representative sample as a comparison to those found in the Heavy Liquids Study." That is a completely wrong conclusion. The 1993 API study did the exact same thing that was done in this study: i.e., bagging was done across components based on their screening values (non-random) so that data would be useful for generating correlation equations. This is the reason for the "prioritization" table on page 31 of the November 2017 version of the District's HLS protocol. The District should make the comparison.

49. Page D-1-32 states without explanation that "The distribution of y = log (leak rate) has been demonstrated to not be normal and thus the same approach used in the 1980 EPA Study is not appropriate." The 1980 EPA Study did not use a straight lognormal assumption but instead used "a mixed distribution, specifically a lognormal distribution with a discrete probability mass at zero".[29]

[29] Appendix C to 1980 EPA study, p. C-149.

APPENDIX F-2

Response to Comments

General Comments

Comment: “B. “Joint Study” Characterization
While we appreciate the acknowledgement that WSPA, its member companies, and their contractors have contributed a great deal of their time and expertise to this study. However, WSPA has raised concerns with transparencies issues during the report development process, such as: not allowing WSPA to communicate directly with the District’s field personnel and statistician with regard to technical matters pertinent to the field work and statistical work, being responsive to WSPA’s comments, and sharing its reasoning/thoughts regarding the discussion and conclusion sections of the draft HLS report prior to issuing it.”

Response: The Air District and WSPA participated in over two dozen technical calls and meetings where technical matters and rationale were discussed. Technical documents outlining data assumptions and approaches were created and shared with the Technical Working Group, which was comprised of Air District and WSPA members. In addition, the Air District responded to questions from WSPA’s statistician as well as held a call between WSPA's statistician and the Air District's statistician to discuss the statistical approaches and answer remaining questions.

Comment: “Pejorative Statements/Misrepresentations”
"The draft HLS report contains several unsupported statements that cast aspersions and mention or infer a substantive bias, that are at best misleading and at worst completely false. Accordingly, WSPA requests that these statements either be substantially revised to be accurate or removed from the report altogether. These include the following:

1. The statement on page 46 that industry’s request to monitor components in lube oil service at the first refinery “introduced a potentially significant bias into the Study” is completely false.

None of the components that the District wanted to have screened were omitted, and all of the lubricating oil screenings were (a) explicitly identified as such and (b) listed out individually in WSPA’s subsequent 2017 “Low Volatility Finished Products Protocol” that was approved by the District. WSPA’s consultant has previously reminded the District to exclude these components, but it does not appear that these were entirely excluded from the District’s analysis. We realize that given the relatively small number of points, the average emission factors will not be significantly affected “potentially significant bias” as a result of these points, all they need to do is exclude them completely and redo the analysis, which would then eliminate that concern.”

Response: The cited text states "potentially" and the next paragraph in the report addresses how these components were handled ("to remove these components from the Study"). One of the reasons for excluding these components was that they were selected by field observations, which introduces a bias (how were components visually selected?).

These components were excluded from the average emission rate analysis.

Comment: "On page 99 and several other places in the report, there is mention of the steam-quenched pump screened at 760 ppm from "a foot or more" or "over a foot" away that is alternately described as "dripping" (p. 99), leaking a "steady stream" (e.g., p. 221, 228, 234), and sometimes "spewing" (p. 103, 179) "liquid hydrocarbons" that were "pooling at the base of the pump".

This is not consistent with what personnel who were on-site recall, nor is it reflected in the District's actual field notes that were shared with WSPA at the time, which state only that 760 ppm was measured "@ housing of shaft" and that there was "steam" (which often drips and forms pools):

A leak/pool of liquid hydrocarbons also seems unlikely for several reasons: i.e., if there was truly a liquid hydrocarbon leak of this magnitude, (a) District field personnel should have attempted to capture some of it, estimate the liquid leak rate (which would have been easy if it were that large a leak), and had the sample analyzed; and (b) this would have presented a safety concern that the refinery would have wanted to address. These unsubstantiated characterizations should be deleted from the report."

Response: The embedded copy of the field data sheet entry only states the location of the leak ("760 ppm @ housing of shaft") and does not state at what distance the measurement was taken.

The observations were noted and verbally told by Air District personnel who had taken the screening measurement.

A video of the pump in question was recorded at the time of the screening. The video shows material spewing from the pump seal and a noticeable pool of liquid with an oily sheen surrounding the pump at the base.

After extensive discussions with the petroleum refinery as well as with WSPA at the time, a method for safely measuring mass emissions from this pump did not result in an identified method. These discussions included how to measure mass emissions from this pump seal as well as other steam-quenched pump seals.

It is the Air District's understanding that this pump was placed out of service for repair by the refinery in question.

Comment: "Pages 46 and 146 refers to 39 times in which the contractor had to make holes in the bag, and identifies that "In these cases, either ambient air was pulled into the tent and through the sampling media or component leakage was emitted out of the tent". Page 223 of the draft HLS report refers to those same 39 cases and states that "If ambient air was drawn into the enclosure, it may have introduced a bias to the sample."

EPA's vacuum method is supposed to draw ambient air into the enclosure, regardless of whether a hole is cut or not, because a vacuum pump is being used. Usually, the bags are not airtight; however, if they are (or are close to it), the vacuum pump could collapse the bag onto the component. Testers alleviate this by cutting a small hole, as specified in EPA's method."

Response: Page 223 of the report addresses background influence and how background influence may have been mitigated by subtracting results of mass emissions sampling of the background. However, WSPA's comments do not address the scenario of whether the bag was pressurized.

On page 4-4 in Section 4.2.1 (Vacuum Method) of the 1995 EPA Protocol for Equipment Leak Emission Estimates states "However, it is important to maintain a vacuum in the bag, since VOC could be lost through the hole if the bag became pressurized."

Comment: "The first of the four "issues uncovered" in the Executive Summary (p. ES-4) and Conclusions (p. 243) is that "Study design may have impacted results (there is a greater probability of missing larger leakers)". This statement requires more explanation, including but not limited to specifying what this is relative to; i.e., there is a greater probability of missing large leakers with this study than with….what? It appears to be referring to a statement on page 230 (which in turn refers to Appendix D-1) that "there is a high probability that the Study did not capture large connector or valve leaks (i.e., the distribution of screening values for the screened connectors and valves does not reflect the actual distribution).

This may be attributed to the selection process for connectors and valves." However, WSPA did not find this discussion in Appendix D-1, it is not clear what "actual distribution" is being referred to, and it is not explained why such a discrepancy would be attributed to the selection process (as opposed to simply a very small number of high leakers), all of which needs to be corrected."

Response: Both the report and Appendix D-1 have been revised to provide more discussion regarding large leakers.

Comment: "The second of the four "issues uncovered" in the Executive Summary (p. ES-4) and Conclusions (p. 243) is that "Screening of heavy liquid streams causes screening instruments to drift low (measured screening values are lower than actual)." There is no mention of the fact that the District analyzed the extent of that drift and showed that it had a very minor impact (pp. 199-208), and therefore was not corrected for (p. 222).

If the District thinks that this is such a significant issue, it should correct for the bias; if not, this should either be removed as a "key issue uncovered" or the District should either reference the magnitude of the impact where this is mentioned in the Executive Summary and Conclusions – e.g., " Screening of heavy liquid streams causes screening instruments to drift low (measured screening values are lower than actual), but the degree of drift was predominantly within pre-established criteria and was not considered to be significant enough to warrant quantitative drift correction".

Response: The referenced statement was a conclusion drawn from the Study that may be applicable to future studies.

Comment: "The third of the four "issues uncovered" in the Executive Summary and Conclusions is that "Screening pace was faster at Refineries B, C, D, and E, which may have impacted measured screening values (and resulting estimated emissions)." Again, this sounds speculative, and necessitates more explanation.

Screening values can be impacted by screening pace, but emissions (measured by bagging) are not. Pace at the beginning of the Refinery A screening survey was slower than during the screening that was subsequently done immediately prior to bagging, which means that the emissions analysis biases emissions from the initial Refinery A components high (as opposed to biasing emissions from the other components low)."

Response: The Air District does not follow WSPA's rationale. Regression equations used to estimate mass emissions are dependent upon screening values. Lower screening values will result in lower estimated emissions. WSPA's rationale would be relevant if the regression equations were derived from pre-bagging screening values at a given point (e.g., the 8 second measurement) rather than the maximum screening value. The pre-bag screening measurement that was used to derive the regression equations was the maximum screening value that was recorded. There was no time limit imposed by the Air District on the bagging time for these measurements. This can be shown in the amount of time (dwell time) that was spent to reach the maximum pre-bag screening value where this time was as great as 29 minutes.

Comment: "The Executive Summary identifies a "safety stand down" as the reason why the District stopped using its own screening inspectors and using the refineries' instead, which is discussed further with several unsubstantiated statements on page 60 that are not germane to the study. WSPA requests that such statements be removed."

Response: The discussion related to the "safety stand down" is germane as it addresses the question of why the Air District only conducted screening at 1.5 refineries.

Comment: "This statement on page 100 reads as though the District is biasing the results low, and does not appear to be accurate: "Although screening instruments had the capability of and did show concentrations greater than 10,000 ppmv, because instruments were not calibrated with a standard gas above 10,000 ppmv, the maximum screening value shown in results is 10,000 ppmv."

In fact, it appears that all of the actual screening values that exceeded 10,000 ppmv values are shown in Appendix B (none were truncated to 10,000 ppmv), and several tables also show a column for "> 10,000" ppmv."

Response: The report was revised to state "Components with leaks above 10,000 ppmv are listed as '> 10,000 ppmv'."

Comment: "On page 233 there is a statement that "the minimum bag vacuum requirement (0.001 inches H_2O) was met by all samples. However, a pressure gauge with a resolution of 0.005 inches H_2O was used in sampling. It is not clear how lower measurements were identified."

