May 30, 2023
Project No. 01210112.02 Task 11

Marcy Hiratzka
Clerk of the Boards, Executive & Administrative Resources
Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105

Subject: **Request for Regular Variance**
Berkeley Landfill
City of Berkeley
Facility A3590

Dear Ms. Hiratzka,

On behalf on the City of Berkeley (City), which owns and operates Berkeley Landfill (Landfill), SCS Engineers (SCS) is submitting a request for a regular variance due to a need for additional allowable gas collection and control system (GCCS) downtime. The Landfill respectfully requests a regular variance to be allowed downtime for the duration of 2023 beyond what is allowed in the Bay Area Air Quality District Management (BAAQMD or District) regulations. A summary of the GCCS events and proposed course of actions are below.

Background

The Landfill's GCCS collects landfill gas (LFG) from all areas of the landfill and sends it to a flare station where the LFG is combusted within an enclosed flare. The Landfill, which was constructed on reclaimed tidelands of San Francisco Bay, began receiving waste in 1961 and continued operations until 1983. The GCCS for the site was installed and became operational in 1988. In March 2009, the City petitioned for a Less than Continuous (LTC) Operation allowance for the GCCS. The petition was approved on April 30, 2009 and was repeatedly renewed on a 3-year cycle until the installation of a new, smaller flare was competed in May 2019. As the Landfill was operating on a LTC basis historically, there has not been a concern of exceeding the requirements of BAAQMD Regulation 8, Rule 34, Part 113.2, which allows for up to 240 hours of inspection and maintenance downtime of the GCCS.
In 2022, a petition for the continued LTC operation status at the Landfill was submitted to the BAAQMD permitting division. Upon multiple information requests from the BAAQMD for additional data and the Landfill providing said additional data, the Landfill decided to withdraw the petition as the BAAQMD permitting division believed massive upgrades were required on the wellfield before they would re-grant the LTC operation status.

In 2015/2016, the City performed extensive below grade LFG vertical extraction well component upgrades (including lateral pipelines, valves, test ports and security access vaults) and replacements at the Landfill. Therefore, the City believes that no wells require additional repairs at this time, as the LFG composition and generation volume is representative of the age of the landfill and waste placed within.

As the 2022 petition for LTC was not granted by the BAAQMD and subsequently withdrawn by the City, going into 2023, the Landfill was required to utilize the downtime hours as allotted by 8-34-113.2 for

qualifying events per BAAQMD Compliance Advisory issued in November 2018. As 2023 commenced, there were two issues which caused GCCS downtime to accrue at an unexpected rate, the first being thermocouple failure, and the second being heavy precipitation.

Weather Events & Equipment Issues

In the beginning of 2023, there was an unprecedented amount of liquid infiltrating the GCCS at the Landfill due to heavy precipitation events. The system was simply not designed for the massive quantities of liquids which occurred in early 2023. There had been condensate buildup within the below grade piping systems due to saturated site conditions and the condensate sumps were unable to drain at an appropriate rate because of the heavy rains. Initially, the Landfill planned to have a vacuum truck onsite to remove the liquids, yet the ground was so saturated that it could not safely access the location to extract liquids. Within five days, the heavy liquids naturally drained from the system. As a result of the unprecedented weather conditions and the system being unable to clear the liquids, there were prolonged periods of downtime at the flare, resulting in GCCS downtime. In addition to the unprecedented weather conditions, the thermocouples in the flare were glitching causing shutdowns and prevented remote restarts. This caused prolonged downtimes as the flare then was required to be manually restarted in these events, which required personnel to travel to site for the manual restarts taking much longer than remote restarts.

Replacement Equipment

The issues from the thermocouples first occurred in January 2023, yet it was unknown at that time that they both required full replacements. It was not until later in April 2023 it was identified that the thermocouples were damaged and it was necessary for the equipment in the flare to be replaced. The thermocouples and thermocouple card, which controls the thermocouples, were replaced promptly once it was identified replacements were needed, yet downtime then occurred at the flare to allow for the replacement of the thermocouples.

Excess Emissions

There have been no excess emissions at the Landfill, up to the present as some downtime is allowed up to 240 hours of downtime within a calendar year per the rule and BAAQMD guidance.

As it is not known the amount of downtime which may be required for the remainder of the year, we have conservatively estimated potential emissions based on the results of the 2022 source test at the flare, the historical flow rates and the methane concentrations in 2023. The tons per year were based on a conservative estimate of 240 hours of downtime beyond the original 240 hours of allotted downtime per 8-34-113.2.

Table 1. Estimated Excess Emissions

	lb/day	tons/year
VOCs	0.87	0.0043
NMOC	0.89	0.0045
Total HAPs	0.05	0.0003

Emissions estimates based on proposed operation of 24 hrs/day and 240 hrs/yr.

As mentioned above, the amount of downtime for the GCCS for the remainder of 2023 is unknown at this time.

Closing

The GCCS will continue to operate, but it is unknown what event(s) could occur which may trigger additional downtime. As noted above, the depleted LFG available for recovery make it difficult to maintain continuous operation at the flare.

The City would like to pursue a regular variance as additional downtime is anticipated for the remainder of 2023, yet the exact amount needed is unknown at this time.

If you have any questions or concerns regarding this request or the proposed course of action, please contact the undersigned.

Sincerely,

Maria Bowen
Project Manager
SCS Engineers

Gabrielle Stephens
Senior Project Manager
SCS Engineers

Attachment: Regular Variance Application
2022 Source Test Results
Permit To Operate

Cc: Mary Skramstad, City of Berkeley
Stephen Harquail, SCS Engineers

REGULAR VARIANCE APPLICATION

Variance Application Form Instructions

Requests for variances from Bay Area Air Quality Management District (BAAQMD) air pollution regulations should be submitted to the Hearing Board of the BAAQMD using the attached form.

The Hearing Board is an independent quasi-judicial body created by California State law with the sole authority to grant variances from air quality regulations. After your application has been reviewed by the Hearing Board, you and the Bay Area Air Quality Management District staff will appear in a public hearing before the Hearing Board to present your respective positions.

Proper completion of the Application will help the Hearing Board fully consider your request and will help you prepare for the hearing. Any Application that is not substantially complete shall not be accepted by the Hearing Board Clerk.

FILING STEPS:

1. Properly complete the Application form. The form is available on the website at www.baaqmd.gov/publications/forms. You may complete the form on your computer and submit the copy you print on your printer.

2. If you need more space and attach additional pages, properly identify the numbered section of the Application form that they support.

3. SMALL BUSINESSES: Review the Small Business Considerations section of the Application for Variance (Page 12, Nos. 21 and 22). If you meet the requirements, complete and sign the Small Business Declaration (Page 13).

4. Submit the filing fee with the Application (or contact the Clerk to confirm overnight payment) and make check payable to BAAQMD. **See District Regulation 3, Schedule A- Hearing Board Fees**.

5. Mail or otherwise deliver an original and nine copies of the Application and all other papers to:

Marcy Hiratzka
Clerk of the Hearing Board
Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105

Clerk of the Hearing Board contact phone # for questions: (415) 749-5073.

BEFORE THE HEARING BOARD
OF THE
BAY AREA AIR QUALITY MANAGEMENT DISTRICT
STATE OF CALIFORNIA

APPLICATION FOR VARIANCE

FILED
MAY 30 2023
HEARING BOARD
BAY AREA AIR QUALITY
MANAGEMENT DISTRICT

for regular variance check box

In the Matter of the Application of)
)
Berkeley Landfill)
)
(Applicant: Insert business or organization name above))
)
DOCKET NO. **3741**)
(Assigned by Clerk)
)
For a Variance from Regulation(s):)
)
Regulation 8, Rule 34, Section 301.1 & 113.2)
)
(Applicant: Insert Regulations in form: Regulation 8 , Rule 34 , Section 301.1 & 113.2)

FILED
JUN 06 2023
HEARING BOARD
BAY AREA AIR QUALITY
MANAGEMENT DISTRICT

for interim variance check box

TYPE OF VARIANCE REQUESTED (see Page 3 for further information)

☐ SHORT ■ INTERIM ■ REGULAR ☐ GROUP ☐ PRODUCT

(applicant called to request that an interim variance also be marked.)

VARIANCE PERIOD REQUESTED (see Page 10, No. 20):

From: 5/26/2023 To 12/31/2023

TOTAL NUMBER OF (CALENDAR) DAYS IN VARIANCE PERIOD: 219

(Note: Variance relief will not be granted for any period preceding the date of filing of the Application for Variance.)

[ALL DOCUMENTS FILED WITH THE CLERK'S OFFICE BECOME PUBLIC RECORD]

SUMMARY PAGE

NAME OF APPLICANT: Berkeley Landfill

FACILITY ADDRESS: Cesar Chavez Park

City, State, Zip: Berkeley, California, 94704

PLANT # or G #: 3590 SOURCE #(S): 1

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CONTACT: Name, title, company (if different than Applicant), address, and phone number of persons authorized to receive notices regarding this Applicant (no more than two authorized persons).

Mary Ellen Skramstad, Envir. Compliance Specialist
City of Berkeley, Public Works Dept.
Berkeley, California *Zip* 94704
☎ (510) 981-6337 *Ext.*
Fax ( )
E-mail mskramstad@cityofberkeley.info
California Bar #

Mary Ellen Skramstad, Envir. Compliance Specialist
City of Berkeley, Public Works Dept.
1947 Center St. 4th Floor
Berkeley, California *Zip* 94704
☎ (510) 981-6337 *Ext.*
Fax ( )
E-mail
California Bar #

BRIEFLY SUMMARIZE EQUIPMENT/ACTIVITY SUBJECT TO THIS VARIANCE REQUEST:

The continuous operation of the gas collection and control system (GCCS) at the closed landfill not being achieved due to heavy precipitation and issues at the thermocouples.

LIST DISTRICT REGULATIONS, RULES AND PERMIT CONDITIONS SUBJECT TO THIS VARIANCE REQUEST:

Regulation 8-34-301.1	
Regulation 8-34-113.2	
Permit to Operate #1826,Pt.3	

SUMMARY OF TOTAL EXCESS EMISSIONS:

Pollutants	Net Emissions After Mitigation (lbs/day or Opacity %)
Volatile Organic Compounds	0.87
Non Methane Organic Compounds	0.89
Hazardous Air Pollutants	0.05

[You May Attach Additional Pages If Necessary]

TYPE OF VARIANCE REQUESTED:

NOTE: The date of filing of the Application for Variance is the earliest allowed starting date for a variance. State law [California Health and Safety Code (H&SC)] imposes requirements on the amount of time to be allowed for notification of the public and air quality regulatory agencies before a hearing on a variance request can be held by the Hearing Board. Review the following descriptions of the types of variances, and select that which is most appropriate for your situation:

SHORT: If compliance with the District Rule(s) can be achieved in **90 (calendar) days or less**, request a short-term variance. [*10-day notice required to Bay Area Air Quality Management District's Air Pollution Control Officer (APCO), Applicant, California State Air Resources Board (ARB), Federal Environmental Protection Agency (EPA).]*

INTERIM: If Applicant requires immediate relief for the period between the date of filing of variance application and the date of the decision on the matter by the Hearing Board, request an interim variance. An interim variance is recommended if significant excess emissions will occur between the date of filing and the date of the fully noticed hearing by the Hearing Board. If an interim variance is required, a hearing will be scheduled as soon as possible. The period of an interim variance shall not exceed 90 days. If an interim variance is requested, Applicant must also request a short or a regular variance on the same application.

REGULAR (OR LONG-TERM): If compliance with District Rule(s) will take **more than 90 (calendar) days**, request a regular variance. *(30-day published notice required. 30 days notice to APCO, Applicant, ARB.)*

GROUP: If non-compliance with District Rule(s) by each individual Applicant comprising a group is based on issues of law and fact common to each Applicant, request a group variance. *(Noticing requirements as for Short or Regular variances depending on period of the Group variance.)*

PRODUCT: Any person who manufactures a product may petition the Hearing Board for a product variance from a District Rule or Regulation. A product variance shall be granted only when a variance is necessary for the sale, supply, distribution, or use of the product. *(Noticing requirements as for Short or Regular variances depending on period of the product variance.)*

BAAQMD Regulation 1-402: **"Status of Violation Notices During Variance Proceedings:** Where a person has applied for a variance, no notices shall be issued during the period between the date of filing for the variance application and the date of decision by the Hearing Board for violations covered by the variance application. However, during the period between the date of the filing for a variance and the date of decision by the Hearing Board, evidence of additional violations shall be collected and duly recorded. Where the variance is denied, evidence of violations collected between the filing date and decision date shall be reviewed and a notice of violation issued for violations occurring during that period shall be served upon said person. Where the variance is granted, no notice of violation shall be issued for violations occurring during that period except in extraordinary circumstances as determined by the APCO."

NOTE: The Environmental Protection Agency (EPA), a federal agency, does not recognize California's variance process, which is established by state law. The EPA considers facilities operating under a variance to be operating in violation of District regulations. Facilities that are in violation and then obtain a variance are advised that the EPA can independently pursue legal action based on federal law against the facility for continuing to be in violation.

1. Briefly describe the type of business and processes at your facility (Attach a map showing location)

The Landfill, which has been closed since 1983, is currently developed as a City park known as Cesar Chavez Park and is undergoing post-closure monitoring and maintenance through various programs administered by CalRecycle, San Francisco Bay Regional Water Quality Control Board (RWQCB) and the BAAQMD.

See Small Business Considerations on Page 12, No. 21 before answering the following question:

Is Applicant a "Small Business" as defined by Health & Safety Code Section 42352.5(b)(1)?
Yes ☐ No ■

Is Applicant a "Major Source" as defined by the applicable provisions of the Federal Clean Air Act, 42 U.S.C. Sec. 7661(2)? Yes ☐ No ■

Is Applicant a "public agency" as defined in Health & Safety Code Section 42352(b)?
Yes ■ No ☐

2. Describe the equipment/activity for which a Variance is being sought (type of equipment/activity, source numbers, purpose, why is it essential to your business). Attach a copy of the BAAQMD Permit to Operate or Authority to construct for the subject equipment and/or facility so long as such Permit is less than 50 pages. If the Permit is greater than 50 pages, all portions relevant to the Application shall be provided.

The City maintains BAAQMD Permit to Operate (PTO; Plant #3590) for the Landfill and its gas control and collection system (GCCS). The GCCS collects landfill gas (LFG) from all areas of the landfill and sends it to a flare station where the LFG is combusted within an enclosed flare. The Landfill, which was constructed on reclaimed tidelands of San Francisco Bay, began receiving waste in 1961 and continued operations until 1983. The GCCS for the site was installed and became operational in 1988.

Is there a regular maintenance and/or inspection schedule for this equipment? Yes ■ No ☐

If Yes, how often?

What was the date of the last maintenance and/or inspection?____5/22/2023____

Are maintenance records available? Yes ■ No ☐

Was there any indication of problems? Yes ☐ No ■

[You May Attach Additional Pages If Necessary]

APPLICANT'S PETITION FOR REQUIRED FINDINGS

California Health and Safety Code (H&S Code) 42352 requires the Hearing Board to make six findings for a variance to be granted. In this Section, Applicant must provide sufficient information to enable the Hearing Board to make a decision on each of the six findings:

Finding # 1: ***That the Applicant for a variance is, or will be, in violation of Health and Safety Code Section 41701 or of any rule, regulation or order of the District.***

3. List all District Regulations, Rules, and/or Permit Conditions from which Applicant is seeking variance relief. Briefly explain how Applicant is or will be in violation of each rule or condition. If Applicant is requesting relief from Regulation 6, and the excess opacity during the variance period will reach or exceed 40% (Ringelmann 2), Applicant should also request relief from California Health and Safety Code Section 41701.

Regulation, Rules, Permit Conditions	Explanation
Regulation 8-34-301.1	The site has exceeded or will the allotted amount of downtime and requires additional downtime for the year.
Regulation 8-34-113.2	
Permit to Operate #1826,Pt.3	

4. Has the District issued any Notice(s) of Violation (NOVs) to the Applicant concerning the subject of this variance request? Yes ☐ No ■ **If "Yes", please attach copies of the NOVs**.

5. Has the equipment in question or any other equipment at this facility been under variance protection during the last year? Yes ☐ No ■

Docket #	Variance Period	Nature of Emission	Regulation/Rule/Section

6. List all NOV(s) issued to equipment at the **entire** facility during the previous 12 months:

Date of Notice	NOV #	Nature of Emission	Regulation/Rule/Section
6/6/2022	A61731	power outage	8-34-301.1

[You May Attach Additional Pages If Necessary]

Finding # 2: ***That, due to conditions beyond the reasonable control of the Applicant, requiring compliance would result in either (A) an arbitrary or unreasonable taking of property, or (B) the practical closing and elimination of a lawful business.***

7. Describe, in detail, the event leading to the need for a variance:

In the beginning of 2023, there was an unprecedented amount of liquid infiltrating the GCCS at the Landfill. The system was simply not designed for the massive quantities of liquids which occurred in early 2023due to weather conditions and heavy storms. There had been condensate buildup within the below grade piping systems due to saturated site conditions and condensate sumps unable to drain from all of the heavy rains. Initially, the site planned to have a vacuum truck onsite to remove the liquids, yet the ground was so saturated that one could not safely extract liquids. Within five days, the heavy liquids naturally drained from the system. As a result of the unprecedented weather conditions and the system being unable to clear the liquids, there were prolonged periods of downtime at the flare, resulting in GCCS downtime. In addition to the unprecedented weather conditions, the thermocouples in the flare were glitching causing shutdowns and prevented remote restarts, which caused prolonged downtimes as the flare then was required to be manually restarted in these events, which required personnel to travel to site for this.

8. Has the Applicant received any complaints from the public regarding the operation of the subject equipment or activity within the last year? Yes ☐ No ■

Date of Complaint	Number of Complaints	Nature of Complaint

9. Explain why it is beyond Applicant's reasonable control to comply with the Regulation(s) and/or Permit Condition(s):

The Site is unable to adhere to the Regulations and permit conditions list above as there was more downtime at the beginning of 2023 due to unforeseen circumstances. As these unanticipated events occurred, the site and operations and maintenance (O&M) team took actions to minimize downtime, yet the allowable downtime in accordance with 8-34-113 was exhausted and as 2023 is not at its end, additional downtime for the site will occur that is outside of the City's control.

[You May Attach Additional Pages If Necessary]

10. When and how did Applicant first become aware that it was not in compliance with the Rule(s) and/or permit condition(s)?

The site operations and maintenance (O&M) team has been tracking the flare's operations in accordance with permit and District requirements consistently. The elevated precipitation and the associated issues were first noted by the site and O&M team in January through March 2023, yet as the precipitation subsided, the site did not believe there would be prolonged concerns with the impacts on the continuous operation of the GCCS.
The issues from the thermocouple first occurred in January 2023, yet it was not known at the time of the failure that the thermocouple(s) would need to be replaced. It was not until later in April 2023 and it was identified that the thermocouple(s) were damaged and it was necessary for the equipment in the flare to be replaced. The thermocouples were replaced promptly once the equipment was known that they had to be replaced, yet the downtime that resulted from the issues at the thermocouples and the replacements occurred and was significant.
The weather-related downtime compounded with the downtime that resulted from the thermocouples' failure and replacement at the flare has put the site at the top of the use of the 240-allotted hours for downtime of the GCCS. It was recently discovered that the 240-hours would be exceeded and not sufficient for the site in 2023 for downtime.

11. What actions has Applicant taken since that time to achieve compliance with the Regulation(s) or permit condition(s)?

The site has replaced the thermocouples which were creating issues at the flare for operations. Additionally, the heavy precipitation has subsided and not anticipated to reoccur at this time.
Along with the unforeseen issues due to weather and equipment, the O&M team is consistently making efforts to keep the flare continuously operating, yet the landfill gas available, both the quantity and quality (methane concentration) are difficult to maintain due to the age of the landfill and waste. The O&M team works to maintain a continuous pull on the wellfield, yet at the lower LFG generation rates do cause the LFG quality (methane concentration) to diminish which makes it difficult to maintain temperature at the flare for continuous operation.

12. What would be the harm to Applicant's business if the variance were not granted?

Economic losses: $0

Number of Employees laid off (if any):_____

Provide detailed information regarding economic losses, if any, (anticipated business closure, breach of contracts, hardship on customers, layoffs and/or similar impacts).

If the variance were not granted, the Landfill would be in a state of non-compliance with District rules and regulations, increasing the likelihood and magnitude of potential enforcement action and fines for the hours above the allotted 240 hours that the flare does not operate. This would result in financial harm from potential penalties as well as additional stigma damages.

[You May Attach Additional Pages If Necessary]

Finding # 3: *That the closing or taking would be without a corresponding benefit in reducing air contaminants.*

13. List the estimated or measured excess emissions or excess opacity, if any, on a daily basis, or over a more appropriate period of time (For example: duration of requested variance period, hourly basis). Also list emissions reductions proposed by Applicant as mitigation. If no excess emissions or opacity are expected during the variance period, go to No. 16.

Pollutant	(A) Estimated Excess Emissions (lbs/day)	(B) Reduction Due to Mitigation (lbs/day)	(C)** Net Emissions After Mitigation (lbs/day)
Volatile Organic Compounds	0.87	NA	0.87
Non-Methane Organic Compounds	0.89	NA	0.89
Hazardous Air Pollutants	0.05	NA	0.05

**Column A minus Column B = Column C

14. Show the calculations used to determine the excess emissions listed in No. 13. Are the values in No. 13 based on measurements_____ or estimates__X_____?

Estimated excess emissions in Section 13 are not based on actual emissions, rather estimated emissions based on the historical operation of the flare in 2023 and actual results of the 2022 source test. Emissions were estimated from the actual source test and extrapolated based on estimated downtime for the remainder of the year. It is not anticipated that the system would be down for 24 hours continuously, yet to provide a conservative estimate of emissions, we have assumed non-operation of 24 hours per day. Emissions were estimated by utilizing the TO-15 sample results and EPA 25C, which were used to determine the concentrations of the TACs and non-methane organic compounds (NMOC) in the landfill gas at Berkeley Landfill.

15. Do the additional emissions during the variance period contain any Toxic Air Contaminants (TACs) [pursuant to Health and Safety Code Section 39655] or odorous substances? Yes ■ No ☐

If Yes, list the TACs or odorous substances and approximate amounts:

The TACs were last tested for on July 20, 2022, and the results of the TO-15 and EPA 25C samples are included as an attachment.

16. List measured or estimated annual emissions from entire facility for each pollutant which is the subject of this variance application:

Pollutant	Total Emissions from Entire Facility (tons/year)
Volatile Organic Compounds	0.0043
Non-methane organic compounds	0.0045
Hazardous Air Pollutants	0.0003

Briefly explain the basis for these facility emission values:

Again, the excess emission provided in Section 13 are not based on actual emissions, rather estimated emissions based on the historical operation of the flare in 2023 and actual results of the 2022 source test. Emissions were estimated from the actual source test and extrapolated based on estimated downtime for the remainder of the year. Emissions were taken from the TO-15 sample results and EPA 25C, which were used to determine the concentrations of the TACs and non-methane organic compounds (NMOC) in the landfill gas at Berkeley Landfill. The concentrations were then utilized to estimate the potentials to emit of the system for the remainder of 2023.

Finding # 4: ***That the Applicant for the variance has given consideration to curtailing operations of the source in lieu of obtaining a variance.***

17. Explain why the Applicant cannot curtail or terminate operations in lieu of obtaining a variance:

The Landfill cannot curtail or terminate operations as LFG would be generated regardless. If the site terminated operations the whole landfill gas system would be offline preventing the site from being able to collect and control LFG at any point, as LFG will still be generated from the closed landfill even if the flare ceases operation.

Finding # 5: During the period that the variance is in effect, the Applicant will reduce excess emissions to the maximum extent feasible.

18. Explain how Applicant plans to reduce (mitigate) excess emissions during the variance period to the maximum extent feasible, or why reductions are not feasible (mitigation may include reductions at other sources):

The estimated emissions which could occur during the variance period are conservative estimates as it is assuming the amount of downtime which has occurred in 2023 shall continue, yet the equipment (thermocouples) which were impacting the downtime have been repaired and the weather conditions (excess precipitation) are not anticipated at the rates experienced in early 2023. Mitigation efforts include monitoring the wellfield for surface emissions on a quarterly basis to ensure no excess emissions.

Finding # 6: During the period the variance is in effect, the Applicant will monitor or otherwise quantify emission levels from the source, if requested to do so by the District, and report these emissions levels to the District pursuant to a schedule established by the District.

19. Has the District requested that the Applicant monitor or otherwise quantify emissions during the variance period? Yes ☐ No ☑

If Yes, please describe how Applicant will do so:

The site's O&M team are able to conduct additional surface emissions monitoring (SEM) as needed as additional downtime occurs.

[You May Attach Additional Pages If Necessary]

APPLICANT'S PLAN FOR ACHIEVING COMPLIANCE:

20. How does the Applicant intend to achieve compliance with the Rule(s) and/or permit condition(s)? Include a detailed description of any equipment to be installed and/or modifications or process changes to be made, a list of the dates by which the actions will be completed, and an estimate of total costs:

Detailed Description:

The Landfill's O&M personnel will continue to work to keep the flow of LFG going to the flare to maintain operations, yet due to stated above, the quantity and quality (methane concentration) has proven to be difficult to maintain as the landfill's age and age of waste within the closed landfill. The upgrades to the flare needed to help maintain operation have occurred (thermocouples) and at this time it is not anticipated that there were would be an infiltration of liquids in the landfill to saturate the landfill and GCCS, therefore shut down time is not expected at this time for these reasons. However, as there is still a significant amount of 2023, it is not known all causes of potential downtime for the remainder of the year.

Schedule Of Increments Of Progress:

Increment Description	Completion Date

Applicant may propose operating conditions for the variance period which may be considered by the Hearing Board in its evaluation of the variance application.

PROPOSED OPERATING CONDITIONS:

The Landfill proposes variance conditions aimed at continuous operation of the GCCS, but provides allowance for additional downtime beyond the 240 hours alloted under Rule 8-34-113 of the GCCS, as continuous operation cannot be guaranteed or anticipate at this time.

Variance Period Requested: **From:** 5/26/2023 **To:** 12/31/2023

Total Number of (Calendar) Days in Variance Period: 219

(Note: Variance relief will not be granted for any period preceding the date of filing of the Application for Variance.)

Date of Application: 5/26/2023

Completed By: Maria Bowen Title: Project Manager
(Print Name)

The following verification must be signed by the owner, manager, director or other responsible party of

the plant, business, factory, or agency requesting the Variance.

VERIFICATION

I, the undersigned, hereby declare under the penalty of perjury, under the laws of the State of California, that I have read the foregoing document, including attachments and the items therein set forth, and that I know its contents, are true.

Dated at May 30th, on 2023

Signature 

Print Name Mary Ellen Skramstad

Title Environmental Compliance Specialist - City of Berkeley

SMALL BUSINESS MATTERS

Small Business Assistance: Assistance in completing the Application for Variance and in developing a compliance schedule is available to small businesses. Contact the office of the Hearing Board Clerk at (415) 749-5073 for assistance.

Small Business Considerations in the Granting of Variances by the Hearing Board: California Health & Safety Code Section 42352.5 directs the Hearing Board to consider additional factors when making the required Findings for the granting of a variance to a small business.

21. Definition of Small Business for purposes of special considerations:

Is Applicant a manufacturing or wholesaling business with fewer than 100 employees?
Yes ☐ No ■ Number of Employees: _____

OR

Is Applicant a retailing or service business with annual sales under $5 million?
Yes ☐ No ■ Annual Sales: $_____

AND

Does Applicant emit 10 tons or less per year of air contaminants? Yes ■ No ☐

If the Applicant satisfies the above conditions, the Hearing Board will consider the following special factors:

(A) In determining the extent to which the petitioner took timely actions to comply or seek a variance**,** the Hearing Board shall make specific inquiries into, and shall take into account, the reasons for any claimed ignorance of the requirement from which a variance is sought.
(B) In determining the extent to which the petitioner took reasonable actions to comply, the Hearing Board shall make specific inquiries into, and shall take into account, the petitioner's financial and other capabilities to comply.
(C) In determining whether or not the burden of requiring immediate compliance would be unreasonable, the Hearing Board shall make specific inquiries into, and shall consider, the impact on the petitioner's business and the benefit to the environment which would result if the petitioner is required to immediately comply.

Reduced Filing and Excess Emission Fees for Small Businesses:
Bay Area Air Quality Management District Regulation 3 allows reduced filing fees and excess emission fees to be charged to small businesses. The definition of a small business for the purpose of these reduced fees is different than the definition used by the State of California for the special considerations listed above.

22. Definition of Small Business for purposes of reduced filing and excess emission fees (District Regulation 3, Section 209; Both the number of employees AND gross annual income must apply);

Does Applicant have no more than 10 employees?
Yes ☐ No ☐ Number of Employees: _____

Does Applicant have a gross annual income of no more than $600,000?
Yes ☐ No ☐ Gross Annual Income: $_____

Is Applicant not affiliated with a non-small business? Yes ☐ No ☐

Declaration Regarding Small Business

1. I am an officer, partner or owner of the Applicant herein, or a duly authorized agent of the Applicant authorized to make the representations set forth herein.

2. The Applicant is a business that meets the following definitions of Small Business (check those that are applicable):

Small Business for Purposes of Special Considerations (No. 21) ☐

Small Business for Purposes of Filing and Excess Emission Fees (No. 22) ☐

I declare under penalty of perjury that the foregoing is true and correct.

Executed on_____, at _____, California

_____ _____

Signature Print Name

_____

Position with Company

Revised 4/4/19

POTENTIAL TO EMIT ESTIMATES FOR THE OFFLINE TIME OF GAS COLLECTION AND CONTROL SYSTEM
BERKELEY LANDFILL
BERKELEY, CALIFORNIA

CAS NUMBER	COMPOUNDS	Molecular Weight (g/Mol)	Ave. Concentration of Compounds Found In LFG (ppmv)[b]	Total Pollutant Flow Rate (lbs/hr)[c]	Pollutant Emission Rate from Landfill (Pounds for Event - 240 hours)
Hazardous Air Pollutants (HAPs)[a]					
71-55-6	1,1,1-Trichloroethane (methyl chloroform)*[h]	133.41	0.003	5.22E-06	1.25E-03
79-34-5	1,1,2,2-Tetrachloroethane*	167.85	0.003	6.57E-06	1.58E-03
75-34-3	1,1-Dichloroethane (ethylidene dichloride)*	98.97	0.003	3.88E-06	9.30E-04
75-35-4	1,1-Dichloroethene (vinylidene chloride)*	96.94	0.003	3.80E-06	9.11E-04
107-06-2	1,2-Dichloroethane (ethylene dichloride)*	98.96	0.003	3.88E-06	9.30E-04
78-87-5	1,2-Dichloropropane (propylene dichloride)*	112.99	0.003	4.42E-06	1.06E-03
67-63-0	2-Propanol (isopropyl alcohol)*	60.11	0.014	9.46E-06	2.27E-03
67-64-1	Acetone*[h]	58.08	0.014	9.14E-06	2.19E-03
107-13-1	Acrylonitrile*	53.06	0.007	4.16E-06	9.99E-04
75-25-2	Bromodichloromethane*	163.83	0.041	7.77E-05	1.86E-02
71-43-2	Benzene*	78.11	0.038	3.44E-05	8.27E-03
75-15-0	Carbon disulfide*	76.13	0.011	9.36E-06	2.25E-03
56-23-5	Carbon tetrachloride*	153.84	0.341	6.02E-04	1.45E-01
46-358-1	Carbonyl sulfide	60.07	0.183	1.26E-04	3.03E-02
108-90-7	Chlorobenzene*	112.56	0.089	1.15E-04	2.76E-02
75-00-3	Chloroethane (ethyl chloride)*	64.52	0.034	2.53E-05	6.06E-03
67-66-3	Chloroform*	119.39	0.034	4.68E-05	1.12E-02
75-45-6	Chlorodifluoromethane*[h]	86.47	0.173	1.72E-04	4.12E-02
74-87-3	Chloromethane (methyl chloride)*	50.49	0.034	1.98E-05	4.75E-03
106-46-7	Dichlorobenzene (1,4-Dichlorobenzene)*	147.00	0.039	6.55E-05	1.57E-02
75-43-4	Dichlorodifluoromethane*[h]	120.91	0.116	1.61E-04	3.87E-02
75-71-8	Dichlorofluoromethane*	102.92	0.051	6.04E-05	1.45E-02
75-09-2	Dichloromethane (Methylene Chloride)*[h]	84.94	0.068	6.66E-05	1.60E-02
64-17-5	Ethanol* **	46.08	0.135	7.14E-05	1.71E-02
100-41-4	Ethylbenzene*	106.16	0.006	7.49E-06	1.80E-03
106-93-4	Ethylene dibromide (1,2-Dibromoethane)*	187.88	0.003	7.36E-06	1.77E-03
75-69-4	Fluorotrichloromethane[h]	137.40	0.327	5.16E-04	1.24E-01
110-54-3	Hexane*	86.18	0.329	3.26E-04	7.81E-02
2148-87-8	Hydrogen Sulfide*	34.08	392.500	1.54E-01	3.69E+01
7439-97-6	Mercury (total)[d]	200.61	0.0003	6.73E-07	1.61E-04
78-93-3	Methyl ethyl ketone*	72.11	0.007	5.66E-06	1.36E-03
108-10-1	Methyl isobutyl ketone*	100.16	0.007	7.86E-06	1.89E-03
127-18-4	Perchloroethylene (tetrachloroethylene)*[h]	165.83	0.034	6.49E-05	1.56E-02
108-88-3	Toluene*	92.13	0.077	8.16E-05	1.96E-02
79-01-6	Trichloroethylene (trichloroethene)*	131.40	0.003	5.15E-06	1.23E-03
75-01-4	Vinyl chloride*	62.50	0.009	6.11E-06	1.47E-03
1330-20-7	Xylenes*	106.16	0.021	2.51E-05	6.02E-03
Single Highest HAP				0.0006	0.14
Totals: HAPs				0.002	0.50
Criteria Air Pollutants					
	Total Non-Methane Organics (NMOCs) as Hexane [e]	86.18	37.60	0.04	8.93
	VOCs [f]	86.18	37.60	0.04	8.69

Notes:

(a) List of hazardous air pollutants was from Title III Clean Air Act Amendments, 1990, and include compounds found in landfill gas, as determined from a list in AP-42 Tables 2.4-1 ("Default Concentrations for Landfill Gas Constituents, 11/98"). Compounds not identified as HAP by AP-42 indicated by "**".

(b) Average concentration of compounds found in LFG based on "Waste Industry Air Coalition Comparison of Recent Landfill Gas Analyses with Historic AP-42 Values" and site-specific values from 2023 LFG composition samples as indicated by "*".

(c) Total pollutant emission rate based on LFG average flow rate prior to event.

(d) Concentration of Mercury based on EPA AP-42 Section 2.4 Table 2.4-1 (11/98).

(e) Concentration of NMOC as hexane from Source Test for Berkeley Landfill, 2023. NMOC peak value as 226 ppmv as methane.

(f) VOCs assumed to equal NMOCs.

(g) Average LFG flow rate to the the flare was based on historical data of flare operations through 2023.

(h) Indicates compound designated as having a negligible contribution to photochemical reactivity by the U.S. Environmental Protection Agency as published in the Federal Register shall be considered a Non-Precursor Organic Compound in accordance with BAAQMD Rule 1-234 and USEPA Section 40 Code of Federal Regulation Section 51.100.