This statement infers that the District may not understand this process. It is important to understand that the gauge was an analog gauge with tic marks every 0.005 inches of water column (which is not the same as "resolution"); when the gauge needle is in between tic marks, the tester visually interpolates, as is typical for analog gauges."

Response: The Air District understood that the gauge was analog and viewed digital photographs of the equipment. Because there were no hash markings indicating increments of 0.001, there would be no reliable way for the tester to "visually interpolate" that a reading was 0.005 versus 0.003 or 0.007 inches of water column.

Comment: "Given that the instruments are not designed for heavy liquids at high temperatures, and because of the deposition problem mentioned in our comments above and the variability in the liquids being monitored, it is not feasible to develop uniform "instrument response times to various materials at different temperatures before study" to "provide to screening personnel for use in screening" as identified in the draft HLS report. Response times will depend on a wide array of variables, including not just material type (which will vary), but also concentration, how long the equipment probe is held at that concentration, etc. This will make it infeasible to simply have an easy "look up table" of precise response times. Instead, it should be recognized that handheld monitors are screening tools, that can be used to distinguish between leaks of different orders of magnitude, but for which there are no "true" values (e.g., to the extent they depend on wind speed at the location of the component) and for which the consistency in readings is going to be limited for a number of reasons beyond the things that can reasonably be controlled."

Response: The Air District agrees with the comment that response times will vary based on a wide array of variables. However, the Air District believes that general response times can be developed as this was done on an ad hoc basis during field screening.

Comment: "The abstract (p. ii) identifies that "the emissions averages resulting from this study are lower than commonly used emission factors developed by the United States Environmental Protection Agency for components in heavy liquid service", with the implication that this was the latest word on the subject. It should also mention the more recent and relevant fact that (1) the 1999 CAPCOA/CARB "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Facilities" (cited by the District's own Permit Handbook) identified that components in heavy liquid service "not [be] included in component counts used for the quantification of fugitive emissions", and that accordingly the District's Permit Handbook doesn't list average emission factors for components in heavy liquid service."

Response: Appendix A of CAPCOA Guidelines addresses "Excluded Components" on page 3 of Appendix A-1:

"Components that are generally excluded from I & M programs monitoring requirements should be reevaluated to determine their true emission potential. Components that have been determined not to leak or emit non-volatile organic compounds (VOC) should be excluded from the inventory. Components that are determined to leak VOCs should be included in the inventory."

The Air District determined that components in heavy liquid service emitted VOCs and are required to be in the emissions inventory.

Previous versions of the Air District's Permit Handbook included the guidance that components in heavy liquid service emitted VOCs and required emissions be estimated and reported for permitted equipment. Emissions from permitted equipment would then be included within the emissions inventory. It appears that when the Handbook was last updated, there was a mistaken assumption that all components, including those in heavy liquid service, were monitored and using correlation equations to estimate emissions. If true, then there would be no need to reference average emission factors for non-monitored components. The Permit Handbook will be revised to correct this error.

Comment: "Page 227 states that "Typically, the valve bonnet flange is considered by the Air District as a connector." For emissions inventories, this would go against both CAPCOA's statewide guidelines and EPA guidelines (which state the opposite) and the corresponding analyses used to generate the emission factors. If the District did not intend this assertion, a more accurate statement would be that "For purposes of the Air District's leak monitoring requirements in Rule 8-18, the bonnet flange is classified as a connector, as currently specified by Section 8-18-204."

Response: This comment does not align with how emissions from valves in LDAR programs are measured, estimated, and reported. For example, LDAR programs have separate entries for both the bonnet flange and the valve stem where both are screened and have separate screening values recorded. Emissions from both are then estimated and provided to the Air District.

Comment: "On page 229, there is a statement that "During the Study, there was a concern that because of the Study design (only two process units were initially selected for screening of connectors and valves), the screening portion may not adequately represent the true distribution of leaks and may exclude potentially significant leaks resulting in lower emissions estimates than actual." Regardless of what was "initially" selected, Table III-63 on page 180 indicates that several process units were sampled from."

Response: Although several process units were sampled, not every process unit or even every process unit type was sampled. Therefore, the referenced text statement still applies.

Comment: "On page 229, there is a statement that "At Refineries B, C, D, and E; separate entries were made for pump seals". That is false, as we have repeatedly identified. Refinery D made separate entries for each pump seal, but refineries B, C, and E made one entry per pump (highest seal) regardless of how many seals were present. We have provided supporting information to the District previously."

Response: The comment would be valid if there were no examples of multiple seal entries recorded for the same pump at these refineries. However, the Air District has provided WSPA examples of separate pump seal entries for Refineries B, C, D, and E.

Rule

Comment: "Given that the emission factors are very small numbers and the number of components is very large, WSPA recommends that some context be provided. For example, applying the emission factors to the listed equipment counts shows that total emissions from the 368,795 valves, pumps, and connectors in heavy liquid service at the refineries is approximately 36 tons per year (TPY). This is obviously substantially lower than the emissions reduction estimate in the District's staff report that was used to justify promulgation of the 2015 Rule 8-18 amendments.

Specifically, the District estimated in the Staff Report that 1,227 TPY of emissions reductions could be obtained from that same equipment by removing the District's exemption of this equipment from leak detection and repair (LDAR) requirements. The data shows that the District's estimate was clearly incorrect."

Response: This comment would be applicable to the Regulation 8, Rule 18 Rule Development efforts and should be made then.

Comment: "As recognized by the draft HLS report, screening value measurements can depend on a number of methodological factors, which include but are not limited to the speed at which the screening monitor is moved, the length of time it is held in one spot, and the proximity of the probe tip to the source. These factors, along with the requisite frequency of calibrations and drift checks, also significantly impact the cost of monitoring that the District is going to be evaluating."

Response: This comment applies to the rule development process and should be discussed then.

Settlement Agreement

Comment: "WSPA and its member companies filed suite (over Rule 8-18 and other related rules), and the ensuing settlement agreements with the District refer to this Heavy Liquid Study. Details in the settlement agreements include the following:

- 'Parties agree that pending completion of the Heavy Liquid Study and the establishment of new emission factors based on the results of the Heavy Liquids Study, the interim Heavy Liquids Emission Factors depicted [below] will be utilized for purposes of complying with and enforcing Rule 12-15, as well as for all other District purposes, including but not limited to, emissions permit fees and rule making.'

  The table of emission factors lists eight component types, and all eight should be identified in the HLS report along with a clear explanation of which are and aren't being covered by the study, given that the HLS is redefining some of the types (e.g., flanges as a subset of connectors), subdividing others (non-process lube oil service vs not), not addressing all of the eight types, and (in the current draft) recommending some but not all of the remaining types for further study. The District also needs to explain what it is proposing to do with regard to emission factors for component types listed in that agreement that are not addressed in the study."

- Following completion of the data collection activities at each refinery, the District was supposed to "meet with the refinery managers and/or other designees of the Petitioners at each refinery participating in the Heavy Liquids Study to discuss the data collection process, any issues encountered, exchange lessons learned and best practices related to data collection from equipment in heavy liquid service, and work to mutually resolve any issues in order to facilitate completion of the Heavy Liquids Study", and the HLS report was supposed to document that.

Particularly, the draft HLS report does not reflect the issues encountered and lessons learned from that field work. This information should be accurately documented in the next revision of the HLS report. WSPA sees the accurate sharing and written documentation of this information to be a key step towards furthering scientific study and minimizing future misunderstandings of technical issues."

Response: Of the referenced eight component types, the report discusses valves, pump seals (other than steam quenched), pump seals (steam-quenched), connectors, flanges (included with connectors), and pressure relief devices. Only the "Others" and "Open Ended Lines" categories are not included within the report.

The referenced table states that the source of information listed within the table is Table IV-3a of the "California Implementation Guidelines for Estimating Mass Emissions of Fugitive Hydrocarbon Leaks at Petroleum Refineries", CAPCOA, February 1999.

Per the 1999 CAPCOA Guidelines, the "Others" category includes "any component type other than connectors, flanges, open-ended lines, pumps, or valves." This included pressure relief valves. However, the referenced table separated pressure relief valves from the "Others" category.

Per the Heavy Liquids Study protocol developed with significant input from WSPA and the five petroleum refineries, the Heavy Liquid Study only included components that were either pump seals, valves, connectors (including flanges), or pressure relief devices.

The report has been revised to recommend that emissions from components other than connectors, pump seals, valves, or pressure relief devices be considered for further emissions study.

Issues encountered during field screening are discussed in Section III.ii.1 Field Observations. Issues encountered during bagging are discussed in Section III.iii.1 Field Observations. Lessons learned are discussed in Section II.i.6. Modifications of the Experimental Design.

Lessons learned toward furthering scientific study are discussed in Section IV.viii. Future Studies.

Study Purpose

Comment: "The purpose of the study is a function of the background. The draft HLS report presents background information in Section I.i, but mischaracterizes the information. For example, the District incorrectly states that District staff used 1980 emission factors as "required" by the CAPCOA Guidelines, and incorrectly identifies the Board's adopting resolution direction regarding the HLS as being "to conduct a joint study with affected refineries to measure mass emissions from components in heavy liquid service and re-visit the cost effectiveness determinations made with the revised rule".

The study's actual background is as follows:

- In 2014, at the time of permit renewal, District staff began requiring that emissions from components in heavy liquid service be based on 1980 average emission factors, in spite of the fact that the 1999 CAPCOA Guidelines stated that such components "are not included in component counts used for the quantification of fugitive emissions" and that the District's own guidance did not (and still does not) say to include components in heavy liquid service.

  This unsupported direction from the District substantially increased emissions inventories at several refineries. District staff required refineries to agree to the change and pay the associated increased permit renewal fees or else risk not having their permits renewed.

- In late 2014 and early 2015, there were multiple meetings between WSPA, its member companies, and District staff regarding this issue. WSPA identified concerns that use of the 1980 factors did not reflect good engineering judgment. On March 9, 2015, District staff acknowledged that in the past, different District refinery permit engineers had not interpreted the methodologies consistently, and identified that the District would prepare a proposal to conduct actual measurements at Bay Area refineries to resolve the disagreement and submit a draft within two weeks.

- District staff subsequently used the 1980 emission factors to justify proposed revisions to Rule 8-18, making these revisions the most significant portion of staff's Refinery Emissions Reduction Strategy.
- On December 15, 2015, the Board promulgated those rule revisions.
- On December 17, 2015, the District e-mailed WSPA the first draft of the 43-page measurement protocol that had been mentioned in the abovementioned meeting on March 9. Clearly, the origin of this protocol predated the Board's adoption of the rule revisions.
  WSPA and its member companies filed suit (over Rule 8-18 and other related rules), and the ensuing settlement agreements with the District refer to this Heavy Liquid Study. Details in the settlement agreements include the following:
- "Parties agree that pending completion of the Heavy Liquid Study and the establishment of new emissions factors based on the results of the Heavy Liquids Study, the interim Heavy Liquids Emissions Factors depicted [below] will be utilized for purposes of complying with and enforcing Rule 12-15, as well as for all other District purposes, including but not limited to, emissions permit fees and rule-making."

Response: The report was revised to include some additional background information.

However, the Air District disagrees with the assertion that including emissions from non-monitored heavy liquid service components in emissions inventories is unsupported.

Appendix A of CAPCOA Guidelines addresses "Excluded Components" on page 3 of Appendix A-1:

"Components that are generally excluded from I & M programs monitoring requirements should be reevaluated to determine their true emission potential. Components that have been determined not to leak or emit non-volatile organic compounds (VOC) should be excluded from the inventory. Components that are determined to leak VOCs should be included in the inventory."

The Air District determined that components in heavy liquid service emitted VOCs and are required to be in the emissions inventory.

Separately, for at least the past 35 years, permit applications submitted by the Bay Area petroleum refineries have included equipment leak emissions estimates from components handling heavy liquid service, when such components were part of a project discussed within the application.

Section 3.4 (Petroleum Refinery Fugitive Emissions) of the Air District's Permit Handbook had the following language from 1991 to 2006:

"Emissions from refinery valves, flanges, pump seals, and compressor seals are calculated by multiplying the number of sources of a particular type by the appropriate emission factor for the fugitive emission source. The choice of emission factor is based the source type (e.g. valve, flange, compressor seal, pump seal), the I/M program in place at the source, and possibly the source fluid. Characterizations of the process fluid as either a light liquid, heavy liquid, or gas stream are based on definitions presented in Environmental Protection Agency document EPA-450/3-80-010.2-22. This document defines gas streams as hydrocarbon gas/vapor at process conditions containing less than 50% hydrogen by volume. Light liquid streams are defined as liquid or liquid/gas streams with a vapor pressure greater than that of kerosene (>0.1 psia @ 100 degrees F or 689 Pa @ 38 degrees C). Heavy liquid streams are defined as liquid streams with a vapor pressure equal to or less than that of kerosene (≤ 0.1 psia @ 100 degrees F or 689 Pa @ 38 degrees C), based on the most volatile class present at greater than 20% by volume." "The emission factors used to calculate refinery fugitive emissions from valves, flanges, compress seals, and pump seals are found in the document titled 'BAAQMD CTG Refinery Emission Factors, 9/8/91'."

In 2006, Section 3.4 of the Permit Handbook was revised to include the following statement:
"Each of the five major refineries (Chevron, ConocoPhillips, Shell, Tesoro, and Valero) in the Bay Area already have District-approved fugitive emission factors derived from the Correlation Equation Method (Method 3) of the Guidelines, based on a comprehensive inspection program of the fugitive components at each of the refineries."

This statement was added as it was believed at the time that the petroleum refineries were including all components handling heavy liquid service streams within their leak inspection programs. This was subsequently found to not be the case.

The Permit Handbook will be revised to address this error.

Background / Previous Studies

Comment: "Pages 7-13: This historical information prior to 1980 seems too outdated to be relevant to this study and is not referenced anywhere else in the Report and should be deleted."

Response: The report has been revised (see III.iv.5.6) to include references to these sections.

Comment: "The background information in Section I.i identifies the District's assertions that (1) with regard to CAPCOA's 1999 exclusion list—i.e., CAPCOA's language was that "the following components are not included in the components counts used for the quantification of fugitive emissions"—the exclusion only pertained to regulatory inspection programs, and that (2) "By default, those components would be required to use [the 1980] average emission factors" (p. 5). The District's assertions here are,

- contrary to the abovementioned language used in the CAPCOA document (as well as the language at the beginning of that section, which states that "In order to accurately calculate fugitive emissions from leaking equipment using the new correlations and emission factors, it is essential that users identify and count components in the same way. This section defines and illustrates how components are to be counted for use with the new emission factors." [emphasis added];"
- not supported by any language in the CAPCOA document; and
- not supported by any language in the relevant section of BAAQMD's own Permit Handbook that cites the CAPCOA document ("Petroleum Refinery Fugitive Emissions/Emission Calculations").

Response: The referenced CAPCOA language contradicts the rationale of the comment. "In order to accurately calculate fugitive emissions … using the new correlation and emission factors …". The correlation equations would not be used where monitoring is not being conducted within an LDAR program. In addition, the CAPCOA guidelines did not develop new emission factors and thus the reference to "...new ... emission factors" refers to the default emission factors that were developed but also apply only to components that are monitored per an LDAR program.

Appendix A of CAPCOA Guidelines addresses "Excluded Components" on page 3 of Appendix A-1:

"Components that are generally excluded from I & M programs monitoring requirements should be reevaluated to determine their true emission potential. Components that have been determined not to leak or emit non-volatile organic compounds (VOC) should be excluded from the inventory. Components that are determined to leak VOCs should be included in the inventory."

The Air District determined that components in heavy liquid service emitted VOCs and are required to be in the emissions inventory.

Previous versions of the Air District's Permit Handbook clearly identified and required estimating emissions from components in heavy liquid service. The Permit Handbook will be revised to correct this omission.

Comment: "In addition, if the District's asserted interpretation were accurate, that would imply that the District would be required to use the 1980 average emission factors for the other 12 types of components in the CAPCOA exclusion list as well, which it does not.:

Response: Emissions would need to be estimated for any components that have been determined to leak emissions. In the absence of other data, emissions would need to be estimated using the listed average emission factors.

Comment: "Section I.i mentions the 1996 study on emissions from components in Heavy Liquid Service but fails to divulge any of the conclusions from that study. It should divulge the emission factors from that study, or at least the fact that the emission factors that were well below the 1980 emission factors."

Response: The 1996 study did not conduct any mass emissions sampling but rather screened components and used the 1993 correlation equations to develop emission factors as stated in Section I.iii.6 of the report. As the emission factors were not derived from mass emissions sampling data, the Air District does not view them as comparable to either the 1980 Study or the Heavy Liquid Study, in which average emission factors were derived using both screening and sampling data.

Comment: "Section I.iii identifies the previous studies, and there are subsequent comparisons with the 1980 study with regard to average emission factors, but there does not seem to be a comparison with regard to all the evaluations the 1980 study made with regard to the effect of temperature, pressure, diameter, etc. It would be particularly useful to both (a) make those comparisons and (b) summarize that information, so that future studies might not have to re-look at "everything under the sun" as potentially impacting the results."

Response: The suggestion for additional evaluations is noted and may be undertaken in future.

Comment: "On page 31, Table II-2, the ownership history of the refineries, has no relevance to the Study and should be removed."

Response: The ownership history provides context to the facilities, may explain any significant differences between facilities, and may be useful for future evaluations (see response above).

Comment: "On page 46 and elsewhere, refinery A is referred to as the "pilot refinery", and there are inferences that procedures were the same throughout the testing of that refinery. In fact, the procedures were changed very early on at that refinery, such that at the end of the testing they were much more similar to those at refineries B-E than at the very beginning. At the time, there was no indication that this refinery was going to be a "pilot", nor are the data being treated any differently (i.e., the District's analysis of average emission factors lumps all the data together), so please remove this term. "First refinery" would be adequate."

Response: The Air District does not understand why the term "pilot" would be pejorative. Rather, the "pilot" refinery was used to identify issues and make changes in methodology (e.g., leak definition, sample size). In addition, the term "pilot" was used by both the Air District and WSPA in the early stages of the Study during pre-screening and post-screening at the refinery.

Editorial

Comment: “Most of the other listings of “Results”, “Issues Uncovered”, and “Recommendations” seem like odd choices for section headers, several of which are not described by the headers they are under. WSPA would be interested in the “improvements…in…screening, and sampling techniques”, but the “improvements” listed in Section IV.viii are not supported and do not reflect the lessons that should have been learned with regard to those techniques (see “Methodology” comments above). Several of the recommendations in that section appear to focus on things that provide more data and reduce some aspect of variability (such as screening distance or response time) without having acknowledged the overarching lessons from this study, such as:

- Clear and unambiguous communications and decision-making are imperative for complex studies involving multiple parties.
- Definitions are important to identify clearly and unambiguously in advance; confusion on this point can get compounded. We have had numerous discussions regarding how to categorize bonnet flanges on valves, what kinds of equipment counts as a PRD for purposes of air emissions, what counts as being “heavy liquid” versus “vapor” service, whether to record one screening value per pump assembly (including connectors), per pump (highest value taken for all seals), or per pump seal, etc., what counts as a “steam-quenched” pump, and what the “non-process lube oil” category that the District exempted from the study explicitly includes.