Variables:

MODEL INPUT VARIABLES:		
Methane Concentration (%) [b]	29%	
LFG Flow Rate [g]	74	SCFM
Duration of Event (Gas Collection and Control System Downtime)	240.00	hours

CONVERSIONS

lb conversion	453.6	g
hour conversion	60	min
mol conversion	24.04	L @ STP
cf conversion	28.32	L
mmbtu conversion	1,000,000	btu

EXAMPLE CALCULATIONS

(HAPS AND VOCS)

Total Pollutant Flow Rate (To Flare)= ((Molecular Weight of Compound[g/mol])*(Concentration of Compound[ppm]/1,000,000)*(Total LFG to Flare [cfm]) *(60min)*(1lb/453.6g)*(1mol/24.04L @ STP)*(28.32L/1cf)

SUMMARY OF POTENTIAL EMISSIONS
BERKELEY LANDFILL
BERKELEY, CALIFORNIA

Emission Source	Regulated Air Pollutant	PTE		
		lb/day	lbs/event	tpy
Landfill during GCCS Downtime	Volatile Organic Compounds	0.87	8.69	0.0043
	Non-Methane Organic Compounds	0.89	8.93	0.0045
	Total Hazardous Air Pollutants	0.05	0.50	0.0003

2022 Source Test Results

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

375 Beale Street, Suite 600
San Francisco, California 94105
(415) 771-6000

Contractor Source Test Supplemental Form

Site name: City of Berkeley

NST number: 7518

Testing company: BEST ENVIRONMETAL

Test purpose:

- [x] Routine compliance testing
- [ ] Compliance test required after previous source test failure
- [ ] Start-up test
- [ ] Other, ex: trial testing for permit changes, engineering studies

  Please explain:
- [ ] Revised report with corrections noted

  Revision number:

Preliminary test results:

- [x] **Values within range set by rule or regulation**
- [ ] **Values outside of range set by rule or regulation**
- [ ] N/A
- [ ] Please explain:

Source Test Report

CITY OF BERKELEY MARINA LANDFILL
Berkeley, CA

Landfill Gas Fired Flare (A-4)
Emission Results & Landfill Gas Characterization
Facility #3590, Condition #1826
NST-7518

Test Date: July 15, 2022
Report Date: August 17, 2022

Performed and Reported by:

BEST ENVIRONMENTAL
339 Stealth Court
Livermore, CA 94551
Phone: (925) 455-9474
Fax: (925) 455-9479

Prepared For:

SCS Field Services
4730 Enterprise Way
Modesto, Ca 95956
Attn: Mr. Stephen Harquail

For Submittal To:

Bay Area Air Quality Management District
375 Beale Street, STE 600
San Francisco, CA 94185

REVIEW AND CERTIFICATION

Team Leader:

The work performed herein was conducted under my supervision, and I certify that the details and results contained within this report are to the best of my knowledge an authentic and accurate representation of the test program. If this report is submitted for compliance purposes, it should only be reproduced in its entirety. If there are any questions concerning this report, please call the Team Leader or Reviewer at (925) 455-9474.

William Johnston
Project Manager

Reviewer:

I have reviewed this report for presentation and accuracy of content, and hereby certify that to the best of my knowledge the information is complete and correct.

Basim (Bobby) Asfour
Principal/QSTI

Source Test Information

Source Owner:	City of Berkeley/Engineering Division/Public Works 1947 Center St., 4th Fl Berkeley, CA 94704
Source Location:	Berkeley Marina Landfill Cesar Chaves Park (Berkeley Marina) Berkeley, California 94704
Engineering Firm:	SCS Field Services
Contact:	Stephen Harquail, (530) 867-2369
Source Description:	Site #3590, Landfill Gas Flare A4
PTO Number:	Condition 1826

Test Parameters & Limits:		**Average Result**
NOx:	**0.06 lbs/MMBtu**	**0.02 lbs/MMBtu**
CO:	**0.2 lbs/MMBtu**	**0.05 lbs/MMBtu**
NMOC:	**30 ppm @ 3% O_2 as methane**	**ppm @ 3% O_2**
CH_4:	**99% DRE**	**99.99% DRE**
Fuel Sulfur:	**300 ppm as H_2S**	**2 ppm as H_2S**

Source Testing Firm:	BEST ENVIRONMENTAL 339 Stealth Court Livermore, CA 94551 Phone (925) 455-9474 Fax (925) 455-9479
Contact:	Bobby Asfour
Test Date:	July 15, 2022
NST Number:	7518
Analytical Laboratories:	Atmospheric Analysis & Consultants (TO 15, M25C) Speciated VOC 1534 Eastman Avenue, Ste. A Ventura, CA 93003 Attn: John Yokoyama Phone: (805) 650-1642 BEST ENVIRONMENTAL (Fixed gases CH_4, H_2S, HHV& F factor) 339 Stealth Court Livermore, CA 94551

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SECTION 1. INTRODUCTION

1.1. Test Purpose

Best Environmental (BE) was contracted by SCS Field Services to perform emissions testing on one landfill gas flare (A-4) to comply with Bay Area Air Quality Management District (BAAQMD) Regulation 8 Rule 34 Sections 301.3 & 412 as well as Condition #1826 of the permit. A copy of the Permit is included in the appendices.

1.2. Test Location

The testing was conducted on the flare located at the City of Berkeley, Caesar Chavez Park, Berkeley Marina, CA 94704. (Facility #3590).

1.3. Test Date

Testing was conducted on July 15, 2022.

1.4. Test Parameters and Methods

The following emission parameters were measured:

Parameter	Monitoring & Analytical Protocols
NMOC, THC, NOx, CO & O_2	EPA Methods 3A, 7E, 10 & 25A
Flowrate (inlet/outlet)	Flowmeter/EPA Method 19
Inlet NMOC & CH_4	EPA Method 18 & 25C
Fixed Gases, Btu/CF & F Factor	ASTM D-1945 & 3588
LFG organics & TRS	Modified EPA TO-15 & D-6228

1.5. Sampling and Observing Personnel

Sampling was performed by Bobby Asfour and Bill Johnston of BE. The BAAQMD was notified of the test date; however, there was no representative present to witness the test program.

SECTION 2. SUMMARY OF RESULTS

2.1. Emission Results

Table 2.1 summarizes the flare outlet average test results. Triplicate 30-minute runs were performed according to BAAQMD and EPA test methods. Individual run results are presented in Table 1 on page 7. Landfill Gas Characterization (TO 15) results are in Appendix B.

Table 2.1: Flare Outlet (A-4)

Parameter	Average Results	Limits
NOx, lbs/MMBtu	0.0205	**0.06**
CO, lbs/MMBtu	0.0529	**0.20**
NMOC, ppm @ 3% O_2	6.47	**30**
CH_4 Destruction Efficiency	99.99	**≥ 99**

2.2. Process Data

Table 2.2 presents the Flare Operational Parameters as recorded by the flares data acquisition system. Process data and fuel meter calibration can be found in Appendix E.

Table 2.2: Operational Parameters

Parameter	Fuel Flow Meter, SCFM	Flare Temp., ^oF
Run # 1	65.56	1,550
Run # 2	65.59	1,555
Run # 3	65.57	1,554

2.3. Allowable Emissions

See Table 2.1 above. The test results show that the flare is operating within the PTO gaseous emission limits and is therefore in compliance.

2.4. Comments: Discussion of Quality Assurance and Errors

Quality assurance procedures listed in the above referenced test methods and referenced in the Source Test Plan were performed and documented. The QA/QC procedures are described in Section 4.3 of the report. Documentation of the QA/QC is provided in Appendix A, B & D.

SECTION 3. SOURCE OPERATION

3.1. Process Description

The landfill gas fired flare is a control device for the treatment of landfill gas (mainly methane, carbon dioxide and nitrogen) that is generated from the decomposition of waste. The gas is collected in a network of interconnected pipes from several landfill gas extraction wells that draw a vacuum on the vapors in the landfill. The vapors are treated to remove condensate and particulate material, and then they are incinerated in the flare.

3.2. Flow Diagram

A digital image of the flare stack is contained in Appendix F.

3.3. Process and Control Operating Parameters

The flare was operated at 1,553 ^{o}F at a fuel rate of 66 SCFM according to the flare's monitoring devices. Flare monitoring data was provided by the facility and can be found in Appendix E.

3.4. Normal Operating Parameters

The flare was operating normally during the test periods.

3.5. Testing or Process Interruptions and Changes

There were no testing or process interruptions during the test series.

SECTION 4. SAMPLING AND ANALYSIS PROCEDURES

4.1. Port Location

Emissions from the flare were sampled via a circular stack with two ports 90º apart located approximately 5 stack diameters downstream of the burners and 1 stack diameter upstream from the exit. Access to the sampling ports was provided using a 40-foot boom-lift.

The dimensional cross-sections of the stack are 56-inches (Area SQFT = 17.104). The fuel line to the flare is a 6-inch stainless steel pipe. A single port/tap was located on the flame arrestor, 2-feet upstream from the flare wall.

4.2. Point Description/Labeling – Ports/Stack

The stack ports were not labeled but were designated as facing south and east.

4.3. Method Description, Equipment, Sampling, Analysis and QA/QC

Sampling and analytical procedures of the methods were followed as published in the EPA "Quality Assurance Handbook for Air Pollution Measurement Systems" Volume III, US EPA 600/4-77-027b.

The following is an overview of the Testing Performed

Parameter	Location	Method(s)	Duration	Runs
THC, CH_4, NMOC, NO_x, CO & O_2	Exhaust	EPA Methods 3A, 7E, 10, 18 & 25A	30 mins	3
Flow Rate	Exhaust	EPA 19	30 mins	3
LFG organics & TRS compounds	Inlet	TO-15	30 mins	3
TRS	Inlet	ASTM D-6228	30 mins	3
C1-C6, O_2, N_2, BTU-Fixed Gases	Inlet	ASTM D-1945/3588	30 mins	3
Flow Rate & Flare Temp.	Inlet	Flare Metering System	Concurrent	3
NMOC & CH_4	Inlet	EPA Method 18 & 25C	30 mins	3

EPA Method 7E, 10 & 3A are all continuous monitoring techniques using instrumental analyzers. Sampling is performed by extracting exhaust flue gas from the stack, conditioning the sample and analyzing the flue gas using continuous monitoring gas analyzers in a CEM test van. The sampling system consists of a stainless-steel sample probe, Teflon sample line, glass-fiber particulate filter, glass moisture-knockout condensers in ice, Teflon sample transfer tubing, diaphragm pump and a stainless steel/Teflon manifold and flow control/delivery system. A constant sample and calibration gas supply pressure of 5 PSI is provided to each analyzer to avoid pressure variable response differences. The entire sampling system is leak checked prior to and at the end of the sampling program. The BE sampling and analytical system is checked for linearity with zero, mid and high-level span calibration gases, and is checked for system bias at the beginning of the test day. System bias is determined by pulling calibration gas through the entire sampling system. Individual test run calibrations use the calibration gas, which most closely matches the stack gas effluent. The calibration gases are selected to fall approximately within the following instrument ranges; 80 to 95

percent for the high calibration, 40 to 60 percent for the mid-range and zero. Zero, calibration and bias drift values are determined for each test.

EPA 25A (THC as methane by FID) is an accepted method for the determination of Total Hydrocarbons (THC). A flame ionization detector (FID) total hydrocarbon continuous monitor is used for the sampling. The sampling and calibrations are performed through an all heated sample line connected directly to the THC analyzer. The FID in the analyzer is heated to 190 ºC. The calibration gases are selected to fall within the following instrument ranges; 80 to 90 percent for the high calibration, 45 to 55 percent for the mid-range calibration, 25 to 35 percent for the low range calibration and zero. Zero and mid external calibration drift values are determined for each test run.

All BE calibration gases are EPA Protocol # 1. The analyzer data recording system consists of BE's Computer Data Acquisition System (DAS). The NO_2 converter is checked and confirmed to be > 90% efficient.

EPA Methods 7E, 10 & 3A met the following QA/QC method requirements:

System Criteria

Instrument Linearity	≤2% Calibration Span or ±0.5diff.
Instrument Bias	≤5% Calibration Span or ±0.5 diff.
NO_2 Converter Efficiency	≥90%
System Response Time	≤2 minutes

Test Criteria

Instrument Zero Drift	≤3% Calibration Span or ±0.5 diff.
Instrument Span Drift	≤3% Calibration Span or ±0.5 diff.

EPA Method 25A met the following QA/QC method requirements:

System Criteria

Instrument Linearity	≤5% Calibration Gas Conc.

Test Criteria

Instrument Zero Drift	≤3% Span Range
Instrument Span Drift	≤3% Span Range

The following continuous monitoring analyzers were used:

Parameter	Make	Model	Principle
NO_x	CAI	600CLD	Chemiluminescence
CO	TECO	48i	GFC IR analyzer
O_2	CAI	110P	Paramagnetic
THC	CAI	600	FID

EPA Method TO-15 & ASTM D-6228 analysis is used to determine emissions of Organic and inorganic compounds including sulfurs. Inlet gases are filled into tedlar bags corresponding to the test program. The bags are labeled respectively then sent to a laboratory and analyzed for GC/MS (gas chromatography/mass spectrometer) within 72 hours and GC/FPD (gas chromatography/flame photometric detector) within 24 hours for sulfur. For more information on the lab analysis, refer to Appendix B for method description and QA/QC.

EPA Method 18 is used to determine carbon speciated hydrocarbons (C_1, C_2 & C_3+) emissions by gas chromatograph / Flame Ionization Detection (GC/FID). Gaseous emissions are drawn through a Teflon sample line to a tedlar bag located in a rigid leak proof bag container.

Sample is drawn into the bag by evacuating the container to stack gas pressure to allow sample flow without using a pump to avoid contamination. Negative pressure is adjusted to maintain an integrated sample flow between 20 to 60 minutes. The bag samples are taken to a laboratory and analyzed within 72 hours. The results are reported as methane with a detection limit of 0.5 ppm for non-methane non-ethane organic compounds (C_3+).

EPA Method 19 is used to determine stack gas volumetric flow rates using oxygen-based F-factors. F-factors are ratios of combustion gas volumes generated from heat input. The heating value of the fuel in Btu per cubic foot is determined from the analysis of fuel gas samples using gas chromatography (GC). Dedicated fuel meters monitor total fuel consumption for the source. The total cubic feet per hour of fuel multiplied times the Btu/CF provides million Btu per hour (MMBTU) heat input. The heat input in MMBTU/hr is multiplied by the F-factor (DSCF/MMBTU) and adjusted for the measured oxygen content of the source to determine volumetric flow rate. This procedure is proposed for pollutants whose compliance standards are based on emission rates (lb/day) or emission factors (lb/MMBtu).

EPA Method 25C is used to determine the emissions of NMOC and can also be used to identify and quantify fixed gases (O_2, CO_2, N_2& CH_4) in conjunction with **EPA Method 3C**. Gaseous emissions are drawn through Teflon sample line to a tedlar bag. Positive pressure is adjusted to maintain an integrated sample flow between 30 to 60 minutes. The bag samples are taken to a laboratory and analyzed for Non-Methane Organic Compound (NMOC) referenced to methane and fixed gases using GC/FID (gas chromatography/flame ionization detector-total combustion analysis and thermal conductivity detector (TCD) within 72 hours.

ASTM D-1945 & D-3588 analysis is used to determine the composition of fuel gas (e.g. Methane, fixed gases & BTU Content). Inlet gases are filled into a tedlar bag, the bag is labeled respectively then sent to a Laboratory and analyzed for fixed gases, methane and C_1-C_6 using GC/FID (gas chromatography/flame ionization detector). Each compound has calorific values that are used to calculate the gas higher heating values.

4.4. Analytical Laboratories

Three summa canisters were sent to AAC Lab. for EPA Method 25C, TO-15 (NMOC, organic compound analyses). Three inlet and three outlet tedlar bag samples were brought to the BE Lab for ASTM D-1945/3588/6228 & EPA Method 18 (heat input, H_2S & C_1, C_2, C_3+). For more information on the analysis procedure and QA/QC refer to Appendix B.

TABLE #1

Test Results
City of Berkeley
Flare

TEST	1	2	3	AVERAGE	LIMIT
Test Date	7/15/22	7/15/22	7/15/22		
Test Time	926-1001	1014-1047	1101-1135		
Standard Temp., °F	70	70	70		
Process Data					
Flare Temp., ^{o}F	1,550	1,555	1,554	1,553	
Fuel F-Factor, DSCF/MMBtu @ 70^{o}F	10,553	10,686	10,438	10,559	
Inlet Methane (CH_4) Content, %	25.70	24.50	26.30	25.50	
Inlet Fuel Flow Rate, DSCFM	65.56	65.59	65.57	65.57	
Heat Input, MMBtu/hr	1.02	0.98	1.05	1.02	
Heat Input, MMBtu/day	24.55	23.42	25.21	24.39	
Outlet Flow Rate, DSCFM (M19)	506	491	523	507	
Outlet Emissions					
O_2, %	13.47	13.51	13.60	13.53	
CO, ppm	16.50	20.63	36.04	24.39	
CO, lbs/hr	0.0047	0.0059	0.0103	0.0069	
CO, lbs/MMBtu	0.0355	0.0452	0.0781	0.0529	**0.20**
NO_x, ppm	9.50	9.53	9.26	9.43	
NO_x, lbs/hr	0.0027	0.0027	0.0026	0.0027	
NO_x, lbs/MMBtu	0.0205	0.0209	0.0201	0.0205	**0.06**
THC, ppm as methane (25A)	5.27	7.29	6.16	6.24	
CH_4, ppm (M18)	3.45	3.48	3.79	3.57	
CH_4, lbs/hr	0.0043	0.0042	0.0049	0.0045	
NMOC, ppm (M25A)	1.82	3.81	2.37	2.67	
NMOC, ppm @ 3% O_2 as CH_4	4.39	9.23	5.80	6.47	**30**
VOC, lbs/hr as methane	0.0023	0.0047	0.0031	0.0039	
Inlet					
Inlet CH_4, ppm (M18)	257,000	245,000	263,000	255,000	
Inlet CH_4, lbs/hr	41.8	39.9	42.8	41.5	
Inlet VOC, ppm as methane (M25C)	226	187	185	199	
Inlet VOC, lbs/hr as methane	0.037	0.030	0.030	0.032	
Landfill Gas Sulfur Content					
Inlet Total Sulfur as H_2S, gr/100dscf	0.89	0.85	0.87	0.87	
Inlet Total Sulfur as H_2S, ppm	1.52	2.58	1.05	1.72	**300**
Destruction Efficiency					
CH_4, Destruction Efficiency %	99.99%	99.99%	99.99%	**99.99%**	**≥99%**
NMOC, Destruction Efficiency %	93.78%	84.73%	89.80%	**89.43%**	**≥98%**

WHERE:

MW = Molecular Weight
DSCFM = Dry Standard Cubic Feet Per Minute
ppm = Parts Per Million Concentration
lbs/hr = Pound Per Hour Emission Rate
lbs/MMBtu = Pounds per million BTU
CO = Carbon Monoxide (MW = 28)
NOx = Oxides of Nitrogen as NO_2 (MW = 46)
THC = Total Hydrocarbons as Methane (MW = 16)
VOC = Total Non-Methane Hydrocarbons as Methane-C1 (MW = 16) CH_4

CALCULATIONS:

VOC ppm = THC ppm - CH_4 ppm
lbs/hr = ppm * DSCFM * MW *60 / 379 x 10^6 (@60^{o}F)
ppm @ 3% O_2 = ppm * 17.9 / (20.9-stack O_2)
lbs/MMBtu = Fd * M.W.* ppm * 2.59E-9 * (20.9/(20.9-%O_2))
Removal Efficiency = (inlet lbs/hr-outlet lbs/hr) / Inlet lbs/hr

APPENDICES

APPENDIX A – CALCULATIONS & NOMENCLATURE

APPENDIX B - LABORATORY REPORTS

APPENDIX C - FIELD DATA SHEETS

APPENDIX D – CALIBRATION GAS CERTIFICATES

APPENDIX E - PROCESS DATA

APPENDIX F - STACK DIAGRAMS

APPENDIX G – SAMPLING SYSTEM DIAGRAMS

APPENDIX H – SOURCE TEST PLAN

APPENDIX I – PERMIT TO OPERATE

APPENDIX A
CALCULATIONS

Standard Abbreviations for Reports

Unit	Abbreviation	Unit	Abbreviation
		microgram	ug
Brake horsepower	bhp	milligram	mg
Brake horsepower hour	bhp-hr	milliliter	ml
British Thermal Unit	Btu	million	MM
capture efficiency	CE	minute	min
destruction efficiency	DE	Molecular Weight	M
Dry Standard Cubic Feet	DSCF	nanogram	ng
Dry Standard Cubic Feet per Minute	DSCFM	Parts per Billion	ppb
Dry Standard Cubic Meter	DSCM	Parts per Million	ppm
grains per dry standard cubic foot	gr/DSCF	pound	lb
gram	g	pounds per hour	lbs/hr
grams per Brake horsepower hour	g/bhp-hr	pounds per million Btu	lbs/MMBtu
kilowatt	kW	second	sec
liter	l	Specific Volume, ft^3/lb-mole	SV
Megawatts	MW	Thousand	K

Common Conversions / Calculations / Constants

1 gram = 15.432 grains

1 pound = 7000 grains

grams per pound = 453.6

bhp = 1.411 * Engine kW, (where Engine kW = Generator kW output / 0.95) @ 95% efficiency

g/bhp-hr = 453*ppm*(MW / (385E6))* 0.00848 * f-factor * (20.9 / (20.9-O_2)); **CARB**

g/bhp-hr = lbs/hr * 453.6 / bhp

2.59E-9 = Conversion factor for ppm to lbs/scf; **EPA 40CFR60.45 @ 68°F**

Correction Multiplier for Standard Temperature = (460 + $T_{std.}$ °F) / 528

F factor: dscf / MMBTU @ **60°F = 8579,** @ **68°F = 8710.** @ 70° F = **8743** for natural gas

Btu/ft^3: **1040**

lb/hr Part. Emission Rate = 0.00857 * gr/dscf * dscfm; **EPA Method 5**

lbs/hr = ppm * dscfm * MW * 0.00008223 / (Std Temp + 460)

Correction to 12% CO_2 = gr/dscf * 12% / stack CO_2%; **EPA Method 5**

Correction to 3% O_2 = ppm * 17.9 / (20.9 - stack O_2 %); **CARB Method 100**

Correction to 15% O_2 = ppm * 5.9 / (20.9 - stack O_2 %); **CARB Method 100**

dscfm = Gas Fd * MMBtu/min * 20.9 / (20.9 - stack O_2 %); **EPA Method 19**

Lb/MMBtu @ **60°F** = Fd * M * ppm * **2.64E-9** * 20.9 / (20.9 - stack O_2 %);
@ **68°F** = Fd * M * ppm * **2.59E-9** * 20.9 /(20.9 - stack O_2 %);
@**70F** = Fd * M * ppm * **2.58-9** * 20.9 / (20.9 - stack O_2 %)

Standard Temperatures by District

EPA	68 °F	NSAPCD - Northern Sonoma	68 °F
CARB	68 °F	PCAPCD - Placer	68 °F
BAAQMD - Bay Area	70 °F	SLOCAPCD - San Luis Obispo	60 °F
SJVUAPCD - San Joaquin	60 °F	SMAQMD - Sacramento	68°F de facto
SCAQMD - South Coast	60 °F	SCAQMD - Shasta County	68 °F
MBUAPCD - Monterey Bay	68 °F	YSAPCD - Yolo-Solano	68 °F
FRAQMD – Feather River	68 °F	AADBAPC – Amador County	68 °F

BEST ENVIRONMENTAL

CEM BIAS SYSTEM TEST SUMMARY FIELD DATA SHEET (EPA)

Facility: City of Berkeley **Date:** 7/15/2022 **Personnel:** BA / BJ

Location: Flare

	O_2		NO_x	CO	THC		Comments
Analyzer	CAI 110		600	48I	600		
Range	20.98		95.3	89.4	100		
Zero Value (N_2)	0.00		0.00	0.00	0.00		
Cal Value (low)					26.88		
Cyl. #					DT27824		
Cyl. Exp. Date					05/27/29		
Cal Value (mid)	11.59		45.30	54.50	43.50		
Cyl. #	CC50881		DT37052	CC707372	DT42922		
Cyl. Exp. Date	10/01/27		11/18/23	02/15/27	06/21/30		
Cal Value (Hi)	20.98		95.30	89.40	92.10		
Cyl. #	CC306150		CC308849	CC306150	CC506583		
Cyl. Exp. Date	11/22/29		10/02/27	11/22/29	03/10/29		

CALIBRATION ERROR CHECK

Zero cal (int)	-0.10		0.00	0.03	-0.69		
Abs. Difference	0.10		0.00	0.03	0.69		= or < 0.5 ppm
% Linearity	-0.5		0.0	0.0	-0.7		= or < 2%
low cal (int)					26.41		
Abs. Difference					0.47		= or < 0.5 ppm
% Linearity					-1.7		= or < 2%
mid cal (int)	11.52		45.56	54.51	44.39		
Abs. Difference	0.07		0.26	0.01	0.89		= or < 0.5 ppm
% Linearity	-0.3		0.3	0.0	2.0		= or < 2%
high cal (int)	20.98		95.14	89.60	93.96		
Abs. Difference	0.00		0.16	0.20	1.86		= or < 0.5 ppm
% Linearity	0.0		-0.2	0.2	2.0		= or < 2%

INITIAL SYSTEM BIAS CHECK

Zero (int)	-0.10		0.00	0.03	-0.69		
Zero (ext)	-0.08		0.00	-0.74	0.73		
Abs. Difference	0.02		0.00	0.77	1.42		
bias, % High Cal	-0.1		0.0	0.9	-1.4		Limit (±5%)

Cal (int)	11.52		45.56	54.51	44.39		
Cal (ext)	11.56		45.27	54.09	44.07		
Abs. Difference	0.04		0.29	0.42	0.31		
bias, % High Cal	-0.2		0.3	0.5	0.3		Limit (±5%)

System response time =

Zero to Cal	Cal to Zero
60.0	60.0

The time required (in seconds) to achieve a 95% difference between ext zero to ext span or ext span to ext zero.

EPA Method 25A (THC) QC
Cal. Error = <5% cal. Value
100 * (Cal Value - Cal Response) / Cal Value
System Drift = <3% of Scale
100 * (final cal - initial cal) / Range

System Bias (Limit ± 5%) = 100 * External cal - Internal cal / High Cal Gas Value

% Linearity (Limit ± 2%) = 100 * Span Value - Internal cal / High Cal Gas Value

% Converter Efficiency (Limit =/ >90%) = 100 * Internal Cal / NO_2 Cal Gas Value

NO_2 Converter Test

NO_2 Cal Gas	NO_2 Value	% of Efficiency	Cyl. #	Cyl. Exp. Date
5.98	5.39	90.07%	CC503193	01/06/24

BEST ENVIRONMENTAL

CEM BIAS SYSTEM TEST SUMMARY SHEET

Facility: City of Berkeley **Date:** 7/15/2022 **Personnel:** BA / BJ

Location: Flare

	O_2		Nox	CO	THC		Comments
Analyzer	CAI 110		600	48I	600		
Range	20.98		95.3	89.4	100		
Cal Value (low)					26.88		M25A only
Cyl. #					DT27824		M25A QC limits-below
Cal Value (mid)	11.59		45.3	54.5	43.5		
Cyl. #	CC50881		DT37052	CC707372	DT42922		
Cal Value (Hi)	20.98		95.30	89.40	92.1		Calibration Span
Cyl. #	CC306150		CC308849	CC306150	CC506583		

zero cal (int)	-0.10		0.00	0.03	-0.69		
% Linearity	**-0.48**		**0.00**	**0.03**	**-0.69**		<2% or +/-0.5diff.
low cal (int)					26.41		
% Linearity					**-1.7**		<2% or +/-0.5diff.
mid cal (int)	11.52		45.56	54.51	44.39		
% Linearity	**-0.3**		**0.3**	**0.0**	**2.0**		<2% or +/-0.5diff.
high cal (int)	20.98		95.14	89.60	93.96		
% Linearity	**0.0**		**-0.2**	**0.2**	**2.0**		<2% or +/-0.5diff.

Zero (int)	-0.10		0.00	0.03	-0.69		
Zero (ext)(i)	-0.08		0.00	-0.74	0.73		
% Bias	**0.1**		**0.0**	**-0.9**	**1.4**		Limit (±5%) or +/-0.5diff.
Cal (int)	11.52		45.56	54.51	44.39		
Cal (ext) 1(i)	11.56		45.27	54.09	44.07		
% Bias	**0.2**		**-0.3**	**-0.5**	**-0.3**		Limit (±5%) or +/-0.5diff.
Zero (ext) 1(f)	-0.17		0.01	-0.85	-0.74		926-1001
Cal (ext) 1(f)	11.54		45.02	53.62	42.46		Run 1
Zero % Drift	-0.4		0.0	-0.1	-1.5		Limit (±3%) or +/-0.5diff.
Cal % Drift	-0.1		-0.3	-0.5	-1.6		Limit (±3%) or +/-0.5diff.
Zero % Bias	-0.3		0.0	-1.0	-0.1		Limit (±5%) or +/-0.5diff.
Cal % Bias	0.1		-0.6	-1.0	-1.9		Limit (±5%) or +/-0.5diff.
Average	13.44		9.47	15.75	5.23		
Corr. Average	**13.47**		**9.50**	**16.50**	**5.27**		
Zero (ext) 2(f)	-0.17		0.00	-0.97	1.24		1014-1047
Cal (ext) 2(f)	11.56		44.96	53.29	42.55		Run 2
Zero % Drift	0.0		0.0	-0.1	2.0		Limit (±3%) or +/-0.5diff.
Cal % Drift	0.1		-0.1	-0.4	0.1		Limit (±3%) or +/-0.5diff.
Zero % Bias	-0.3		0.0	-1.1	1.9		Limit (±5%) or +/-0.5diff.
Cal % Bias	0.2		-0.6	-1.4	-1.8		Limit (±5%) or +/-0.5diff.
Average	13.48		9.47	19.67	7.33		
Corr. Average	**13.51**		**9.53**	**20.63**	**7.29**		
Zero (ext) 3(f)	-0.18		0.00	-1.01	0.83		1101-1135
Cal (ext) 3(f)	11.56		45.05	53.08	43.24		Run 3
Zero % Drift	-0.1		0.0	0.0	-0.4		Limit (±3%) or +/-0.5diff.
Cal % Drift	0.0		0.1	-0.2	0.7		Limit (±3%) or +/-0.5diff.
Zero % Bias	-0.4		0.0	-1.2	1.5		Limit (±5%) or +/-0.5diff.
Cal % Bias	0.2		-0.5	-1.6	-1.1		Limit (±5%) or +/-0.5diff.
Average	13.59		9.20	34.84	6.96		
Corr. Average	**13.60**		**9.26**	**36.04**	**6.16**		

System Drift (Limit ± 3%) = 100 * (External final cal - External Initial cal) / Cal Value (Hi)

System Bias (Limit ± 5%) = 100 * (External cal - Internal cal) / Cal Value (Hi)

% Linearity (Limit ± 2%) = 100 * (Span Value - Internal cal) / Cal Value (Hi)

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

EPA Method 25A (THC) QC
Cal. Error = <5% cal. Value
100 * (Cal Value - Cal Response) / Cal Value
System Drift = <3% of Scale
100 * (final cal - initial cal) / Range

A-4

STACK GAS FLOW RATE DETERMINATION -- FUEL USAGE
EPA Method 19

Facility: City of Berkeley
Unit: Flare
Condition: Normal
Date: 7/15/2022
Personell: BA / BJ
Time:

	926-1001 Run 1	1014-1047 Run 2	1101-1135 Run3	
Gross Calorific Value	260	248	267	Btu / ft³
Stack Oxygen	13.47	13.51	13.60	%
Gas Fd-Factor @ 70°F	10,553	10,686	10,438	DSCF/MMBtu
Standard Temperature (°F)	70	70	70	°F
Corrected Fuel Rate (SCFM)	65.56	65.59	65.57	SCFM
Fuel Flowrate (SCFH)	3,934	3,935	3,934	SCFH
Million Btu per minute	0.017	0.016	0.018	MMBtu/min
Heat Input (MMBtu/hour)	1.02	0.98	1.05	MMBtu/Hr
Stack Gas Flow Rate	**506**	**491**	**523**	**DSCFM**

WHERE:

Gas Fd-Factor = Fuel conversion factor (ratio of combustion gas volumes to heat inputs)
MMBtu = Milion Btu

CALCULATIONS:

SCFM = CFM * 528 * (gas line PSIA) / 14.7 / (gas °F + 460)
MMBtu/min = (SCFM * Btu/ft³) / 1,000,000
DSCFM = Gas Fd-Factor * MMBtu/min * 20.9/ (20.9 - stack oxygen%)
SCFH = SCFM * 60
Heat Input = MMBtu/min * 60

APPENDIX B
LAB REPORTS

BEST ENVIRONMENTAL
339 Stealth Court
Livermore, California 94551
(925) 455-9474 FAX (925) 455-9479
bestair@best-enviro.com

August 8, 2022

Subject: On July 15, 2021 Best Environmental collected three inlet and three outlet samples from the Berkeley Marina Landfill Source Test.

CLIENT: SCS Field Services
PROJECT NAME: Berkeley Marina Source Test
BE PROJECT NO: 312
ANALYSIS DATE: 7/16/22

Sample ID	Lab Sample Number
Run 1 Inlet	9030
Run 2 Inlet	9031
Run 3 Inlet	9032
Run 1 Outlet	9049
Run 2 Outlet	9050
Run 3 Outlet	9051

The samples were analyzed in accordance with EPA Method 18 (CH_4) & ASTM D-1945/3588/6228 (fuel composition analysis, High heat value calculations and Fuel Sulfur).

The following pages present the inlet and outlet VOC and LFG gas composition analytical results with calculated HHV. A chain of custody can also be found in this report. This Lab report contains a total of 12 pages.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples.

If you have any questions concerning these results, or if Best Environmental can be of any further assistance, please contact me at (925) 455-9474 x 103.

Submitted by,

Bobby Asfour
Lab Director

EPA Methods 3C, 18, 25C & ASTM D-1945/3588/6228

Facility: City of Berkeley Marina Landfill Source: LFG Flare

Test Date: 7/15/22 Lab Personnel: BA

Analysis Date: 7/16/22 Project #: 312

CH4 Analysis (M18)

M-18

Lab ID	Time	Inlet Run #	% CH4	ppm C2 as CH4		Duplicate CH4	Duplicate C2 as CH4	R1/Inlet	Limit
9030	926	Run 1	25.7	18.5		25.20	17.89		
9031	1014	Run 2	24.5	17.7		2.04	3.46		15%
9032	1101	Run 3	26.3	16.5					

		Outlet Run #	ppm CH4	ppm C2 as CH4	
9049	926	Run 1	3.45	ND	
9050	1014	Run 2	3.48	ND	
9051	1101	Run 3	3.79	ND	

Inlet H2S	ppmv
R1	1.52
R2	2.58
R3	1.05

DL	outlet	Inlet	
CH4	<1	<0.2	ppm/%
C2	<1	<1	ppm
C3+ as methane	<1	<1	ppm

GC/FID/FPD/TCD: SRI 8610C
Column: 3 foot Haysep D, 60M capillary, 12' 13x Packed column
Chromatic integration: Peak444 Peaksimple by SRI
Gas Standards: Propane in air/C1-C6 n-alkane in N2
H2S in N2
Natural gas standard in Methane

Fuel Analysis-R1 inlet

Helium	0.04	%
Hydrogen	0.11	%
Nitrogen	45.28	%
Oxygen	5.67	%
Carbon Mo	0.00	%
Carbon Dio	22.75	%
Methane	25.73	%
Ethane	0.00	%
Propane	0.00	%
Isobutane	0.00	%
n-Butane	0.00	%
Isopentane	0.00	%
n-Pentane	0.00	%
Hexanes	0.00	%

Fd-Factor	10,553	
HHV	260	

Fuel Analysis-R2 Inlet

Helium	0.01	%
Hydrogen	0.15	%
Nitrogen	45.63	%
Oxygen	5.99	%
Carbon Mo	0.00	%
Carbon Dio	22.42	%
Methane	24.52	%
Ethane	0.00	%
Propane	0.00	%
Isobutane	0.00	%
n-Butane	0.00	%
Isopentane	0.00	%
n-Pentane	0.00	%
Hexanes	0.00	%

Fd-Factor	10,686	
HHV	248	

Fuel Analysis-R3 Inlet

Helium	0.02	%
Hydrogen	0.38	%
Nitrogen	45.15	%
Oxygen	5.83	%
CO	0.00	%
CO2	22.17	%
Methane	26.35	%
Ethane	0.00	%
Propane	0.00	%
Isobutane	0.00	%
n-Butane	0.00	%
Isopentane	0.00	%
n-Pentane	0.00	%
Hexanes	0.00	%