Page 85 also notes that “Because of the number and diversity of component subtypes, a standardized listing of subtypes was not identified or provided to field personnel and subtype categorizations were left to the field personnel completing the standardized field data sheets.” Lack of consistency in definitions results in lack of consistency in data and analysis. Clear definitions for component types should have been included in the District protocol. And if subtypes are too diverse/numerous/specialized to be consistently categorized, that begs the question of (1) the validity of any analysis based on recorded subtype information and (2) why that information was even recorded.”

Response: The definition of PRV was established prior to the Study and the other cited issues arose during the Study and were not foreseen by any party.

WSPA's suggestion concerning standardizing subtype classifications would not be practical as it requires identifying all component subtypes in use at the five petroleum refineries. It is questionable that any of the five petroleum refineries has an inventory of all the subtypes of components in heavy liquid service at all five refineries.

Regarding the second point, there is value in having field personnel knowledgeable in refinery component types and subtypes record the information to evaluate potential impacts of component subtype classification on emissions.

Comment: “Abstract page ii. The objective identified in the abstract (p. ii), on page 1, and on page 5 are all worded slightly differently, with the first two mentioning an objective to “understand” emissions and the last more specifically stating that the primary objective is to answer the question, “What are the average emission rates for the Bay Area refinery components in heavy liquid service?” The first two explain the recommendations of “improvements…for future studies” including things such as vibration monitoring. However, the Board directive focuses upon specific objectives, and does not mention a need to try to “understand” component fugitives. The statements of objective should be made consistent, and should reflect applicable language in the Board direction and agreements between the District and WSPA as mentioned in our comment letter.”

Response: The text does not state "understand component fugitives" as suggested by the comment. The text states to understand emissions which is a necessary step for developing average emission factors that are necessary to reevaluate cost effectiveness per the Board direction.

Comment: “Abstract pg ii identifies that “measurements were used to develop correlation equations using linear regression analysis”, but as mentioned in our letter, the correlation equations are not identified in the report. If equation [III-2] on page 176 is the correlation equation and the parameters that are in Table III-61 are the parameters for that correlation equation, then they should be identified as such; and if they aren’t, the correlation equations need to be shown.”

Response: The section was revised to state "measurements were used to develop regression equations using linear regression analysis".

Comment: “(Pg xiii) The Glossary should include a definition of “in Heavy Liquid Service” (separate from just “Heavy Liquid”) to document that this means the component is in contact with the heavy liquid itself, not the vapor coming off of it.”

Response: This comment would be applicable to the Regulation 8, Rule 18 Rule Development efforts and should be made then.

Comment: “(Page xiv) The Glossary definition of “Pressure Relief Valve” has two pictures and the bottom one appears to be incorrectly pointing to a bonnet flange as a connector. The report appears to goes back and forth between the terms PRV and PRD interchangeably

– it should be consistent as much as possible, and generically use the more generic term (PRD) to avoid missing any PRDs that are not PRVs.”

Response: In the context of a pressure relief valve, the bonnet flange is a connector.

In the context of the report, a pressure relief valve (PRV) is a device that relieves to atmosphere. A PRV is a type of a pressure relief device (PRD).

Comment: “The Glossary should include a definition of “steam-quenched pump” to avoid confusion. Given that the District was unwilling to base this on observation, we had previously mentioned API Schedules 61 and 62. However, if the District is interested in defining the status pump seals, there are some cases in which there are pumps with two seals where one of the seals appears to be steam-quenched and one does not.”

Response: The Glossary was amended to include an entry for "Steam-Quenched Pump".

Comment: "Page ES-1 of the Executive Summary states that "The Board's adopting resolution directed Air District staff to conduct a joint study with affected refineries to measure mass emissions from components in heavy liquid service", and there is a similar statement on page 4. The adopting resolution does not state that; it only states that
"the Board of Directors directs staff to examine emission reduction and cost effectiveness issues related to the inclusion in Regulation 8, Rule 18 of requirements for monitoring of components in heavy liquid service, and to report back to the Stationary Source Committee prior to July 2017 regarding the results of the examination together with recommendations for modifying the rule if appropriate based on the results."

Response: The Executive Summary was revised to reflect the specific resolution language.

Comment: "The Executive Summary (p. ES-2) shows Table ES-1, "Estimated Population by Component Type".
a. This appears to be the population that was in Heavy Liquid Service and should be labeled as such."

Response: Both Table ES-1 and Table II-3, which was not identified but is identical to Table ES_1, were revised to reflect components in heavy liquid service.

Comment: "This also appears to be the population estimate from 2015. Given the amount of detailed information that the District has received in each refinery's 2016-2020 Rule 12-15 submittals, a more recent estimate should be provided."

Response: The report was revised to include both the original population estimate (since it was the basis for establishing the screening target sample) and the estimated population at the end of the Study.

Comment: "Given the confusion that has been previously discussed it is not clear if the "pump" count is the number of pumps, or the number of pump seals."

Response: The estimate is the number of pumps, not pump seals.

Comment: "For consistency with the rest of the Report, the pressure relief device (PRD) count should exclude the count of PRDs that are in vapor service (where the vapor is coming off heavy liquids). Information in the report indicates that 30 PRDs were screened and it is not clear if that number reflects PRDs that are actually in heavy liquid service."

Response: The cited counts include all components that were included in the Study that handled material with an initial boiling point greater than 302 degrees Fahrenheit. The 30 PRDs were identified and verified by refinery personnel as being in heavy liquid service and not in vapor service.

Comment: "The Executive Summary (p. ES-3) mentions that "Process units were first selected using process flow diagrams provided by each petroleum refinery. After selecting process units, individual process lines were identified from petroleum refinery-provided piping and instrumentation diagrams." It should clarify that the District selected both the process units and the process lines."

Response: The referenced section and text was revised to include "by the Air District" to provide the requested clarification.

Comment: "On page ES-5 (and page 244), the section titled "Recommendations" states that "There were several component types for which average emission rates could not be derived either because there were insufficient numbers, their emissions could not be evaluated, or they are recommended for inclusion in a future study" – pressure relief valves that relieve to atmosphere, pump seals with steam or hot oil quenching systems, and components handling non-process lube oil. It should be clarified which ones are which: e.g., that the PRVs had insufficient numbers, the steam-quenched pumps could not be evaluated, and the lube oils were recommended for inclusion in a future study. For steam-quenched pumps, it should be acknowledged that WSPA did propose to get the best information possible with available monitoring equipment; however, the District identified that they did not agree with this, and also declined to specify what they would recommend."

Response: The report was revised to clarify the distinction between component types as suggested.

Comment: "With regard to the "future study" of components handling "non-process lube oil", the Report should recognize that WSPA developed the protocol, the District approved it, and the emissions data were provided to and quality-assured by the District in 2019. In addition, definitions continue to be important: "non-process lube oil" is shorthand for "low-volatility finished products", which were explicitly defined as

"finished products having an initial boiling point greater than 302° F that are being used for their intended purpose including, but not limited to, hydraulic fluids, glycol in transmitter loops, seal fluid, MEA, DEA, and lubrication oil used to lubricate, including but not limited to pumps, compressors and other rotating equipment"
or
"finished lubricants and base oils that require no further processing, other than blending, to produce finished lubricant products, and are at an operating temperature of less than 200° F".

To prevent confusion, this explicit definition should be included in the HLS Report (i.e., the Glossary)."

Response: The Glossary was amended to include an entry for "Non-Process Lube Oil".

Comment: "Section II.ii. is titled "Sampling Methodology" but describes both screening and sampling and should be titled accordingly."

Response: "Sampling" included both screening and mass emissions sampling and does not refer to only mass emissions measurements.

Comment: “Page 85 contains the text that “Component subtype categories were identified for connectors, valves, and pressure relief devices. Because of the number and diversity of component subtypes, a standardized listing of subtypes was not identified or provided to field personnel and subtype categorizations were left to the field personnel completing the standardized field data sheets. Proper identification and categorization of a component subtype depended upon the familiarity and knowledge of field personnel.” Since “proper” identification and categorization is not standardized and is acknowledged as having not been identified, the last sentence should be removed. This is also pertinent to the subsequent analysis of information by subtype; the subsequent tables and figures should be footnoted accordingly.”

Response: The Air District agrees with the comment regarding the word "proper" and this word was deleted from the last sentence in the revised report.

Comment: “Page 150 shows how TO-15 results were biased low compared to tube results, and states that “The difference between two figures for the same component is attributed to the difference in sample volumes for the canisters as compared to the sorbent tubes.” This statement appears to be flawed. What it should instead identify is that (1) there was a knockout upstream of the canisters and (2) the TO-method is more suited to more volatile components, as less volatile components may stay adsorbed on the canister walls.”

Response: The referenced language was not intended to address the difference between results between the two sampling media but rather to explain the difference between the concentration and mass emissions for the same compound. For example, Figure III.36 shows that the canister (TO-15) measured a higher concentration of C8 compounds than the other samples; however, in Figure III.37, mass emissions of C8 compounds from the other samples are greater than the canister sample. This discrepancy is explained by the fact that although the other samples measured less concentrations of C8 compounds, their sample volumes were greater, so their corresponding mass emissions were also greater.

However, to prevent confusion, the refenced text was deleted.

Comment: “There does not seem to be any discussion of the graphs on and around page 156, and the casual reader might erroneously infer that (for example) hydrotreaters have more leakers, etc. In fact, what seems more appropriate to conclude—given this study and previous ones—is that (a) there are very few leakers and (b) their location cannot be predicted a priori.”

Response: Language was added after Figure III.44 to address sampled emissions from hydrotreaters.

Comment: “Page 179 states that “The five petroleum refineries have agreed to incorporate any components handling a heavy liquid stream in the gaseous phase within their LDAR programs. As such, it will be necessary to have separate average emission factors with and without gaseous phase components.” If the components are subject to LDAR, there is no need to have an average emission factor that includes both them and components that are not subject to LDAR. More appropriate language addressing this issue is on page 229 and the language on page 179 should be corrected.”

Response: This section was revised to address the comment.

Comment: "Page 196 incorrectly identifies that the scenarios exclude gaseous phase components and components handling non-process lube oil; as identified by our other comments, they appear to actually include both the components in gaseous phase (which has a significant impact on the results, given the high screening values for several components handling gaseous phase material) and components in "non-process lube oil" service (though these are all very low emitters)."

Response: The screening data set included within the appendix includes all components that were screened including those in gaseous phase and non-process lube oil. However, the gaseous phase components were excluded from the derivation of the emission factors.

Comment: "On Page 212, the quotient (primary results – replicate results / average of the two) is not "absolute" difference but the "relative" difference. And the problem with using only this as a metric is that two results that are wildly different—e.g., by an order of magnitude, two orders of magnitude, or three orders of magnitude—will have very similar quotients (close to 200%, because the denominator will be approximately equal to half of the higher value)."

Response: The report was revised to state "relative" rather than "absolute" difference.

Comment: "On page 232, Table IV-1 is titled "Comparison of Number of Components Screened and Sampled Between 1980 Study and Heavy Liquids Study", but this is inaccurate; i.e., for the 1980 study, this is only the number of components in heavy liquid service that were screened and sampled. The table also mentioned that "The specific number of flanges in heavy liquid service that were screened is not known", but this information appears to be available in Table B2-21 on page 230 of the 1980 EPA study."

Response: The footnotes to Table IV-1 were revised to clarify the cited 1980 Study numbers include only those components in heavy liquid service (what is relevant for the comparison).

Regarding flanges screened in the 1980 Study, there appears to be a discrepancy in Table B2-21 when summing up the number of flanges by variable (none of the sums equal each other). It is not clear from the table whether it reflects all flanges in heavy liquid service that were screened or only a subset for which process variables were recorded. When totaling the cited numbers of flanges by process variable (e.g., gasket material, vibration, manufacturer code), none of the totals match each other.

For example, the total number of flanges by "Manufacturer Code" totals 209 flanges. The total number of flanges by "Gasket Material" is 254 while the total by "Vibration" is 307.

The text in Section 2.5.3 preceding Table B2-21 states "Note that the sum of the sources listed for each variable is not the same for all variable groups due to missing data for some sources."

This suggests that Table B2-21 reflects a subset of flanges that were screened.

Comment: “Pages 221-222 attempt to define the terms screening time and screening pace, but are still ambiguous. The sentence “Screening time is not expected to impact the actual leak concentration but rather what is measured” is unclear, given that there is no “actual” leak concentration – that is purely a function of how the measurement is taken. The Report needs to clarify that in the relatively simple case of something like a flange, the total time needed to screen it is going to be the sum of (1) the time needed to move the probe all the way around the flange (which is in turn a function of the diameter of the flange lip, not the line size) and what would often be referred to as the “pace” (speed of movement around the flange), as well as any obstructions that might require the screener to have to move to a different spot to screen and any other potential interferences; and (2) any additional time needed as a result of finding an elevated concentration: i.e., time needed to locate the point of maximum concentration, and hold it at that point. Our understanding—though it is not clarified in the report—is that this “total time” is the difference between the beginning and end times recorded by the screeners for each component. Accordingly, if “pace” as calculated in the Report is that total time by an estimated circumference (i.e., not the same as “pace” as defined above), the “pace” itself is a function of the extent to which a leak was found, and the graphs that seem to imply the difference that the pace makes on the emissions/screening value (p. 144) need to also have some discussion identifying that the emissions/screening value also affects the “pace”.”

Response: The Air District agrees with the statement that the measured leak concentration is a function of how the measurement is taken. However, there is an "actual" leak concentration that is attempted to be measured by the screening device. The intent of following established screening protocols (EPA Method 21, etc.) is to reduce the variation between the measured leak concentration and the actual leak concentration.

Regarding "pace", it is correct that the total time includes both the time to identify the location of maximum leakage as well as the time spent measuring the leak at that location. Additional language was included in Section III.i.5 under "Component Monitoring Time / Pace" around Equation III-1 to make this clear.

Component Classification / Scope

Comment: "Another key aspect of the study was that components in gas-phase service were supposed to excluded. The whole purpose of that agreement was technical in nature, pointing out that a vapor leak is very different from a liquid leak and can potentially have a nearly unlimited flowrate whereas a nondripping leak from a component in liquid service is limited by the rate at which the liquid volatizes."

Response: The Air District disagrees with the stated reason for excluding these components.

These components were excluded because they would be included within each refinery's leak detection and repair program for which average emission factors for non-monitored components would not apply. These components were excluded from the data sets used to derive the average emission factors. However, these components were left in the field screening data set that was included in an attachment to the report for an accurate accounting of what was found during the Study.

Comment: "Accordingly, the understanding was that the District would exclude components in vapor service from the analysis of components in heavy liquid service if the refineries agreed to classify these as components in "vapor" service (and included in their existing LDAR programs), and that is reflected in the draft HLS report text. However, it is not clear that the District has actually excluded those points from the analysis: i.e., both the data table in Appendix B-1 and several of the data summaries appear to include these components—two of which had screening values of over 10,000 ppm and two of which had screening values of 2,263 ppm and 1,749 ppm22--while others (such as Table III-64) seem to have excluded them."

Response: The referenced screening data was excluded from the analysis for deriving the average emission rates but was not excluded from the data set included in the appendix. This was done for an accurate reflection of what was found during screening.

Comment: "Page 227 states that "if a sample only included a bonnet flange and did not include the valve stem, this sample was considered a connector as the valve stem is considered the defining feature of a valve and the location where leaks most often occur". This was never discussed with WSPA, and we were not made aware if this situation ever occurred. A bonnet flange is a flange that is part of a valve, the CAPCOA Guidelines and this study clearly identify that "valve" includes both the stem and any bonnet flanges on the valve. If the District reclassified a valve's bonnet flange as a connector, that would be contrary to the what was agreed upon and this needs to be changed."

Response: This was discussed in Technical Working Group calls (for example, see notes/emails for meeting on 11/07/2019) and included in the "Data Entry / Analysis Comments" column of the "Heavy Liquids Study_Bag Data Analysis_2020-02-07_Technical Working Group-Revised_2020-06-15" sent to the Technical Working Group on June 15, 2020. However, there was no impact of re-classifying the few such components within the bagged data since the bagged data set for valves and connectors was ultimately pooled to derive the same regression equations for both valves and connectors.

Screening

Comment: " The District's initial screening was problematic, with very slow movement and hold times, multiple monitor breakdowns (list prices for new monitors can be in the neighborhood of $10K-$20K),15 monitors sometimes taking hours to return to background levels after monitoring (not just the much shorter times shown in Table II-12 of the draft HLS report), and some very large discrepancies between readings taken by different people monitoring the same component. The District subsequently modified its methodology over the course of the study to at least partially mitigate those problems – including changes in monitoring speeds and automatically swapping out monitors if elevated concentrations were found (another added cost)—but these changes and their timing are not divulged (and in some cases are inaccurately stated) in the draft HLS report. The HLS report needs to divulge the details of these issues, both for purposes of cost implications and improving future studies."

Response: Changes in the methodology employed are discussed in Section II.i.6 (Modifications of the Experimental Design) and in Section II.ii.3 (Modifications of the Experimental Design). The comment regarding cost implications would apply to the rule development process and should be made then.

Comment: "The draft HLS report also omits mention of a key concept associated with the screening methodology that explains several of the findings in this study and therefore is important to include in the revised report, both for purposes of analyzing the results of this study and planning future ones. While the report recognizes the problems associated with steam condensing in the monitors (for steam-quenched pump seals), it fails to point out the much more widespread issue that heavy hydrocarbon liquids at high temperatures are prone to condensing in screening monitors and their probes.

This is the reason for the slow response times and "clear times" noted on pages 49-50, 67-71, 99, and 220, and may also contribute to the apparent "drift" issues mentioned on pages 68-69 and 222 (which can result from calibration gas getting adsorbed by heavy liquids that are adsorbed on the probe wall and/or recalibrating instruments with zero gas when they still have some residual adsorbed hydrocarbon, rather than true "drift"). This deposition is also why monitors needed to be swapped out after readings higher than specified values (something that should be mentioned in the draft HLS report): i.e., people sometimes had to flush the monitor for hours to clear out the deposited material. On the other hand, if there is insufficient cooling in the probe, hot material can reach the detector and damage the monitor, which only has an operating range of -10 to 45 °C (14-113 °F).19 These problems were exacerbated by the study's specification to always hold the monitor's probe tip closer to components than required by Method 21 (exposing it to the hottest temperatures) and hold it in place for an extended period of time, and that should be recognized in the report."

Response: The occurrence or impact of hydrocarbons condensing within and affecting screening instruments was not evaluated as part of the Heavy Liquids Study. However, this possibility was included within the revised report in Section IV (Discussion). ii (Screening) as well as in Section IV.viii. (Future Studies).

Method 21 requires screening at the interface of components where leakage occurs. Where a pumps or compressor shaft is rotating, Method 21 allows that the screening instrument probe inlet may be positioned up to 1 centimeter away from the interface. As such, the comment suggests that Method 21 screening may not be performed with the TVA 2020 (the screening instruments used in the Heavy Liquid Study) for any components handling materials with a temperature above 113 degrees Fahrenheit (the listed operating range).

It is the Air District's understanding that several of the petroleum refineries use either the TVA 2020 or its predecessor, the TVA 1000B, within Method 21 inspections of components handling materials with operating temperatures well above 113 degrees Fahrenheit.

Comment: "Section II.i.6 should include the information in the March 8, 2018 and March 16, 2018 e-mails from staff (i.e., Linda Duca/BAAQMD), which were helpful to field personnel and provided useful clarifications. It should also clarify that sampling was called off when it was raining. WSPA can provide copies of these emails if the District does not have them."