Fd-Factor	10,438	dscf/MMBtu @
HHV	267	BTU/cf

BEST ENVIRONMENTAL Livermore, CA 925 455-9474

Gas Chromotography QA/QC Results

Facility: City of Berkeley Marina Landfill **Source:** LFG Flare

Test Date: 7/15/22 **Lab Personnel:** BA

Analysis Date: 7/16/22

Cal Curve Date: 7/1/22

	Daily Blank & R.T.			limit
	C1/CH4	C2/ethane	C3+/NMNEHC	DL
He Gas	ND	ND	ND	
C1-C6 gas	2.96	4.46	5.73	

* C1-C6 gas used to determine retention times

	initial cal propane as methane			
conc.	92.1	255.1	8970	
area ct.	20.8	58.64	2015.5	

	3 point Cal-3 injections each (area ct)			limit
	20.8	58.5	2015.5	
	20.9	59	2016	
	20.99	58.7	2014	
average	20.90	58.73	2015.17	
Deviation	0.10	0.25	1.04	
% diff	**0.45**	**0.43**	**0.05**	**<5**

H2S Caibration Check	area ct		
Cal value	171		
Response	172	3231	
% Diff.	**-0.58**		<15

	post cal			limit
	92.1	255.1	8322	
	91.1	244.2	8215	
% diff	**1.09**	**4.27**	**1.29**	**<15%**

EPA Method 3C/ASTM D-1945 Daily Calibrations			
Method Required Values	Actual Value	Results	**% Diff.**
N2	2	2.1	5.00
O2	1	1.006	0.60
CO	0.1	0.0995	-0.50
CO2	44	46	4.55
CH4	52	51	-1.92

Making our world more productive

DocNumber: 444964

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22022

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 01/06/2022
Linde Order Number: 59001704
Part Number: EV NIHS170ME-AS
Customer PO Number: 32

Fill Date: 12/09/2021
Lot Number: 70086134305
Cylinder Style & Outlet: AS CGA 330
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	01/05/2025	NIST Traceable
Cylinder Number:	SA4842	Expanded Uncertainty
171 ppm	Hydrogen sulfide	± 2 ppm
Balance	Nitrogen	

Certification Information: Certification Date: 01/05/2022 Term: 36 Months Expiration Date: 01/05/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Hydrogen sulfide

Requested Concentration: 170 ppm
Certified Concentration: 171 ppm
Instrument Used: Ametek Series 9900 S/N ZW-9900-S1330-1
Analytical Method: UV Spectrometry
Last Multipoint Calibration: 12/30/2021

Reference Standard: Type / Cylinder #: GMIS / DT0009254
Concentration / Uncertainty: 251 ppm ±2 ppm
Expiration Date: 07/17/2024
Traceable to: SRM # / Sample # / Cylinder #: PRM / C2103401 / D587474
SRM Concentration / Uncertainty: 400.4 ppm / ±3.2 ppm
SRM Expiration Date: 05/20/2024

First Analysis Data:						Date	12/29/2021
Z: 0	R: 251	C: 172				Conc:	172
R: 251	Z: 0	C: 171				Conc:	171
Z: 0	C: 173	R: 252				Conc:	173
UOM: ppm					Mean Test Assay:		172 ppm

Second Analysis Data:						Date	01/05/2022
Z: 0	R: 251	C: 171				Conc:	171
R: 251	Z: 0	C: 171				Conc:	171
Z: 0	C: 171	R: 251				Conc:	171
UOM: ppm					Mean Test Assay:		171 ppm

Analyzed By: Jose Vasquez

Certified By: Amalia Real

Making our world more productive

Linde Gas & Equipment Inc.
ISO 9001 Registered
37256 Highway 30
Gelsmar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Customer & Order Information:

LGEPKG FREMONT CA HP
41446 CHRISTY STREET,
FREMONT, CA 94538-5105

Linde Order Number: **71954931**
Customer PO Number: **79956654**

Certificate Issuance Date: **1/27/2022**

Certification Date: **1/27/2022**
Lot Number: **70340 2026 6J**
Part Number: **HE BU100X2C-A3**
DocNumber: **482274**
Expiration Date: **1/26/2024**

CERTIFICATE OF ANALYSIS

Certified Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Butane	58.12 100 ppm	**96.0 ppm**	1	± 2 %
Ethane	30 100 ppm	**95.5 ppm**	1	± 2 %
n-Hexane	86.18 100 ppm	**91.9 ppm**	1	± 2 %
Methane	16 100 ppm	**99.4 ppm**	1	± 2 %
n-Pentane	72.15 100 ppm	**93.7 ppm**	1	± 2 %
Propane	44 100 ppm	**97.6 ppm**	1	± 2 %
Helium	99.94 %	**99.94259 %**	2	N/A

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **1200 psig**
Cylinder Volume: **16.5 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EX0013583**

Fill Date: **1/26/2022**
Analysis Date: **1/26/2022**

Filling Method: **Gravimetric**

Analyst: **Craig Billiot**

QA Reviewer: **Kristen Hanna**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Agilent 7890B - Gas Chromatography with FID
2	N/A - By Difference of Other Components

The gas calibration cylinder standard prepared by Linde Gas & Equipment Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Linde Gas & Equipment Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by mole unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

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DocNumber: 405533

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 03/11/2021
Praxair Order Number: 36989506
Part Number: EV AIPR30ME-AS
Customer PO Number: 6

Fill Date: 02/25/2021
Lot Number: 70086105605
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	03/10/2029	NIST Traceable
Cylinder Number:	CC506583	Expanded Uncertainty
30.7 ppm	Propane	± 0.1 ppm
Balance	Air	

Certification Information:

Certification Date: 03/10/2021 *Term:* 96 Months *Expiration Date:* 03/10/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. *Component:* Propane

Requested Concentration: 30 ppm
Certified Concentration: 30.7 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 03/05/2021

First Analysis Data:						Date	03/10/2021
Z:	0	R:	136.8	C:	82.9	Conc:	30.7
R:	136.8	Z:	0	C:	82.8	Conc:	30.7
Z:	0	C:	82.8	R:	136.9	Conc:	30.7
UOM:	ppm				Mean Test Assay:		30.7 ppm

Reference Standard: Type / Cylinder #: GMIS / CC302220
Concentration / Uncertainty: 50.68 ppm ±0.13 ppm
Expiration Date: 07/06/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1667b / 83-J-17 / CAL017783
SRM Concentration (enter with units) / 48.83 ppm / ±0.11 ppm
SRM Expiration Date: 08/17/2017

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm				Mean Test Assay:		ppm

Analyzed By Jose Vasquez

Certified By Amalia Real

CH4
92.1 ppm

PRAXAIR
Making our planet more productive

DocNumber: 315881

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22020

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 10/20/2020
Praxair Order Number: 25533164
Part Number: EV AIPR85ME-AS
Customer PO Number: 9096

Fill Date: 10/14/2020
Lot Number: 70086028806
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	10/20/2028	NIST Traceable
Cylinder Number:	SA8052	Expanded Uncertainty
85.2 ppm	Propane	± 0.5 %
Balance	Air	

Certification Information:

Certification Date: 10/20/2020 *Term:* 96 Months *Expiration Date:* 10/20/2028

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as relative expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. *Component:* Propane

Requested Concentration: 85 ppm
Certified Concentration: 85.2 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 10/15/2020

Reference Standard: Type / Cylinder #: GMIS / CC86463
Concentration / Uncertainty: 101.5 ppm ±0.15%
Expiration Date: 01/04/2027
Traceable to: SRM # / Sample # / Cylinder #: SRM 1668b / 82-L-22 / FF10569
SRM Concentration / Uncertainty: 98.68 PPM / ±0.14 PPM
SRM Expiration Date: 09/12/2019

First Analysis Data:						Date	10/20/2020
Z: 0	R: 265.4	C: 222.9	Conc: 85.2				
R: 265.3	Z: 0	C: 223.3	Conc: 85.4				
Z: 0	C: 222.8	R: 265.9	Conc: 85.2				
UOM: ppm			Mean Test Assay:	85.2	ppm		

Second Analysis Data:						Date	
Z: 0	R: 0	C: 0	Conc: 0				
R: 0	Z: 0	C: 0	Conc: 0				
Z: 0	C: 0	R: 0	Conc: 0				
UOM: ppm			Mean Test Assay:		ppm		

Analyzed By: Jenna Lockman

Certified By: Jose Vasquez

CH_4 255.6 ppm

Making our world more productive

DocNumber: 448691

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22022

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 02/21/2022
Linde Order Number: 61663855
Part Number: AI PR3000E-AS
Customer PO Number: 35

Fill Date: 02/16/2022
Lot Number: 70086204705
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	02/21/2030	NIST Traceable
Cylinder Number:	CC15394	Expanded Uncertainty
2990 ppm	Propane	± 25 ppm
Balance	Air	

Certification Information:

Certification Date: 02/21/2022 Term: 96 Months Expiration Date: 02/21/2030

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard If Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Propane

Requested Concentration: 3000 ppm
Certified Concentration: 2990 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 02/07/2022

Reference Standard: Type / Cylinder #: GMIS / CC257728
Concentration / Uncertainty: 2497 ppm ±13 ppm
Expiration Date: 02/09/2025
Traceable to: SRM # / Sample # / Cylinder #: SRM 2647a / 104-C-21 / XF003205B
SRM Concentration / Uncertainty: 2467 ppm / ±13.0 ppm
SRM Expiration Date: 05/02/2024

First Analysis Data:						Date	02/21/2022
Z:	0	R:	7350	C:	8810	Conc:	2989
R:	7360	Z:	0	C:	8810	Conc:	2989
Z:	0	C:	8820	R:	7370	Conc:	2992
UOM:	ppm			Mean Test Assay:		2990	ppm

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			ppm

Analyzed By: Courtney Zielke

Certified By: Jose Vasquez

8970 ppm CH4


CALIBRATION
GAS MIXTURE
GAS COMPOSITION
Components
Concentrations (MOLE
Hydrogen 1.00%
Oxygen 1.00%
Nitrogen 2.00%
Carbon Monoxide 0.1%
Carbon Dioxide 44.0%
Methane
Balance
Number: F1035VIMLF
Volume: 34 Liters @ 500 psi
Accuracy: 2% Certified Standard
Recommended Shelf Life: 3 Years
Lot #: 1-305-1
Date: November
Ref #: 1303-3
MESA
MESA Specialty Gases & Equipment
TEL: (888) 470-MESA (6372)
e-mail: mail@mesagas.com
www.mesagas.com

Best Environmental Ph (925) 455-9474; Fx (925) 455-9479

Project ID: City of Berkeley **SAMPLE CHAIN OF CUSTODY** **BE PROJECT MANAGER:**

Analyical Lab: BE

#	DATE	TIME	SAMPLE ID Run#/Method/Fraction/Source	CONTAINER size / type	Volume	Storage Temp °F	SAMPLE DESCRIPTION	ANALYSIS	TAT
1	7/15/22	926	9430 Run 1/inlet	10L/Tedlar	7.0	Amb.	LFG	M18 + Comp Fuel	Norm.
2		1014	9431 Run 2/Inlet	10L/Tedlar		Amb.	LFG	M18 + Comp Fuel	Norm.
3		1101	9432 Run 3/Inlet	10L/Tedlar		Amb.	LFG	M18 + Comp Fuel	Norm.
4									
5		926	9449 Run 1/outlet	10L/Tedlar		Amb.	Exhuast Gas	M18	Norm.
6		1014	9450 Run 2/outlet	10L/Tedlar		Amb.	Exhuast Gas	M18	Norm.
7		1101	9451 Run 3/outlet	10L/Tedlar		Amb.	Exhuast Gas	M18	Norm.
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									

SPECIAL INSTRUCTIONS: Record & Report all liquid sample volumes.

3 2

Submit Results to: Attn: Bobby Asfour BEST ENVIRONMENTAL 339 STEALTH COURT LIVERMORE CA. 94551

Relinquished by:_____ Received by:_____ Date:_____ Time:_____

Relinquished by:_____ Received by:_____ Date:_____ Time:_____

Relinquished by:_____ Received by:_____ Date:_____ Time:_____

SAMPLE CONDITION AS RECEIVED: OK or not OK

B1

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Atmospheric Analysis & Consulting, Inc.

CLIENT	: Best Environmental
PROJECT NAME	: City Berkeley Flare
AAC PROJECT NO.	: 221529
REPORT DATE	: 08/10/2022

On July 20th, 2022, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Summa Canisters for TNMOC analysis by EPA 25C. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHg)
LFG R1	221529-33751	777.5
LFG R2	221529-33752	749.0
LFG R3	221529-33753	743.0

This analysis is performed in accordance with AAC's Quality Manual. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples. The Technical Director or his/her designee, as verified by the following signature, has authorized release of the data.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 4 pages.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Laboratory Analysis Report

Client : Best Environmental
Project No. : 221529
Matrix : AIR
Units : ppmC

Sampling Date : 07/15/2022
Receiving Date : 07/20/2022
Analysis Date : 08/10/2022
Report Date : 08/10/2022

EPA 25C

Reporting Limit: 3.0 ppmC		*Canister Dilution Factor*	*Analysis Dilution Factor*	TNMOC*	SRL (RL x DF's)
Client Sample ID	AAC ID				
LFG R1	221529-33751	1.3	1.0	226	3.9
LFG R2	221529-33752	1.4	1.0	187	4.1
LFG R3	221529-33753	1.4	1.0	185	4.1

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac.

**Total Non-Methane Organic Carbon*

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Quality Control/Quality Assurance Report

Analysis Date : 08/10/2022
Analyst : MR
Units : ppmv

Instrument ID: : GCTCA#2-FI
Calibration Date: : 7/18/2022

I - Opening Calibration Verification Standard - Method 25C

Analyte	xRF	DRF	%RPD*
Propane	119363	126680	5.9

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	119363	126680	125233	125159	125691	5.2

III - Method Blank - Method 25C

AAC ID	Analyte	Sample Result
MB	TNMOC	0.00

IV - Laboratory Control Spike & Duplicate - Method 25C

AAC ID	Analyte	Spike Added	LCS	LCSD	LCS % Rec **	LCSD % Rec **	% RPD***
LCS/LCSD	Propane	51.0	52.30	52.27	102.6	102.6	0.1

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	119363	122523	2.6

xCF - Average Calibration Factor from Initial Calibration Curve
dCF - Daily Calibration Factor
* Must be <15%
** Must be 90-110 %
*** Must be <20%

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Ph (925) 455-9474; Fx (925) 455-9479

B-15

Project ID: City Berkeley Flare SAMPLE CHAIN OF CUSTODY BE PROJECT MANAGER: B Johnston

Analyical Lab: ATC

#	DATE	TIME	SAMPLE ID Run#/Method/Fraction/Source	CONTAINER size / type	Volume	Storage Temp °F	Method	ANALYSIS
1	7-15-22	930	LFG R1 33751	Can			TO 15	TO 15
2	↓	1017	R2 33752	↓				↓
3	↓	1105	R3 33753	↓				
4								
5								All cans 30" → 0"
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								

ord & Report all liquid sample volumes.

esults to: Attn: BEST ENVIRONMENTAL 339 STEALTH COURT, LIVERMORE CA. 94551

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: Bell _____ Received by: _____ Date: 7/20/22 Time: 0979

SAMPLE CONDITION AS RECEIVED: OK or not OK

Fx 4 cans (1c void)

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Atmospheric Analysis & Consulting, Inc.

CLIENT	: Best Environmental
PROJECT NAME	: City Berkeley Flare
AAC PROJECT NO.	: 221529
REPORT DATE	: 08/03/2022

On July 20, 2022, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Summa Canisters for Volatile Organic Compounds analysis by EPA Method TO-15. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab ID	Return Pressure (mmHga)
LFG R1	221529-33751	777.5
LFG R2	221529-33752	749.0
LFG R3	221529-33753	743.0

This analysis is accredited under the laboratory's ISO/IEC 17025:2017 accreditation issued by the ANSI National Accreditation Board. Refer to certificate and scope of accreditation AT-1908. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples.