Response: Section II.i.6 addresses changes to the design of the study. However, the referenced e-mails address changes to the screening/sampling methodology discussed in Section II.ii.3. This section of the report was revised to include additional clarifications.

Comment: "Page 50 shows an IR temperature gun being aimed inside a flange between the gasket and the flange face. There are several issues with this:

a. This specific direction of where to aim the gun on a flange was not specified in the protocols that were in place at the time that the District inspectors did their work, or in the 2018 protocol that was in place at the time that the refineries/contractors did their work, nor did WSPA observe it in the field
b. It is unclear how a person would be able to point the laser at such a spot, given that the flange ends are bolted together tightly over the flange (see, for example, Figure II.1 on p. 34).
c. It should be recognized that the laser spot is an approximation of where the temperature is being measured from; it is not exact (i.e., the temperature is not being read from the exact spot where the beam hits)."

Response: The Air District provided this guidance in training to both Air District inspectors who participated in screening as well as to the third-party auditors overseeing screening by refinery personnel. As can be seen in digital photographs of flanges, some bolted flanges can have gaps of several inches. Therefore, it is possible to obtain temperatures as shown in the figure.

The Air District recognizes that temperature measurements were estimates. As with all measuring instruments, there are uncertainties with the measurement attributed to both the instrument itself as well as with how the instrument is employed.

Comment: "The precise changes in screening time that were made are not documented in the draft HLS report and need to be. Other changes that were made in the study over time included changing the leak threshold of 2.5 ppm (identified on p. 51) and swapping out monitors whenever a concentration over a specified value was detected."

Response: There were several changes implemented to improve the efficiency of screening components.

These included:
- increasing the threshold for the documentation of leaking components (from 2.5 ppmv to 25 ppmv), which reduced the amount of time in between screening of components.
- revising practice of swapping screening instruments every 25 components (to reduce potential of failing a drift criteria), and
- revising the practice of conducting a drift test of a screening instrument after measuring a leak of 25 ppmv or greater (to reduce potential of failing a drift criteria).

These changes are documented within the report. However, the minimum screening pace requirements or direction was not changed.

In a March 8, 2016 email (referenced in WSPA Comment # 19) from staff to WSPA, staff stated "Monitoring Pace: Continue to work to ensure that monitoring pace is slow enough to spend at least 1/4" per second of circumference of the component when the monitoring for leaks, and as long as necessary to reach the maximum ppm value leak (1 minute plateau guideline)."

Comment: "On page 68, a key monitor specification that is not identified is operating temperature range. This should be identified; the TVA has an operating range of -10 to 45 °C (14-113 °F)."

Response: This was not discussed prior to initiating the Study and was not included within the Protocol that was extensively discussed with WSPA. Checks were not done in the field to verify that the instruments were used within this range. As such, it was not included in Table II-9 of the report.

Comment: "Page 220 defines screening instrument "response" as "the difference between the measured concentration and the actual concentration of a leak", but there is no "actual concentration of a leak". The actual concentrations in the vicinity of the leak vary spatially and temporally and depend on many factors, including the size of the wetted surface exposed to the air, airflows around that wetted area (including those due to wind and those due to a monitor's sampling pump), temperature (at the liquid-air interface), and the equilibrium vapor pressures and vaporization rates of the various components of the liquid as a function of temperature. What is going to be recorded by the instrument is going to be a function of those actual concentrations, the sampling pump flowrate, the location and orientation of the probe tip (and the extent to which that location and the pump speed influence the actual concentrations), instrument response time and response factor (both of which can also depend on the substances in the liquid being monitored), the extent to which you have a steady-state situation between the volatization rate from the leak point and the flow going into the probe tip, the extent to which you are outside the monitor's temperature range, and the extent to you lose material due to deposition in the probe and instrument or gain it due to the revolatization of material that was previously adsorbed on to the probe wall/instrument surfaces (both of which are affected by temperature, equilibrium vapor pressures, and volatization rates)."

Response: The entire sentence in the draft report should be cited: "Screening instrument response (the difference between the measured concentration and the actual concentration of a leak) was found to vary depending upon the stream material, the leak magnitude, and the temperature of the stream material."

Most of the variables identified in the comment (pump flow rate, probe orientation, probe location) were stipulated within the procedures to follow by screening personnel. Assuming these procedures were followed, the stated language in the report still applies.

Comment: "On page 230, there is mention of use of a FLIR camera that was terminated "when the petroleum refinery personnel determined more process lines than expected would be affected and it became a daunting task" that is then followed up with an alternative explanation that "this effort ceased once several components with leaks were discovered with screening values above 10,000 ppmv were identified". The latter is an unsubstantiated statement that appears to be a gross mischaracterization of the fact that FLIR camera readings are often interfered with by heat. In addition, FLIR cameras do not measure either concentrations or screening values. Accordingly, this statement should be removed."

Response: The comment conflates two statements within the draft report.

The cited language is from the following paragraph:

"Believing that the likelihood of such leaks was limited to a few process lines, one petroleum refinery manager offered to use their subject matter experts to identify process lines within their petroleum refinery through knowledge of their operating conditions and physical chemistry calculations. However, this effort was halted when the petroleum refinery personnel determined more process lines than expected would be affected and it became a daunting task."

It is clear from the context of the paragraph that the cited text applies to the effort to identify process lines through knowledge of operating conditions and physical chemistry calculations.

Regarding the use of a FLIR camera, the report states that "there were several concerns with this approach:

- the operator skill needed to correctly position the camera at each leak point for a valid reading,
- potential interference or masking of leaks by steam, clouds of which are ubiquitous within each petroleum refinery, and
- the high threshold for identifying leaks, potentially missing moderate to significant leaks."

However, the use of a FLIR camera for identifying large leaks (> 10,000 ppmv) is common practice by the petroleum refineries as well as cited in published documents by the CARB and the EPA.

See Section 2.1 (page 2-2) of California Air Resources Board "Air Resources Board IFB No. 13-414: Enhanced Inspection & Maintenance for GHG & VOCs at Upstream Facilities – (Revised)", dated November 2019:

"A FLIR GF-320 infrared (IR) camera was also used to survey all equipment for large leaks (i.e. leaks > 10,000 ppm)."

https://ww2.arb.ca.gov/sites/default/files/2020-04/2019-11-21%20CARB%2013-414%20Revised%20Final%20Report_0.pdf

Comment: “Page 200 shows drift check results for calibration gases. However, what would be particularly interesting to know would be (1) what the drift results for the zero gases were (obviously, those can’t be expressed as %) and (2) what sequence the drift checks were done in (e.g., was 10 ppm always first). This might potentially shed more light on results.”

Response: The sequence of calibration drift checks was expected to be in sequential order (zero gas, 10 ppmv, etc.). However, the field data sheets did not capture this information so it would not be possible to verify whether all calibration drift checks were indeed done sequentially.

Comment: “The discussion of the justification of the screening methodology on page 220 of the draft HLS report appears to be most focused on obtaining the highest screening value possible, rather than recognizing that these are truly screening instruments – especially in heavy liquids application – where it may be better to do a larger number of screenings quickly than do a smaller number slowly. The report should recognize and acknowledge that for purposes of emissions, what is most important is that the screening methodology used to screen components and the screening methodology used prior to bagging (that is used to relate screening values to emissions rates) are consistent.”

Response: The Study required that both screening and bagging utilize the same screening methodology, which included identifying the maximum screening value. The comment suggests that rather than identifying the "highest screening value possible", it would be preferable that screening be conducted within the same screening duration (faster than the time required to identify the maximum screening value). However, TRICORD's (WSPA bagging contractor) data showed the fallacy in this.

For each bagged sample taken at Refineries B, C, D, and E; TRICORD recorded two pre-bag screening results: one after eight seconds and the maximum screening value identified, regardless of time duration, as well as the total time spent to reach this maximum value. Several of these components had the same 8-second pre-bag screening result but had different final pre-bag screening values.

For example, bagged samples D019, D025, and E016 all had 8-second pre-bag screening values of 58 ppmv. However, they had final pre-bag screening values of 76 ppmv, 63 ppmv, and 967 ppmv, respectively. The measured mass emissions of E016 was one and two orders greater than that measured with samples D019 and D025.

In this case, if only samples D019 and D025 were bagged and E016 only screened, mass emissions from E016 would be underestimated by one or two orders of magnitude following the comment's suggestion.

Sampling

Comment: "In several parts of the Report it is mentioned that "Method 18" was used—including for the evacuated canisters, for which it does not apply—and US EPA Method 18 is included in an appendix; page 62 states that samples were analyzed "following the procedures specified in Section 8.2.4 (Adsorption Tube Procedure)". There is actually very little analytical detail in that Section (or in Method 18 as a whole), and typically not all of the procedures are followed. Among analytical laboratories, the term "Method 18" is often used colloquially to refer to GC work in general. Details of the actual analytical work conducted were provided to and reviewed by the District's source test division. At a minimum, Method 18 should be removed from the appendix, and canister analysis should only reference the relevant "TO" method."

Response: Method 18 is listed on the cover sheets of laboratory reports from Enthalpy Analytical for samples taken by TRICORD (WSPA's consultant) as well as by the Air District. For sampling done with evacuated cannisters, Method 18 was used for any liquid condensate collected in prior to the cannister. The report was revised to clarify this distinction.

Comment: "Page 72 states that "A Thermo Fisher Scientific TVA1000B was used at the pilot refinery (Refinery A) while a Thermo Fisher Scientific TVA2020 was used at the other refineries." That statement is not accurate – i.e., TVA2020's were used at Refinery A as well (as the District specified in their protocol) - but we are not completely sure whether they were used 100% of the time. This can be confirmed from the District's field sheets, which identified all the TVA #'s used."

Response: The referenced sentence applies to the pre-bag screening that was conducted by TRICORD at Refinery A. See July 07, 2017 email from David Ranum of TRICOD to Kevin Buchan of WSPA, in which TRICORD agreed to use TVA 2020 after Refinery A.

Comment: "There is no indication that the "sample train recovery tests" mentioned on page 74 were done – e.g., no data is provided – and this sentence is unclear: "The theoretical amount of methane introduced into the system was calculated using the measured concentrations (introduced and bag measured) and gas flow rates and compared to the amount calculated as collected in the bag, correcting for pressure and temperature." If they were done, please clarify (i.e., how is gas flow rate pertinent) and if they were not done, please remove reference to them."

Response: These tests were conducted by WSPA's bagging contractor, TRICORD and calculated using gas flow rate. These recoveries were provided to the Air District by WSPA and TRICORD. The report and Appendix C-2 were revised to include the results of these tests (see new Table C-2-6).

Comment: "Page 77 states that 'a select few [samples] were taken with a XAD tube in series with the charcoal tubes with the XAD tube closest to the component leak'. To be clear, all of the initial samples were taken with XAD tubes to comply with the District's original protocol. The test protocol was subsequently revised when it was realized that these tubes (a) were not necessary and (b) created excessive pressure drop. District source test personnel had a good explanation for why the XAD was originally specified, and why they were subsequently dropped and this information should be included in the writeup. Similarly, page 79 indicates that lab results went to only C24, but C30 for condensate; the original version of the District's protocol mentioned taking all analysis out to C30, but this was subsequently scaled back when it was recognized that this was not necessary."

Response: This is discussed in section II.ii.3 "Modification of the Experimental Design" under Sampling Media and Analysis.

In a July 07, 2017 email from David Ranum of TRICOD to Kevin Buchan of WSPA regarding changes made after Refinery A, TRICORD stated "XAD Tubes - TRICORD understands that the District may request XAD tubes be used on certain high temperature components. Provided the District gives 24-hour notice, TRICORD will be able to arrange the sample collection using the same setup used at [Refinery A] - i.e. 3 series connected tubes consisting of a XAD tube, followed by two charcoal tubes."

Therefore, the use of a XAD tube was not summarily "dropped".

Comment: "On page 226, when providing details regarding sample C004, please add that the vapor was obviously not from a heavy liquid – i.e., this was the sole component for which the overwhelming majority of the sample was C5."

Response: The Air District confirmed the sample was from a component in heavy liquid service and cannot provide more information without possibly divulging confidential business information.

Correlation Equations

Comment: "Correlation equations are needed to estimate the mass emissions rates that correspond to each of the measured screening values which are then combined to determine average emissions rates. The need for correlation equations was mentioned extensively by the District between 2016-2020, and while the abstract to the draft HLS report refers to correlation equations, those equations are not identified in the report."

Comment: "As shown previously by EPA, WSPA, and CARB, the first step towards developing correlation equations is to do linear regression in log-log space, which the District did. The District added an additional term for temperature because there was a statistically significant dependence and including that term reduced residuals. WSPA understands why this was a first step, but repeatedly asked the District to reconsider or refine that inclusion. There are several reasons that WSPA is still asking for the inclusion of correlation equations:"

Response: The intent of the Heavy Liquids Study was to estimate average emissions, not to develop correlation equations. As stated in Appendix D-1, the transformation scale bias correction factor approach was not appropriate for and not used within the Heavy Liquid Study. As such, the transformation scale error could not be readily accounted for and combined with the regression equations to develop the requested correlation equations.

Temperature

Multiple comments were made regarding the inclusion of a temperature variable within the regression equations used to estimate emissions from screened components.

Comment: "While the portion of the equation that includes temperature is a simple line in log-log space, when the equation for emissions (as opposed to the log of emissions) is written, temperature is an exponent, and that form of the emissions equation shows an unrealistic dependence on temperature that is not sufficiently supported by the data or scientific principles."

Response: It is unclear which principles should be involved – whether the relationship of leakage to temperature is linear or exponential. The Study goal was to provide good estimates of emissions. This involved finding its relationship with other variables that are best supported by the data.

Taking the logarithm of temperature – lt = $\log_{10}$(temperature) – was considered rather than t = temperature but this was rejected because temperature provided a better fit.

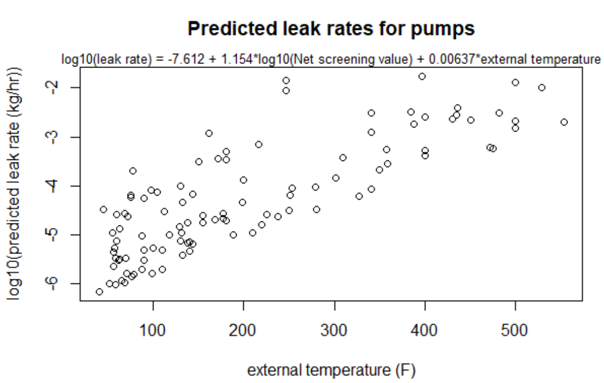
A test of this is to put both lt and t into the same model. Of course, these are highly colinear. In the pump seals regression equation, neither is statistically significant – that is the inclusion of either after the other in the model does not improve the fit. But for the valve and connector regression, the inclusion of t after lt is statistically significant whereas the inclusion of lt after t is not. Thus, t provides a better fit, so it is used.

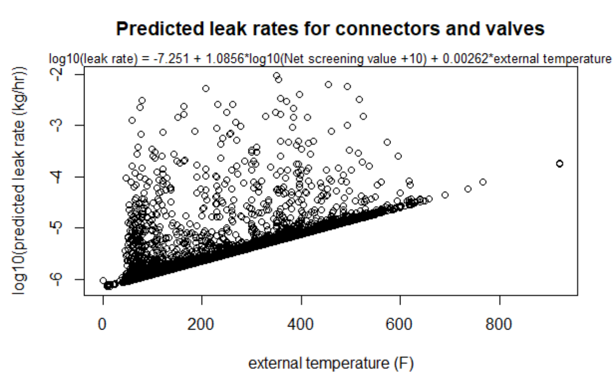
Comment: "The component temperature data themselves are not very high quality."

Response: The comment is a subjective judgement. The value of a variable here is if it can add precision to the estimate of emissions leakage. The temperature term is highly statistically significant and does appreciably improve the fit as will be demonstrated below.

Comment: "An exponential form yields vastly larger factors at high temperatures."

Response: Although there is validity to the comment, it is counterbalanced by the very low leakage rates predicted by the other factors. As shown in the following figures, high temperatures do not produce leakage estimate outliers.





Comment: "There was no guidance regarding the specifics of temperature monitoring in the protocols provided to the screeners, baggers, and 3rd party observers,20 and the District appears to have filled in missing component temperature data by simply setting them equal to "operating temperature" data (even though there is considerable scatter in the correlation between those temperatures, and Figure III.i.2.6 of Appendix D.1 illustrates a difference between "operating temperature" and component temperature)."

Response: Direction was given in training provided by the Air District's field team to the refinery screening personnel and was included within training materials.

Comment: "The addition of the temperature dependence adds complexity and makes the equation less useful for purposes outside of this study (i.e., it could only be used to calculate mass emissions if screeners also had the time to collect temperature data)."

Response: The Air District cannot speak to "purposes outside of the study", only to those of the Study, which were to evaluate emissions from heavy liquid service components.

Comment: "The temperature correlations appear weak (as shown in Figure III.i.2.6 of Appendix D.1 below) – in particular, too weak to support the current form of the equation over other forms for temperature that might make more sense (e.g., ones where the effect of temperature changes with screening value) – and it does not appear that they appreciably improve the results."

Response: The comment "appreciably improve" is subjective. The inclusion of the temperature term in the valve and connector regression equation improves the adjusted R^2 from 74.0% to 84.2%, and in the pump seal regression equation from 64.5% to 72.8%. The p-values for the temperature coefficients were < 0.0001 and 0.003 respectively.

In this case, the important issue is how well the component leakage can be estimated by the regression equation, which is governed by the regression sigma.

For valves and connectors, the sigma dropped from 0.5348 to 0.4173. Even this modest reduction will make a big difference on the original scale, where the estimates are $\hat{Y}_i = 10^{p_i + \sigma Z_i}$, where Z_i is a standard normal variable, here assuming pi and σ are known, for simplicity.

Although the confidence intervals in the analysis were based on simulations, they will act similarly to one based on the Central Limit Theorem (CLT), namely that the estimate

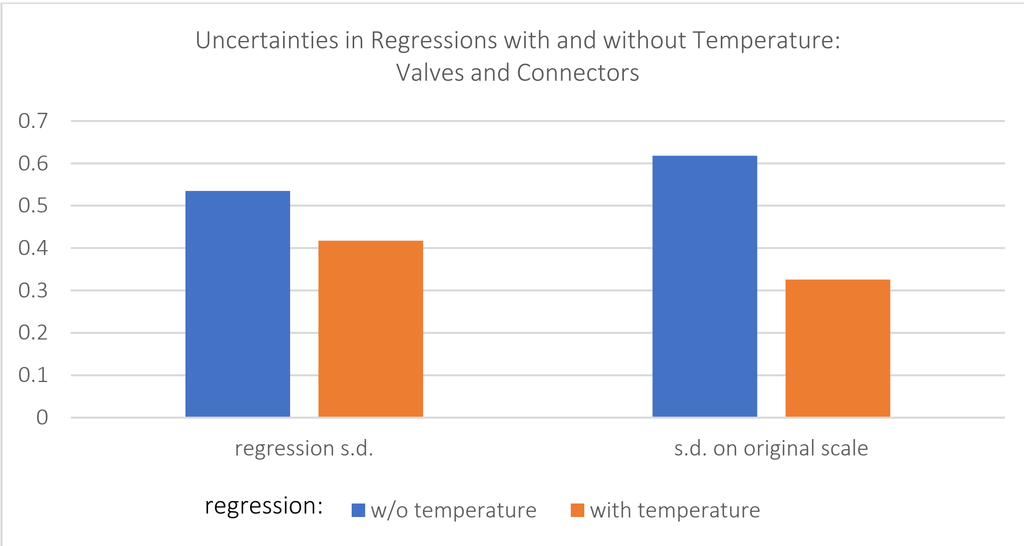
$L = \sum_{i=1}^{n} 10^{p_i + \sigma Z_i}$ is approximately normal with variance

$Var(L) = \sum_{i=1}^{n} Var(10^{p_i + \sigma Z_i}) = \sum_{i=1}^{n} 10^{2p_i} Var(10^{\sigma Z_i}) = Var(10^{\sigma Z}) \sum_{i=1}^{n} 10^{2p_i}$. considering the p_i and σ constant.