The Technical Director or his designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 10 pages.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com • (805) 650-1642

Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO : 221529
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R1			Sample Reporting Limit (SRL)	LFG R2			Sample Reporting Limit (SRL)	Method Reporting Limit (MRL)
AAC ID	221529-33751				221529-33752				
Date Sampled	07/15/2022				07/15/2022				
Date Analyzed	07/20/2022				07/20/2022				
Can Dilution Factor	1.31				1.35				
Compound	Result	Qualifier	Analysis DF	(MRLxDF's)	Result	Qualifier	Analysis DF	(MRLxDF's)	
Chlorodifluoromethane	173		5	3.27	142		5	3.38	0.50
Propene	247		5	6.55	189		5	6.75	1.00
Dichlorodifluoromethane	116		5	3.27	93.9		5	3.38	0.50
Chloromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Dichlorotetrafluoroethane	76.7		5	3.27	66.1		5	3.38	0.50
Vinyl Chloride	8.51		5	3.27	7.70		5	3.38	0.50
Methanol	8.32	J	5	32.7	8.64	J	5	33.8	5.00
1,3-Butadiene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Bromomethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Chloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Dichlorofluoromethane	5.11		5	3.27	4.52		5	3.38	0.50
Ethanol	<SRL	U	5	13.1	<SRL	U	5	13.5	2.00
Vinyl Bromide	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Acetone	<SRL	U	5	13.1	<SRL	U	5	13.5	2.00
Trichlorofluoromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
2-Propanol (IPA)	<SRL	U	5	13.1	<SRL	U	5	13.5	2.00
Acrylonitrile	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
1,1-Dichloroethene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Methylene Chloride (DCM)	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Allyl Chloride	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Carbon Disulfide	8.19		5	6.55	<SRL	U	5	6.75	1.00
Trichlorotrifluoroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
trans-1,2-Dichloroethene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1-Dichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Methyl Tert Butyl Ether (MTBE)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Vinyl Acetate	<SRL	U	5	6.55	108		5	6.75	1.00
2-Butanone (MEK)	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
cis-1,2-Dichloroethene	3.80		5	3.27	3.78		5	3.38	0.50
Hexane	329		5	3.27	259		5	3.38	0.50
Chloroform	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Ethyl Acetate	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Tetrahydrofuran	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,2-Dichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1,1-Trichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Benzene	38.4		5	3.27	32.1		5	3.38	0.50

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com • (805) 650-1642

Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO : 221529
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R1			Sample Reporting Limit (SRL) (MRLxDF's)	LFG R2			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	221529-33751				221529-33752				
Date Sampled	07/15/2022				07/15/2022				
Date Analyzed	07/20/2022				07/20/2022				
Can Dilution Factor	1.31				1.35				
Compound	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Carbon Tetrachloride	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Cyclohexane	43.6		5	3.27	42.7		5	3.38	0.50
1,2-Dichloropropane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Bromodichloromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,4-Dioxane	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Trichloroethene (TCE)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
2,2,4-Trimethylpentane	17.0		5	3.27	13.8		5	3.38	0.50
Heptane	105		5	3.27	98.9		5	3.38	0.50
cis-1,3-Dichloropropene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
4-Methyl-2-pentanone (MiBK)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
trans-1,3-Dichloropropene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1,2-Trichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Toluene	7.73		5	3.27	8.58		5	3.38	0.50
2-Hexanone (MBK)	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Dibromochloromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,2-Dibromoethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Tetrachloroethene (PCE)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Chlorobenzene	80.6		5	3.27	84.1		5	3.38	0.50
Ethylbenzene	4.19		5	3.27	6.14		5	3.38	0.50
m & p-Xylene	8.12		5	6.55	11.0		5	6.75	1.00
Bromoform	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Styrene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1,2,2-Tetrachloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
o-Xylene	8.25		5	3.27	9.59		5	3.38	0.50
4-Ethyltoluene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,3,5-Trimethylbenzene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,2,4-Trimethylbenzene	4.32		5	3.27	5.40		5	3.38	0.50
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,3-Dichlorobenzene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,4-Dichlorobenzene	36.9		5	3.27	39.0		5	3.38	0.50
1,2-Dichlorobenzene	4.26		5	3.27	4.59		5	3.38	0.50
1,2,4-Trichlorobenzene	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Hexachlorobutadiene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
BFB-Surrogate Std. % Recovery		95%				97%			70-130%

U - Compound was not detected at or above the SRL.

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Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO : 221529
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R3			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	221529-33753				
Date Sampled	07/15/2022				
Date Analyzed	07/20/2022				
Can Dilution Factor	1.37				
Compound	Result	Qualifier	Analysis DF		
Chlorodifluoromethane	142		5	3.41	0.50
Propene	202		5	6.83	1.00
Dichlorodifluoromethane	98.2		5	3.41	0.50
Chloromethane	<SRL	U	5	3.41	0.50
Dichlorotetrafluoroethane	67.0		5	3.41	0.50
Vinyl Chloride	7.37		5	3.41	0.50
Methanol	8.74	J	5	34.1	5.00
1,3-Butadiene	<SRL	U	5	3.41	0.50
Bromomethane	<SRL	U	5	3.41	0.50
Chloroethane	<SRL	U	5	3.41	0.50
Dichlorofluoromethane	4.51		5	3.41	0.50
Ethanol	<SRL	U	5	13.7	2.00
Vinyl Bromide	<SRL	U	5	3.41	0.50
Acetone	<SRL	U	5	13.7	2.00
Trichlorofluoromethane	<SRL	U	5	3.41	0.50
2-Propanol (IPA)	<SRL	U	5	13.7	2.00
Acrylonitrile	<SRL	U	5	6.83	1.00
1,1-Dichloroethene	<SRL	U	5	3.41	0.50
Methylene Chloride (DCM)	<SRL	U	5	6.83	1.00
Allyl Chloride	<SRL	U	5	6.83	1.00
Carbon Disulfide	10.7		5	6.83	1.00
Trichlorotrifluoroethane	<SRL	U	5	3.41	0.50
trans-1,2-Dichloroethene	<SRL	U	5	3.41	0.50
1,1-Dichloroethane	<SRL	U	5	3.41	0.50
Methyl Tert Butyl Ether (MTBE)	<SRL	U	5	3.41	0.50
Vinyl Acetate	<SRL	U	5	6.83	1.00
2-Butanone (MEK)	<SRL	U	5	6.83	1.00
cis-1,2-Dichloroethene	3.89		5	3.41	0.50
Hexane	261		5	3.41	0.50
Chloroform	<SRL	U	5	3.41	0.50
Ethyl Acetate	<SRL	U	5	3.41	0.50
Tetrahydrofuran	<SRL	U	5	3.41	0.50
1,2-Dichloroethane	<SRL	U	5	3.41	0.50
1,1,1-Trichloroethane	<SRL	U	5	3.41	0.50
Benzene	32.5		5	3.41	0.50

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Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO : 221529
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R3			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	221529-33753				
Date Sampled	07/15/2022				
Date Analyzed	07/20/2022				
Can Dilution Factor	1.37				
Compound	Result	Qualifier	Analysis DF		
Carbon Tetrachloride	<SRL	U	5	3.41	0.50
Cyclohexane	42.4		5	3.41	0.50
1,2-Dichloropropane	<SRL	U	5	3.41	0.50
Bromodichloromethane	<SRL	U	5	3.41	0.50
1,4-Dioxane	<SRL	U	5	6.83	1.00
Trichloroethene (TCE)	<SRL	U	5	3.41	0.50
2,2,4-Trimethylpentane	13.9		5	3.41	0.50
Heptane	99.8		5	3.41	0.50
cis-1,3-Dichloropropene	<SRL	U	5	3.41	0.50
4-Methyl-2-pentanone (MiBK)	<SRL	U	5	3.41	0.50
trans-1,3-Dichloropropene	<SRL	U	5	3.41	0.50
1,1,2-Trichloroethane	<SRL	U	5	3.41	0.50
Toluene	7.71		5	3.41	0.50
2-Hexanone (MBK)	<SRL	U	5	6.83	1.00
Dibromochloromethane	<SRL	U	5	3.41	0.50
1,2-Dibromoethane	<SRL	U	5	3.41	0.50
Tetrachloroethene (PCE)	<SRL	U	5	3.41	0.50
Chlorobenzene	81.9		5	3.41	0.50
Ethylbenzene	4.57		5	3.41	0.50
m & p-Xylene	8.60		5	6.83	1.00
Bromoform	<SRL	U	5	3.41	0.50
Styrene	<SRL	U	5	3.41	0.50
1,1,2,2-Tetrachloroethane	<SRL	U	5	3.41	0.50
o-Xylene	8.74		5	3.41	0.50
4-Ethyltoluene	<SRL	U	5	3.41	0.50
1,3,5-Trimethylbenzene	<SRL	U	5	3.41	0.50
1,2,4-Trimethylbenzene	4.51		5	3.41	0.50
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	5	3.41	0.50
1,3-Dichlorobenzene	<SRL	U	5	3.41	0.50
1,4-Dichlorobenzene	38.8		5	3.41	0.50
1,2-Dichlorobenzene	4.51		5	3.41	0.50
1,2,4-Trichlorobenzene	<SRL	U	5	6.83	1.00
Hexachlorobutadiene	<SRL	U	5	3.41	0.50
BFB-Surrogate Std. % Recovery		97%			70-130%

U - Compound was not detected at or above the SRL.

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022
MATRIX : High Purity N_2
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : MS1-070822-02
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 07/11/2022 Calibration

Analyte Compounds	*Source*[1]	*CCV*[2]	*% Recovery*[3]
4-BFB (surrogate standard)	10.00	9.39	94
Chlorodifluoromethane	10.50	11.29	108
Propene	10.60	11.58	109
Dichlorodifluoromethane	10.40	11.15	107
Dimethyl Ether	10.80	10.21	95
Chloromethane	10.40	10.23	98
Dichlorotetrafluoroethane	10.30	10.75	104
Vinyl Chloride	10.50	10.37	99
Acetaldehyde	22.50	25.87	115
Methanol	20.10	16.73	83
1,3-Butadiene	10.60	10.21	96
Bromomethane	10.40	10.37	100
Chloroethane	10.30	9.77	95
Dichlorofluoromethane	10.50	10.15	97
Ethanol	11.20	10.31	92
Vinyl Bromide	10.50	9.76	93
Acrolein	11.10	10.31	93
Acetone	10.60	10.58	100
Trichlorofluoromethane	10.50	10.71	102
2-Propanol (IPA)	11.00	11.33	103
Acrylonitrile	11.40	10.90	96
1,1-Dichloroethene	10.40	10.27	99
Methylene Chloride (DCM)	10.50	10.15	97
TertButanol (TBA)	11.30	10.56	93
Allyl Chloride	10.40	10.80	104
Carbon Disulfide	10.50	10.26	98
Trichlorotrifluoroethane	10.40	10.07	97
trans-1,2-Dichloroethene	10.60	10.98	104
1,1-Dichloroethane	10.50	11.60	110
Methyl Tert Butyl Ether (MTBE)	10.50	10.55	100
Vinyl Acetate	11.00	12.34	112
2-Butanone (MEK)	10.60	11.02	104
cis-1,2-Dichloroethene	10.50	10.86	103
Hexane	10.70	11.29	106
Chloroform	10.60	10.86	102
Ethyl Acetate	10.60	11.52	109
Tetrahydrofuran	10.20	10.24	100
1,2-Dichloroethane	10.50	10.81	103
1,1,1-Trichloroethane	10.40	10.57	102
Benzene	10.60	10.23	97
Carbon Tetrachloride	10.20	9.72	95
Cyclohexane	10.50	10.04	96

Analyte Compounds (Continued)	*Source*[1]	*CCV*[2]	*% Recovery*[3]
1,2-Dichloropropane	10.50	10.76	102
Bromodichloromethane	10.40	10.45	100
1,4-Dioxane	10.40	10.34	99
Trichloroethene (TCE)	10.40	10.34	99
2,2,4-Trimethylpentane	10.40	10.27	99
Methyl Methacrylate	11.00	11.11	101
Heptane	10.50	10.47	100
cis-1,3-Dichloropropene	10.40	10.36	100
4-Methyl-2-pentanone (MiBK)	10.40	10.48	101
trans-1,3-Dichloropropene	10.50	10.45	100
1,1,2-Trichloroethane	10.50	10.49	100
Toluene	10.60	10.15	96
2-Hexanone (MBK)	10.50	11.19	107
Dibromochloromethane	10.30	10.25	100
1,2-Dibromoethane	10.60	10.71	101
Tetrachloroethene (PCE)	10.40	9.83	95
Chlorobenzene	10.60	10.44	98
Ethylbenzene	10.50	10.76	102
m & p-Xylene	21.00	21.87	104
Bromoform	10.50	10.63	101
Styrene	10.50	10.82	103
1,1,2,2-Tetrachloroethane	10.50	11.69	111
o-Xylene	10.50	10.82	103
1,2,3-Trichloropropane	10.40	10.71	103
Isopropylbenzene (Cumene)	10.40	10.81	104
α-Pinene	11.40	9.97	87
2-Chlorotoluene	10.40	10.22	98
n-Propylbenzene	10.50	10.70	102
4-Ethyltoluene	10.30	11.22	109
1,3,5-Trimethylbenzene	10.30	11.08	108
β-Pinene	11.30	8.28	73
1,2,4-Trimethylbenzene	10.30	11.08	108
Benzyl Chloride (a-Chlorotoluene)	10.40	11.78	113
1,3-Dichlorobenzene	10.40	11.53	111
1,4-Dichlorobenzene	10.30	11.26	109
Sec-ButylBenzene	10.40	11.03	106
1,2-Dichlorobenzene	10.60	11.51	109
n-ButylBenzene	10.40	11.11	107
1,2-Dibromo-3-Chloropropane	10.40	11.00	106
1,2,4-Trichlorobenzene	11.00	11.42	104
Naphthalene	11.50	10.46	91
Hexachlorobutadiene	11.00	11.06	101

[1] Concentration of analyte compound in certified source standard.

[2] Measured result from daily Continuing Calibration Verification (CCV).

[3] The acceptable range for analyte recovery is 100±30%.

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022
MATRIX : High Purity N_2
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : MS1-070822-02
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Laboratory Control Spike Analysis

System Monitoring Compounds	*Sample Concentration*	*Spike Added*	*LCS[1] Recovery*	*LCSD[1] Recovery*	*LCS[1] % Recovery[2]*	*LCSD[1] % Recovery[2]*	*RPD[3]*
4-BFB (surrogate standard)	0.0	9.80	9.39	9.47	95.8	96.6	0.8
1,1-Dichloroethene	0.0	10.40	10.27	10.07	99	97	2.0
Methylene Chloride (DCM)	0.0	10.50	10.15	10.21	97	97	0.6
Benzene	0.0	10.60	10.23	10.65	97	100	4.0
Trichloroethene (TCE)	0.0	10.40	10.34	10.37	99	100	0.3
Toluene	0.0	10.60	10.15	10.09	96	95	0.6
Tetrachloroethene (PCE)	0.0	10.40	9.83	10.11	95	97	2.8
Chlorobenzene	0.0	10.60	10.44	10.28	98	97	1.5
Ethylbenzene	0.0	10.50	10.76	10.84	102	103	0.7
m & p-Xylene	0.0	21.00	21.87	21.96	104	105	0.4
o-Xylene	0.0	10.50	10.82	10.89	103	104	0.6

[1] Laboratory Control Spike (LCS) / Laboratory Control Spike Duplicate (LCSD)

[2] The acceptable range for analyte recovery is 100±30%.

[3] Relative Percent Difference (RPD) between LCS recovery and LCSD recovery (acceptable range is <25%).

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022 | **INSTRUMENT ID : GC/MS-02**
MATRIX : High Purity He or N_2 | **ANALYST : MB/DL**
UNITS : PPB (v/v)

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Method Blank Analysis

Analyte Compounds	*MB 072022*	*Reporting Limit (RL)*
4-BFB (surrogate standard)	83%	100±30%
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Dimethyl Ether	<RL	0.5
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Acetaldehyde	<RL	5.0
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acrolein	<RL	1.0
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	1.0
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
TertButanol (TBA)	<RL	0.5
Allyl Chloride	<RL	1.0
Carbon Disulfide	<RL	1.0
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5

Analyte Compounds (Continued)	*MB 072022*	*Reporting Limit (RL)*
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	1.0
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Methyl Methacrylate	<RL	0.5
Heptane	<RL	0.5
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	1.0
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylene	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
1,2,3-Trichloropropane	<RL	0.5
Isopropylbenzene (Cumene)	<RL	0.5
α-Pinene	<RL	0.5
2-Chlorotoluene	<RL	0.5
n-Propylbenzene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
β-Pinene	<RL	0.5
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
Sec-ButylBenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
n-ButylBenzene	<RL	0.5
1,2-Dibromo-3-Chloropropane	<RL	0.5
1,2,4-Trichlorobenzene	<RL	1.0
Naphthalene	<RL	1.0
Hexachlorobutadiene	<RL	0.5

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022
MATRIX : Air
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
ANALYST : MB/DL
DILUTION FACTOR[1] : x1.95

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Duplicate Analysis of AAC Sample ID: 221499-33593

Analyte Compounds	*Sample*	*Duplicate*	*RPD*[2]
4-BFB (surrogate standard)	8.50	8.75	2.9
Chlorodifluoromethane	<SRL	<SRL	*NA*
Propene	<SRL	<SRL	*NA*
Dichlorodifluoromethane	<SRL	<SRL	*NA*
Dimethyl Ether	<SRL	<SRL	*NA*
Chloromethane	<SRL	<SRL	*NA*
Dichlorotetrafluoroethane	<SRL	<SRL	*NA*
Vinyl Chloride	<SRL	<SRL	*NA*
Acetaldehyde	42.1	39.4	6.6
Methanol	12.2	11.9	2.1
1,3-Butadiene	<SRL	<SRL	*NA*
Bromomethane	<SRL	<SRL	*NA*
Chloroethane	<SRL	<SRL	*NA*
Dichlorofluoromethane	<SRL	<SRL	*NA*
Ethanol	6.32	6.11	3.5
Vinyl Bromide	<SRL	<SRL	*NA*
Acrolein	<SRL	<SRL	*NA*
Acetone	9.11	8.84	3.0
Trichlorofluoromethane	<SRL	<SRL	*NA*
2-Propanol (IPA)	<SRL	<SRL	*NA*
Acrylonitrile	<SRL	<SRL	*NA*
1,1-Dichloroethene	<SRL	<SRL	*NA*
Methylene Chloride (DCM)	<SRL	<SRL	*NA*
TertButanol (TBA)	10.3	10.2	0.6
Allyl Chloride	<SRL	<SRL	*NA*
Carbon Disulfide	4.20	4.14	1.4
Trichlorotrifluoroethane	<SRL	<SRL	*NA*
trans-1,2-Dichloroethene	<SRL	<SRL	*NA*
1,1-Dichloroethane	<SRL	<SRL	*NA*
Methyl Tert Butyl Ether (MTBE)	<SRL	<SRL	*NA*
Vinyl Acetate	<SRL	<SRL	*NA*
2-Butanone (MEK)	<SRL	<SRL	*NA*
cis-1,2-Dichloroethene	<SRL	<SRL	*NA*
Hexane	<SRL	<SRL	*NA*
Chloroform	<SRL	<SRL	*NA*
Ethyl Acetate	<SRL	<SRL	*NA*
Tetrahydrofuran	<SRL	<SRL	*NA*
1,2-Dichloroethane	<SRL	<SRL	*NA*
1,1,1-Trichloroethane	<SRL	<SRL	*NA*
Benzene	1.01	<SRL	*NA*
Carbon Tetrachloride	<SRL	<SRL	*NA*
Cyclohexane	<SRL	<SRL	*NA*

Analyte Compounds (Continued)	*Sample*	*Duplicate*	*RPD*[2]
1,2-Dichloropropane	<SRL	<SRL	*NA*
Bromodichloromethane	<SRL	<SRL	*NA*
1,4-Dioxane	<SRL	<SRL	*NA*
Trichloroethene (TCE)	<SRL	<SRL	*NA*
2,2,4-Trimethylpentane	<SRL	<SRL	*NA*
Methyl Methacrylate	<SRL	<SRL	*NA*
Heptane	<SRL	<SRL	*NA*
cis-1,3-Dichloropropene	<SRL	<SRL	*NA*
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	*NA*
trans-1,3-Dichloropropene	<SRL	<SRL	*NA*
1,1,2-Trichloroethane	<SRL	<SRL	*NA*
Toluene	1.46	1.17	22.2
2-Hexanone (MBK)	<SRL	<SRL	*NA*
Dibromochloromethane	<SRL	<SRL	*NA*
1,2-Dibromoethane	<SRL	<SRL	*NA*
Tetrachloroethene (PCE)	<SRL	<SRL	*NA*
Chlorobenzene	<SRL	<SRL	*NA*
Ethylbenzene	<SRL	<SRL	*NA*
m & p-Xylene	<SRL	<SRL	*NA*
Bromoform	<SRL	<SRL	*NA*
Styrene	<SRL	<SRL	*NA*
1,1,2,2-Tetrachloroethane	<SRL	<SRL	*NA*
o-Xylene	<SRL	<SRL	*NA*
1,2,3-Trichloropropane	<SRL	<SRL	*NA*
Isopropylbenzene (Cumene)	<SRL	<SRL	*NA*
α-Pinene	<SRL	<SRL	*NA*
2-Chlorotoluene	<SRL	<SRL	*NA*
n-Propylbenzene	<SRL	<SRL	*NA*
4-Ethyltoluene	<SRL	<SRL	*NA*
1,3,5-Trimethylbenzene	<SRL	<SRL	*NA*
β-Pinene	<SRL	<SRL	*NA*
1,2,4-Trimethylbenzene	<SRL	<SRL	*NA*
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	*NA*
1,3-Dichlorobenzene	<SRL	<SRL	*NA*
1,4-Dichlorobenzene	<SRL	<SRL	*NA*
Sec-ButylBenzene	<SRL	<SRL	*NA*
1,2-Dichlorobenzene	<SRL	<SRL	*NA*
n-ButylBenzene	<SRL	<SRL	*NA*
1,2-Dibromo-3-Chloropropane	<SRL	<SRL	*NA*
1,2,4-Trichlorobenzene	<SRL	<SRL	*NA*
Naphthalene	<SRL	<SRL	*NA*
Hexachlorobutadiene	<SRL	<SRL	*NA*

[1] Dilution factor is the product of the Canister Dilution Factor and the Analysis Dilution Factor.