The upper bound of the confidence interval will be proportional to the square root of $Var(10^{\sigma Z})$. $10^{\sigma Z}$ has a lognormal distribution with scale parameter μ = 0 and shape parameter ln(10)σ. Therefore, its variance is:

$\tau^2 = e^{2\ln(10)^2\sigma^2} - e^{\ln(10)^2\sigma^2}$.

Applying this to the estimated standard errors, τ = 0.62 for a standard error of 0.5348 and τ = 0.33 for a standard error of 0.4173. So, the CLT approximated confidence interval would be almost twice as wide with the former s.e. as the latter (see figure).



For pump seals, the difference in standard errors is more modest, 0.7264 for the model without temperature vs. 0.6345 for the model with. The corresponding τ's are τ = 1.57 and τ = 1.01, so even here the confidence intervals for a regression without temperature would be more than 50% larger (see figure).

The goal of the analysis was to provide leakage estimates that were as precise as possible. The reduction in confidence interval widths of more than a third to almost in half is an appreciable improvement in our opinion.

Comment: “On page 145, there should be some discussion regarding the fact that the act of bagging itself can increase the temperature around the component (compared to when it is open to air; i.e., heat trapping) and cause more emissions than would have otherwise been present, as illustrated by the photos and associated text that WSPA’s consultant provided to the District in the past. This also seems to be born out by the results for A09 mentioned on page 212, where a component that was bagged for an extended period of time showed two orders of magnitude more emissions from the bag at the end of the time period than at the beginning of the time period.”

Response: The report currently states that the act of bagging may affect emissions (see page 225). The Study did not evaluate whether bagging would lead to a temperature rise, the degree of temperature rise, and what impact that may have on emissions. Regarding Sample A09, a plausible reason for the difference in measurements could be a change in the process or operation.

Statistical Approach

Comment: "The second step towards developing correlation equations – in previous studies by EPA, WSPA, and CARB – was then to adjust the linear regression lines for the scale transformation. The District opted to not adjust for scale transformation explicitly—in part because of a claim that a certain distribution was necessary, and use a bootstrapping approach instead. WSPA finds the writeup in Appendix D.1 confusing and the draft HLS does not clearly identify,

- Which of the eight scenarios shown in Tables IV-4 and IV-5 was eventually used to determine average emissions (page D-1-27 identifies which ones had "the highest adjusted R2 and lowest sigma", but does not specify that these were the scenarios used, and none of the parameters match those shown in Table III-62 on page 177); or
- Any quantitative intermediate calculations/sample calculations showing how the District arrived at the emission factors using the regression equations."

Response: Scenario 6 was used, and the report was revised so that regression parameters shown in Table III-62 match those shown in Appendix D-1. Appendix D-1 has been revised to include more discussion and figures surrounding the approach used.

Comment: "Because there are several calculations being made, a key check that was explicitly discussed and agreed to by the District in 2018, was to make sure than when each correlation equation was applied to the corresponding screening values measured prior to bagging, it agreed reasonably well with the actual measured emissions rates for those bags. (It could also be compared to other studies' correlation equations.) Although the District appears to have predicted emissions rates for each component, the draft HLS report appears to be missing this validation check. We ask the District to provide in the HLS report the correlation equations used to estimate the mass emissions rates from screening values, provide the estimated mass emissions rates, and do the validation check."

Response: "As noted in WSPA's comment above, the Study did not adjust for scale transformation error directly but did so through simulation. Therefore, there are no direct correlation equations to use directly for comparison. However, the Air District did enter the bagging data set within the same approach as used for the field data set and compared the estimated mass emissions results with those that were measured. Appendix D-1 of the report was revised to include new Section III.iii.1 (Validation Check), which describes this validation."

Comment: "Please provide the table of mass emissions rates that were calculated for the screening values in the valve/connector category that were used to calculate the average emission factor for valves."

Response: The comment appears not to understand how the average emission rates were estimated. There was no single table of mass emission rates. Rather there were 10,000 tables where the median value from each simulation run was taken. The average emission rate was then the median value of the 10,000 arrays of median values.

Comment: “At the bottom of page 192, there is a statement that “Using the regression estimates and cumulative probability theory (see Appendix D-1 for a detailed analysis), a cumulative distribution of the maximum emissions by component type was derived and shown in Figure III.66.” It is unclear what is meant by “maximum emissions by component type”—i.e., does it mean maximum measured in this particular study? The subsequent statements that “there is a 70 percent chance of one of the petroleum refineries’ connectors leaking more than 0.1 kg/hour and a 40 percent chance of the maximum being greater than 0.2 kg/hour” and “For valves, there is a close to 50 percent chance of leaking more than 0.1 kg/hour and a 20 percent chance of leaking more than 0.2 kg/hour” are also unclear. On the face of it, these seem to be substantially different from the other study results (i.e., if there was really this much leakage, the average emission factors would be orders of magnitude higher). If what was instead meant was e.g. that “at a given refinery, there is a 70 percent chance of at least one connector leaking 0.1 kg/hour”, the sentence should be worded that way.”

Response: The referenced text is intended to be interpreted literally - "maximum emissions by component type" - and not as measured in the study. The paragraphs that come after the text state "[t]o understand whether screening results may be biased because of missing large leakers...".

The intent of the section is to discuss the probability that the Study did not include one or more large leakers that may exist within the population. As noted in the comment, if such a leaker were included, "the average emission factors would be orders of magnitude higher".

Comment: “Page 235 mentions “eight different regression scenarios” but does not identify what those scenarios are, or why they were chosen. It should include the description of the scenarios from page D-1-25 and provide an explanation of why these eight scenarios were chosen. There was a lot of discussion about this topic and yet there seems to be no information in the Report about it; there should be, as this was an interesting topic that might be of some relevance to future studies. One key reason those scenarios were developed was that there appeared to be a substantive difference between emissions rates measured by the District’s bagging team and emission rates measured by Tricord, with the former being lower. This was analyzed by the District in Spring 2017 and by others in 2018-19, yet we could not discern a reason for the difference, or assess which sampling crew was likely to be getting the more correct result. Accordingly, when assessing how to deal with duplicate samples taken on the same component, the question arose as to whether to disregard all of the District’s sampling entirely (scenarios #3, 4, 7, and 8) or to simply take the first result, whether the District took the data or Tricord did (scenarios #2 and #6). WSPA was against double-counting a component just because multiple samples were taken from it, and so never agreed to scenarios #1 and 5. The other key reason those scenarios were developed was that WSPA had pointed out that the data in the 0-10 ppm range were pretty imprecise (as were many of the results for the 10 ppm cal gas), so it might not make sense for those data to be influencing the regression lines as much as the higher data. So scenarios #1-4 were for linear regression across the full range of data, and #5-8 were for linear regression across just the screening values of 10 ppm and higher. We believe it is more justifiable to make a consistent decision. It appears that the District may have chosen different scenarios for pumps versus other components, and made that choice based on statistical correlation parameters.”

Response: The report was revised to include the referenced description of the scenarios as well as a discussion concerning the rationale for the scenario chosen and used in determining average emission factors.

Comment: “The District goes through several comparisons of its log-space regression equations with those of the 1980 study – which nobody has been using the regression equations from –and then declines to compare to the regression equations in the 1993 API study (which is also the backbone for the correlation equations in the 1995 EPA Protocol and 1999 CAPCOA guidelines) because “because the intent of the 1993 Refinery Study was to derive new correlation equations rather than average emissions, a random sampling of components was not done. Rather, components within given screening ranges were located and then sampled. Therefore, the 1993 Refinery Study screening results would not be a representative sample as a comparison to those found in the Heavy Liquids Study.” That is a completely wrong conclusion. The 1993 API study did the exact same thing that was done in this study: i.e., bagging was done across components based on their screening values (non-random) so that data would be useful for generating correlation equations. This is the reason for the “prioritization” table on page 31 of the November 2017 version of the District’s HLS protocol. The District should make the comparison.”

Response: How data was obtained from the 1993 Refinery Study differed from that obtained in both the 1980 Study and the Heavy Liquids Study. The 1993 Refinery Study included components that handled gas, light liquid, and heavy liquid service while the Heavy Liquid Study did not.

The 1993 Refinery Study did not develop average emission factors for heavy liquid service components while the 1980 Study did.

The premise of the Heavy Liquids Study was that the emissions estimated using the 1980 Study average emission factors may no longer represent existing emissions. Therefore, a comparison with the 1980 regression equations is appropriate while a comparison with the 1993 Study is not.

Comment: “Page D-1-32 states without explanation that “The distribution of y = log (leak rate) has been demonstrated to not be normal and thus the same approach used in the 1980 EPA Study is not appropriate.” The 1980 EPA Study did not use a straight lognormal assumption but instead used “a mixed distribution, specifically a lognormal distribution with a discrete probability mass at zero”.

Response: Appendix D-1 was revised to address this comment.