[2] Relative Percent Difference (RPD) between Sample analysis and Duplicate analysis (acceptable range is <25%).

SRL - Sample Reporting Limit (minimum)

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com • (805) 650-1642

22154 9

Ph (925) 455-9474; Fx (925) 455-9479

B-25

Project ID: City Berkeley Flare SAMPLE CHAIN OF CUSTODY BE PROJECT MANAGER: B Johnston

Analyical Lab: ARC

#	DATE	TIME	SAMPLE ID Run#/Method/Fraction/Source	CONTAINER size / type	Volume	Storage Temp °F	Method	ANALYSIS
1	7-15-22	930	LFG R1 33751	Can			TO 15	TO 15
2	↓	1017	R2 33752	↓				↓
3	↓	1105	R3 33753	↓				
4								
5								All cans 30" → 0"
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								

ord & Report all liquid sample volumes.

esults to: Attn: BEST ENVIRONMENTAL 339 STEALTH COURT, LIVERMORE CA. 94551

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: Bell Received by: _____ Date: 7/20/22 Time: 0979

SAMPLE CONDITION AS RECEIVED: OK or not OK

Ex 4 cans (1 void)

f:\forms\field\coc.xls - 6/4/99

APPENDIX C
FIELD DATA SHEETS

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	**Berkeley Landfill**	**Run #:**	**CEC**	**Date:**	**07/15/22**
Location:	**Flare**	**Barometric:**	**29.90**	**Leak ✔ :**	***OK***
Observers:		**Personnel:**	**BA**	**Strat.✔ :**	***OK***
Expected Run Time =	**30 min**	**Std. Temp:**	**60**		

Cylinder #s:

Analyte		**O2**		**NOx**	**CO**	**THC**				
Analyzer		CAI 110P		CAI 600	TECO 48i	CAI 300				
Range		20.98		95.30	89.40	100.00				
Span Value		11.59		45.30	54.50	43.50				
	Time									**Comments:**
	8:26	-0.08		0.00	0.17					
	8:27	-0.09		0.00	0.03					***Unit #***
	8:28	**-0.10**		**0.00**	**0.03**					
	8:29	18.24		0.00	50.28					
	8:30	20.98		0.00	87.46					***Operating Conditions***
	8:31	20.98		0.00	89.51					
	8:32	**20.98**		0.00	**89.60**					
	8:33	12.66		0.00	37.81					***Fuel***
	8:34	11.53		0.00	-0.59					
	8:35	**11.52**		0.00	-0.65					
	8:36	3.86		0.08	21.34					
	8:37	-0.13		0.00	54.66					
	8:38	-0.14		0.00	54.55					
	8:39	-0.14		0.00	**54.51**					
	8:40	-0.12		69.98	21.66					
	8:41	-0.15		94.88	-0.31					
	8:42	-0.15		95.10	-0.31					
	8:43	-0.15		**95.14**	-0.31					
	8:44	-0.11		55.01	-0.23					
	8:45	-0.15		45.59	-0.31					
	8:46	-0.16		45.59	-0.31					
	8:47	-0.16		**45.56**	-0.31					
	8:48	-0.01		13.32	-0.32					
	8:49	-0.05		5.42	-0.35					
	8:50	-0.06		5.40	-0.33					
	8:51	-0.06		**5.39**	-0.35					NOx Converter
	8:52					0.59				
	8:53					-0.31				
	8:54					**-0.69**				
	8:55					45.50				
	8:56					94.74				
	8:57					93.60				
	8:58					93.87				
	8:59					**93.96**				
	9:00					57.96				
	9:01					46.37				
	9:02					44.11				
	9:03					**44.39**				
	9:04					27.38				
	9:05					27.00				
	9:06					26.65				
	9:07					**26.41**				

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	Berkeley Landfill	**Run #:**	1	**Date:**	07/15/22
Location:	Flare	**Barometric:**	29.90	**Leak ✔ :**	*OK*
Observers:		**Personnel:**	BA	**Strat.✔ :**	*OK*
Expected Run Time =	30 min	**Std. Temp:**	60		

Cylinder #s:

Analyte		O2		NOx	CO	THC				
Analyzer		CAI 110P		CAI 600	TECO 48i	CAI 300H				
Range		20.98		95.30	89.40	100				
Span Value		11.59		45.30	54.50	43.50				
Time										Comments:
	9:26	13.23		9.89	5.15	7.40				
	9:27	13.23		9.81	12.58	7.04				*Unit #*
	9:28	13.37		9.63	12.24	6.74				
	9:29	13.36		9.65	15.99	6.53				
	9:30	13.26		9.77	11.90	6.29				*Operating Conditions*
	9:31	13.45		9.49	15.18	6.17				
	9:32	13.23		9.80	13.79	5.97				
	9:33	13.34		9.64	25.68	5.80				*Fuel*
	9:34	13.63		9.25	25.77	5.74				
	9:35	13.52		9.43	21.36	5.56				
	9:36	13.64		9.22	14.14	5.50				
	9:37	13.22		9.82	12.84	5.27				
	9:38	13.47		9.48	12.65	5.22				
	9:39	13.28		9.66	10.51	5.15				
	9:40	13.38		9.60	9.07	5.09				Port Change
	9:46	13.96		8.60	23.29	6.13				
	9:47	13.39		9.37	25.66	5.31				
	9:48	13.37		9.49	16.68	4.90				
	9:49	13.36		9.49	11.70	4.70				
	9:50	13.58		9.24	11.30	4.63				
	9:51	13.44		9.44	15.51	4.53				
	9:52	13.61		9.24	15.00	4.41				
	9:53	13.41		9.40	20.44	4.33				
	9:54	13.63		9.25	7.64	4.32				
	9:55	13.40		9.49	6.05	4.20				
	9:56	13.33		9.61	15.23	4.06				
	9:57	13.43		9.49	24.44	4.04				
	9:58	13.40		9.51	23.49	3.97				
	9:59	13.61		9.29	14.33	4.00				
	10:00	13.77		9.03	22.91	4.03				
ZERO I	*9:11*	*-0.08*		*0.00*	*-0.74*	*0.73*				
SPAN I	*9:16*	*11.56*		*45.27*	*54.09*	*44.07*				
Average		*13.44*		*9.47*	*15.75*	*5.23*				
ZERO f	*10:05*	*-0.17*		*0.01*	*-0.85*	*-0.74*				
SPAN f	*10:10*	*11.54*		*45.02*	*53.62*	*42.46*				
Zero Drift %		*-0.4%*		*0.0%*	*-0.1%*	*-1.5%*				
Span Drift %		*-0.1%*		*-0.3%*	*-0.5%*	*-1.6%*				
Corr. Avg.		*13.47*		*9.50*	*16.50*	*5.27*				

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

Zero Drift % = 100 * (Zf - Zi)/Intrument Range

Span Drift % = 100 * (Sf - Si)/Instrument Range

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	**Berkeley Landfill**	**Run #:**	**2**	**Date:**	**07/15/22**
Location:	**Flare**	**Barometric:**	**29.90**	**Leak ✔ :**	***OK***
Observers:		**Personnel:**	**BA**	**Strat.✔ :**	***OK***
Expected Run Time =	**30 min**	**Std. Temp:**	**60**		

Cylinder #s:

Analyte		**O2**		**NOx**	**CO**	**THC**				
Analyzer		CAI 110P		CAI 600	TECO 48	CAI 300H				
Range		20.98		95.30	89.40	100				
Span Value		11.59		45.30	54.50	43.50				
Time										**Comments:**
	10:14	13.68		9.27	19.00	9.22				
	10:15	13.66		9.25	31.24	8.73				***Unit #***
	10:16	13.80		9.08	23.16	8.39				
	10:17	13.62		9.31	18.39	8.06				
	10:18	13.41		9.56	14.48	7.80				***Operating Conditions***
	10:19	13.39		9.63	13.74	7.58				
	10:20	13.64		9.34	18.01	7.48				
	10:21	13.41		9.66	15.18	7.30				***Fuel***
	10:22	13.51		9.56	11.57	7.28				
	10:23	13.58		9.42	19.79	7.09				
	10:24	13.62		9.26	33.40	7.05				
	10:25	13.70		9.15	50.84	7.02				
	10:26	13.58		9.32	41.03	6.91				
	10:27	13.36		9.61	19.33	6.89				
	10:28	13.38		9.58	9.61	6.85				Port Change
	10:32	13.35		9.62	9.58	8.16				
	10:33	13.44		9.53	11.12	7.65				
	10:34	13.36		9.59	14.55	7.42				
	10:35	13.38		9.58	11.23	7.28				
	10:36	13.39		9.57	12.47	7.17				
	10:37	13.46		9.51	15.01	7.08				
	10:38	13.50		9.46	17.82	7.02				
	10:39	13.39		9.59	16.93	6.91				
	10:40	13.44		9.52	17.92	6.88				
	10:41	13.42		9.52	20.13	6.85				
	10:42	13.37		9.59	14.58	6.85				
	10:43	13.33		9.62	16.12	6.79				
	10:44	13.42		9.55	18.22	6.75				
	10:45	13.44		9.49	22.99	6.72				
	10:46	13.49		9.38	32.62	6.74				
ZERO I	*10:05*	***-0.17***		***0.01***	***-0.85***	***-0.74***				
SPAN I	*10:10*	***11.54***		***45.02***	***53.62***	***42.46***				
Average		***13.48***		***9.47***	***19.67***	***7.33***				
ZERO f	*10:52*	***-0.17***		***0.00***	***-0.97***	***1.24***				
SPAN f	*10:57*	***11.56***		***44.96***	***53.29***	***42.55***				
Zero Drift %		***0.0%***		***0.0%***	***-0.1%***	***2.0%***				
Span Drift %		***0.1%***		***-0.1%***	***-0.4%***	***0.1%***				
Corr. Avg.		***13.51***		***9.53***	***20.63***	***7.29***				

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

Zero Drift % = 100 * (Zf - Zi)/Intrument Range

Span Drift % = 100 * (Sf - Si)/Instrument Range

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	Berkeley Landfill	**Run #:**	3	**Date:**	07/15/22
Location:	Flare	**Barometric:**	29.90	**Leak ✔ :**	*OK*
Observers:		**Personnel:**	BA	**Strat.✔ :**	*OK*
Expected Run Time =	30 min	**Std. Temp:**	60		

Cylinder #s:

Analyte		O2		NOx	CO	THC				
Analyzer		CAI 110P		CAI 600	TECO 48i	CAI 300H				
Range		20.98		95.30	89.40	100				
Span Value		11.59		45.30	54.50	43.50				
	Time									Comments:
	11:01	13.35		9.51	18.32	8.57				
	11:02	13.55		9.28	31.24	8.18				***Unit #***
	11:03	13.50		9.36	25.61	7.88				
	11:04	13.48		9.36	39.97	7.66				
	11:05	13.48		9.35	34.70	7.46				***Operating Conditions***
	11:06	13.46		9.41	33.43	7.28				
	11:07	13.79		9.00	28.11	7.24				
	11:08	13.61		9.11	36.40	7.15				***Fuel***
	11:09	13.76		9.03	31.23	7.08				
	11:10	13.35		9.50	16.56	6.93				
	11:11	13.47		9.41	19.70	6.87				
	11:12	13.66		9.13	21.08	6.87				
	11:13	13.61		9.12	38.54	6.84				
	11:14	13.48		9.33	42.32	6.80				
	11:15	13.67		9.13	31.92	6.79				Port Change
	11:20	13.78		8.94	38.33	6.84				
	11:21	13.62		9.12	34.06	6.76				
	11:22	13.73		9.00	47.28	6.82				
	11:23	13.55		9.21	37.95	6.69				
	11:24	13.60		9.19	33.99	6.63				
	11:25	13.66		9.06	44.51	6.68				
	11:26	13.74		8.93	54.70	6.69				
	11:27	13.80		8.92	47.37	6.65				
	11:28	13.66		9.06	41.13	6.62				
	11:29	13.64		9.15	41.21	6.57				
	11:30	13.56		9.26	30.02	6.52				
	11:31	13.54		9.29	32.82	6.46				
	11:32	13.56		9.23	46.69	6.46				
	11:33	13.55		9.29	39.72	6.37				
	11:34	13.55		9.34	26.28	6.36				
ZERO I	*10:52*	*-0.17*		*0.00*	*-0.97*	*1.24*				
SPAN I	*10:57*	*11.56*		*44.96*	*53.29*	*42.55*				
Average		*13.59*		*9.20*	*34.84*	*6.96*				
ZERO f	*11:40*	*-0.18*		*0.00*	*-1.01*	*0.83*				
SPAN f	*11:46*	*11.56*		*45.05*	*53.08*	*43.24*				
Zero Drift %		*-0.1%*		*0.0%*	*0.0%*	*-0.4%*				
Span Drift %		*0.0%*		*0.1%*	*-0.2%*	*0.7%*				
Corr. Avg.		*13.60*		*9.26*	*36.04*	*6.16*				

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

Zero Drift % = 100 * (Zf - Zi)/Intrument Range

Span Drift % = 100 * (Sf - Si)/Instrument Range

BEST ENVIRONMENTAL

CEMS CALIBRATION SHEET

Facility: City Berkley Date: 7-15-2- Personnel: BS+BA

Location: Flare Barometric Pressure: 29.9

	O_2		NOx	CO	THC		Comments
Analyzer	CAI 110		CAI 60N	Teco 48.	CAI 300		
Range	20.98		95.3	89.4	100		
Cal Value (low)					26.88		
Cyl. #					DT27824		
Expiration					5-27-29		
Cal Value (mid)	11.59		45.3	54.5	43.5		
Cyl. #	CC508881		DT37052	CC707372	DT42922		
Expiration	10-1-27		11-18-23	2-15-27	6-21-30		NO2
Cal Value (Hi)	20.98		95.3	89.4	92.1		5.979
Cyl #	CC306150		CC308849	CC306150	CC506583		CC503193
Expiration	11-22-29		10-2-27	11-22-29	3-16-29		1-6-24

	Start	Stop
Run 1	926	1001
Run 2	1014	1047
Run 3	1101	1135

~~Flow~~ Temp	Temp ~~Flow~~	Can ID	
66	1551	504	Traverse
67	1554	24	↓
66	1552	153	

Leak Check: 0 Heated Line Temp (F): ~250

Calculations

% Linearity (Limit ± 2%) = 100 * Span Value - Internal cal / Span Range

Zero and Calibration Drift = 100 x (Cfb - Cib) / range

Cbcal = (Cib + Cfb) / 2 for cal gas

APPENDIX D
CALIBRATION GAS CERTIFICATES

PRAXAIR
Making our planet more productive

DocNumber: 405533

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 03/11/2021
Praxair Order Number: 36989506
Part Number: EV AIPR30ME-AS
Customer PO Number: 6

Fill Date: 02/25/2021
Lot Number: 70086105605
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	03/10/2029	NIST Traceable
Cylinder Number:	CC506583	Expanded Uncertainty
30.7 ppm	Propane	± 0.1 ppm
Balance	Air	

Certification Information:

Certification Date: 03/10/2021 *Term:* 96 Months *Expiration Date:* 03/10/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** Propane

Requested Concentration: 30 ppm
Certified Concentration: 30.7 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 03/05/2021

Reference Standard: Type / Cylinder #: GMIS / CC302220
Concentration / Uncertainty: 50.68 ppm ±0.13 ppm
Expiration Date: 07/06/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1667b / 83-J-17 / CAL017783
SRM Concentration (enter with units) / Uncertainty: 48.83 ppm / ±0.11 ppm
SRM Expiration Date: 08/17/2017

First Analysis Data: Date 03/10/2021

Z: 0	R: 136.8	C: 82.9	Conc: 30.7		
R: 136.8	Z: 0	C: 82.8	Conc: 30.7		
Z: 0	C: 82.8	R: 136.9	Conc: 30.7		

UOM: ppm Mean Test Assay: 30.7 ppm

Second Analysis Data: Date

Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		

UOM: ppm Mean Test Assay: ppm

Analyzed By Jose Vasquez

Certified By Amalia Real

CH4
92.1 ppm

D-2

Making our world more productive

DocNumber: 477448

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22022

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 06/24/2022
Linde Order Number: 67255744
Part Number: EV AIPR15ME-AS
Customer PO Number: 43

Fill Date: 06/14/2022
Lot Number: 70086216502
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	06/21/2030	NIST Traceable
Cylinder Number:	EB0018485	Expanded Uncertainty
14.5 ppm	Propane	± 0.1 ppm
Balance	Air	

Certification Information: Certification Date: 06/21/2022 Term: 96 Months Expiration Date: 06/21/2030

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Propane

Requested Concentration: 15 ppm
Certified Concentration: 14.5 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 06/06/2022

First Analysis Data:						Date	06/21/2022
Z:	0	R:	150.7	C:	43.3	Conc:	14.5
R:	151.7	Z:	0	C:	43.5	Conc:	14.6
Z:	0	C:	43.5	R:	151.6	Conc:	14.6
UOM:	ppm				Mean Test Assay:		14.5 ppm

Reference Standard: Type / Cylinder #: GMIS / CC302220
Concentration / Uncertainty: 50.68 ppm ±0.13 ppm
Expiration Date: 07/06/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1667b / 83-J-17 / CAL017783
SRM Concentration / Uncertainty: 48.83 ppm / ±0.11 ppm
SRM Expiration Date: 08/17/2017

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm				Mean Test Assay:		ppm

Analyzed By: Courtney Zielke

Certified By: Henry Koung

43.5 ppm C1

PRAXAIR
Making our planet more productive

DocNumber: 411093

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

TESLA INC
47700 KATO RD
FREMONT CA 94538

Certificate Issuance Date: 05/27/2021
Praxair Order Number: 42827444
Part Number: AI PR9ME-AS
Customer PO Number: 4900225193

Fill Date: 05/20/2021
Lot Number: 70086114010
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	05/27/2029	NIST Traceable
Cylinder Number:	DT0027824	Expanded Uncertainty
8.96 ppm	Propane	± 0.04 ppm
Balance	Air	

Certification Information:

Certification Date: 05/27/2021 *Term:* 96 Months *Expiration Date:* 05/27/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. *Component:* Propane

Requested Concentration: 9 ppm
Certified Concentration: 8.96 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 05/05/2021

Reference Standard: Type / Cylinder #: GMIS / CC130474
Concentration / Uncertainty: 9.952 ppm ±0.035 ppm
Expiration Date: 10/16/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1666b / 84-K-35 / FF10676
SRM Concentration (enter with units) / Uncertainty: 9.888 ppm / ±0.032 ppm
SRM Expiration Date: 10/05/2019

First Analysis Data:						Date	05/27/2021
Z:	0	R:	12.44	C:	11.21	Conc:	8.96
R:	12.44	Z:	0	C:	11.22	Conc:	8.97
Z:	0	C:	11.2	R:	12.46	Conc:	8.96
UOM:	ppm			Mean Test Assay:		8.96	ppm

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			ppm

Analyzed By: Jose Vasquez

Certified By: Amalia Real

26.88 ppm CH4

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DocNumber: 270077

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 10/03/2019
Praxair Order Number: 88376369
Part Number: NI NO95ME-AS
Customer PO Number: 9014

Fill Date: 09/17/2019
Lot Number: 70086926008
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	10/02/2027	NIST Traceable
Cylinder Number:	CC308849	Expanded Uncertainty
95.0 ppm	Nitric oxide	± 0.5 %
Balance	Nitrogen	

For Reference Only: *NOx 95.3 ppm*

Certification Information: *Certification Date:* 10/02/2019 *Term:* 96 Months *Expiration Date:* 10/02/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. *Component:* Nitric oxide

Requested Concentration: 95 ppm
Certified Concentration: 95.0 ppm
Instrument Used: Thermo Electron 42i S/N 0726024326
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 09/09/2019

Reference Standard: Type / Cylinder #: GMIS / CC703030
Concentration / Uncertainty: 96.9 ppm ±0.52%
Expiration Date: 05/20/2027
Traceable to: SRM # / Sample # / Cylinder #: 1684b / 44-T-89 / FF9260
SRM Concentration / Uncertainty: 99.75 PPM / 0.5 PPM
SRM Expiration Date: 01/25/2020

First Analysis Data:					Date	09/25/2019
Z: 0	R: 96.9	C: 95.2	Conc: 95.2			
R: 96.9	Z: 0	C: 95.4	Conc: 95.4			
Z: 0	C: 95.4	R: 96.9	Conc: 95.4			
UOM: ppm			Mean Test Assay:	95.3	ppm	

Second Analysis Data:					Date	10/02/2019
Z: 0	R: 96.0	C: 94.5	Conc: 94.5			
R: 96.9	Z: 0	C: 94.6	Conc: 94.6			
Z: 0	C: 94.6	R: 96.9	Conc: 94.6			
UOM: ppm			Mean Test Assay:	94.6	ppm	

Analyzed By Quinn Hailes

Certified By Amalia Real

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DocNumber: 317670

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22020

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 11/18/2020
Praxair Order Number: 27982553
Part Number: NI NO45ME-AS
Customer PO Number: 9099

Fill Date: 11/04/2020
Lot Number: 70086030909
Cylinder Style & Outlet: AS CGA 660
Cylinder Prassure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	**11/18/2023**	NIST Traceable
Cylinder Number:	**DT0037052**	Expanded Uncertainty
45.1 ppm	**Nitric oxide**	**± 0.2 ppm**
Balance	**Nitrogen**	

For Reference Only: *NOx 45.3 ppm*

Certification Information: *Certification Date:* 11/18/2020 *Term:* 36 Months *Expiration Date:* 11/18/2023

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Cendidete)

1. *Component:* **Nitric oxide**

Requested Concentration: 45 ppm
Certified Concentration: 45.1 ppm
Instrument Used: Thermo Electron 42i-LS S/N 1030645077
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 11/11/2020

Reference Standard: Type / Cylinder #: GMIS / CC324044
Concentration / Uncertainty: 50.02 ppm ±0.21 ppm
Expiration Date: 04/27/2028
Traceable to: SRM # / Sample # / Cylinder #: APEX1324323 / N/A / APEX1324323
SRM Concentration / Uncertainty: 50.04 PPM / ±0.20 PPM
SRM Expiration Date: 12/09/2022

First Analysis Data:								**Date**	11/11/2020
Z:	0	R:	50	C:	45	Conc:	45		
R:	50	Z:	0	C:	45.1	Conc:	45.1		
Z:	0	C:	45.1	R:	49.9	Conc:	45.1		
UOM:	ppm					**Mean Test Assay:**		45.1	ppm

Second Analysis Data:								**Date**	11/18/2020
Z:	0	R:	50	C:	45	Conc:	45.1		
R:	49.9	Z:	0	C:	44.9	Conc:	45		
Z:	0	C:	44.9	R:	49.9	Conc:	45		
UOM:	ppm					**Mean Test Assay:**		45	ppm

Analyzed By **Henry Koung**

Certified By **Leeanna Flores**

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15WC004	Reference Number:	48-401989410-1
Cylinder Number:	CC503193	Cylinder Volume:	144.0 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32021	Valve Outlet:	660
Gas Code:	NO2,BALN	Certification Date:	Jan 06, 2021

Expiration Date: Jan 06, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	6.000 PPM	5.979 PPM	G1	+/- 2.1% NIST Traceable	12/28/2020, 01/06/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	401206803104	CC511311	9.690 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.1%	May 02, 2022
PRM	12386	D685025	9.91 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 20, 2020

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR NO2 018335821	FTIR	Jan 06, 2021

Triad Data Available Upon Request

Approved for Release

D-7

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DocNumber: 442525

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 11/22/2021
Linde Order Number: 56224584
Part Number: NI CD19CO10E-AS
Customer PO Number: 27

Fill Date: 11/01/2021
Lot Number: 70086130505
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 156 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	11/22/2029	NIST Traceable
Cylinder Number:	CC306150	Expanded Uncertainty
18.98 %	Carbon dioxide	± 0.06 %
89.4 ppm	Carbon monoxide	± 0.4 ppm
20.98 %	Oxygen	± 0.03 %
Balance	Nitrogen	

Certification Information:

Certification Date: 11/22/2021 *Term:* 96 Months *Expiration Date:* 11/22/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference. CO responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. *Component:* Carbon dioxide

Requested Concentration: 19 %
Certified Concentration: 18.98 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 11/19/2021

First Analysis Data:					Date 11/22/2021
Z: 0	R: 19.34	C: 18.98	Conc: 18.98		
R: 19.34	Z: 0	C: 18.99	Conc: 18.99		
Z: 0	C: 18.99	R: 19.35	Conc: 18.99		
UOM: %		Mean Test Assay:	18.98 %		

Reference Standard: Type / Cylinder #: NTRM / CC726055
Concentration / Uncertainty: 19.34 % ±0.03 %
Expiration Date: 01/12/2027
Traceable to: SRM # / Sample # / Cylinder #: NTRM / 190701 / CC725973
SRM Concentration / Uncertainty: 19.34% / ±0.031%
SRM Expiration Date: 01/12/2027

Second Analysis Data:					Date
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: %		Mean Test Assay:	%		

2. *Component:* Carbon monoxide

Requested Concentration: 90 ppm
Certified Concentration: 89.4 ppm
Instrument Used: Horiba VIA-510 S/N 576876015
Analytical Method: NDIR
Last Multipoint Calibration: 10/22/2021

First Analysis Data:					Date 11/22/2021
Z: 0	R: 98.1	C: 89.4	Conc: 89.4		
R: 98.1	Z: 0	C: 89.5	Conc: 89.5		
Z: 0	C: 89.5	R: 98.2	Conc: 89.5		
UOM: ppm		Mean Test Assay:	89.4 ppm		

Reference Standard: Type / Cylinder #: GMIS / DT0019705
Concentration / Uncertainty: 98.1 ppm ±0.4 ppm
Expiration Date: 01/23/2028
Traceable to: SRM # / Sample # / Cylinder #: SRM 1679c / 3-I-45 / FF28593
SRM Concentration / Uncertainty: 98.40 ppm / ±0.40 ppm
SRM Expiration Date: 01/28/2020

Second Analysis Data:					Date
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: ppm		Mean Test Assay:	ppm		

3. *Component:* Oxygen

Requested Concentration: 21 %
Certified Concentration: 20.98 %
Instrument Used: Siemens Oxymat 6E S/N 7MB20211AA000CA1
Analytical Method: Paramagnetic
Last Multipoint Calibration: 11/12/2021

First Analysis Data:					Date 11/22/2021
Z: 0	R: 20.9	C: 20.98	Conc: 20.98		
R: 20.9	Z: 0	C: 20.99	Conc: 20.99		
Z: 0	C: 20.99	R: 20.91	Conc: 20.99		
UOM: %		Mean Test Assay:	20.98 %		

Reference Standard: Type / Cylinder #: GMIS / ND29287
Concentration / Uncertainty: 20.90 % ±0.02 %
Expiration Date: 09/01/2028
Traceable to: SRM # / Sample # / Cylinder #: SRM 2659a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
SRM Expiration Date: 08/23/2021

Second Analysis Data:					Date
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: %		Mean Test Assay:	%		

Analyzed By: Jose Vasquez

Certified By: Nelson Ma

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DocNumber: 270196

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 10/01/2019
Praxair Order Number: 86601158
Part Number: NI CD6.25O5E-AS
Customer PO Number: 9017

Fill Date: 09/26/2019
Lot Number: 70086927001
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	10/01/2027	NIST Traceable
Cylinder Number:	CC50881	Expanded Uncertainty
6.23 %	Carbon dioxide	± 0.3 %
11.59 %	Oxygen	± 0.2 %
Balance	Nitrogen	

Certification Information: *Certification Date:* 10/01/2019 *Term:* 96 Months *Expiration Date:* 10/01/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Carbon dioxide**

Requested Concentration: 6.25 %
Certified Concentration: 6.23 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 09/18/2019

First Analysis Data: **Date** 10/01/2019

Z:	0	R:	6.91	C:	6.23	Conc:	6.23
R:	6.91	Z:	0	C:	6.23	Conc:	6.23
Z:	0	C:	6.23	R:	6.91	Conc:	6.23

UOM: % Mean Test Assay: 6.23 %

Reference Standard: Type / Cylinder #: GMIS / CC243646
Concentration / Uncertainty: 6.91 % ±0.208%
Expiration Date: 06/07/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 1674b / 7-H-07 / FF10631
SRM Concentration / Uncertainty: 6.944% / ±0.013%
SRM Expiration Date: 06/17/2019

Second Analysis Data: **Date**

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: % Mean Test Assay: %

2. ***Component:*** **Oxygen**

Requested Concentration: 11.5 %
Certified Concentration: 11.59 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 09/18/2019

First Analysis Data: **Date** 10/01/2019

Z:	0	R:	14.98	C:	11.6	Conc:	11.59
R:	15	Z:	0	C:	11.6	Conc:	11.59
Z:	0	C:	11.58	R:	14.98	Conc:	11.57

UOM: % Mean Test Assay: 11.59 %

Reference Standard: Type / Cylinder #: GMIS / SGAL2761
Concentration / Uncertainty: 14.98 % ±0.119%
Expiration Date: 07/19/2026
Traceable to: SRM # / Sample # / Cylinder #: 2659a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
SRM Expiration Date: 08/23/2021

Second Analysis Data: **Date**

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: % Mean Test Assay: %

Analyzed By Jenna Leckman

Certified By Jose Vasquez

APPENDIX E
PROCESS DATA

City of Berkely Flare
Process Data

	Flow		Flare Temp				
	Min	Max	Min	Max			
926	65.20	65.67	1303	1311	**Run 1**		
927	65.30	65.83	1486	1490			
928	65.33	65.83	1564	1565			
929	65.20	65.77	1591	1591			
930	65.27	65.93	1576	1577			
931	65.33	65.90	1567	1567			
932	65.23	65.80	1571	1571			
933	65.37	65.93	1578	1578			
934	65.27	65.80	1565	1566			
935	65.23	65.77	1554	1554			
936	65.17	65.87	1554	1554			
937	65.20	65.83	1556	1557			
938	65.30	65.93	1555	1555			
939	65.37	65.87	1557	1557			
940	65.37	65.80	1561	1561			
941	65.37	65.77	1565	1565			
942	65.27	65.70	1562	1563			
943	65.33	65.77	1558	1558			
944	65.47	65.93	1553	1553			
945	65.03	65.77	1553	1553			
946	65.33	66.07	1552	1552			
947	65.30	65.83	1553	1553			
948	65.43	65.87	1556	1556			
949	65.30	65.87	1561	1561			
950	65.17	65.80	1560	1560			
951	65.30	65.80	1554	1554			
952	65.27	65.97	1553	1554			
953	65.10	65.67	1553	1553			
954	65.30	65.83	1553	1553			
955	65.30	65.93	1550	1550			
956	65.30	65.83	1553	1553			
957	65.40	65.93	1553	1553			
958	65.23	65.80	1553	1553			
959	65.23	65.87	1552	1552			
1000	65.33	65.80	1556	1556	**Stop**		
1001	65.37	65.83	1559	1560	**Avg**	**65.56**	**1550**
1002	65.50	66.10	1557	1557			
1003	65.37	65.80	1556	1556			
1004	65.43	65.83	1556	1556			
1005	65.37	65.80	1558	1558			
1006	65.30	65.90	1555	1556			
1007	65.43	65.87	1555	1555			
1008	65.23	65.97	1555	1555			
1009	65.40	65.87	1554	1554			
1010	65.43	65.90	1553	1553			
1011	65.27	65.93	1547	1547			
1012	65.40	65.80	1554	1554			
1013	65.30	65.77	1554	1555			
1014	65.20	65.93	1553	1553	**Run 2**		
1015	65.20	65.73	1550	1551			
1016	65.33	65.87	1548	1548			
1017	65.17	65.77	1558	1558			
1018	65.43	66.10	1564	1564			
1019	65.40	65.90	1560	1561			
1020	65.30	65.87	1557	1557			
1021	65.37	66.00	1558	1558			

City of Berkely Flare
Process Data

	Flow		Flare Temp				
	Min	Max	Min	Max			
1022	65.50	66.10	1557	1558			
1023	65.43	65.87	1560	1560			
1024	65.37	65.97	1557	1557			
1025	65.67	65.90	1551	1551			
1026	65.43	65.93	1551	1551			
1027	65.17	65.87	1555	1555			
1028	65.40	65.80	1558	1558			
1029	65.43	65.83	1559	1559			
1030	65.23	65.87	1551	1551			
1031	65.33	65.77	1548	1548			
1032	65.37	66.03	1552	1553			
1033	65.37	65.83	1556	1557			
1034	65.23	65.90	1558	1558			
1035	65.30	65.77	1557	1557			
1036	65.17	65.77	1559	1560			
1037	65.23	65.77	1555	1555			
1038	65.13	65.60	1542	1543			
1039	65.43	65.83	1549	1549			
1040	65.40	65.83	1554	1554			
1041	65.30	66.03	1556	1557			
1042	65.33	65.80	1557	1557			
1043	65.17	65.70	1552	1553			
1044	65.43	65.90	1559	1559			
1045	65.37	65.73	1560	1560			
1046	65.17	65.73	1556	1556	**Stop**		
1047	65.27	65.93	1554	1555	**Avg**	**65.59**	**1555**
1048	65.17	65.73	1544	1544			
1049	65.27	65.87	1549	1549			
1050	65.43	65.87	1547	1548			
1051	65.27	65.87	1549	1549			
1052	65.13	65.73	1554	1554			
1053	65.33	65.93	1557	1557			
1054	65.30	65.87	1559	1559			
1055	65.27	65.83	1559	1559			
1056	65.27	65.70	1550	1550			
1057	65.37	65.90	1556	1556			
1058	65.37	65.77	1558	1558			
1059	65.33	65.93	1555	1556			
1100	65.37	65.80	1558	1558			
1101	65.30	65.83	1553	1553	**Run 3**		
1102	65.30	65.70	1555	1555			
1103	65.30	65.70	1555	1555			
1104	65.33	65.97	1550	1550			
1105	65.20	65.70	1549	1550			
1106	65.17	65.87	1558	1559			
1107	65.17	65.77	1563	1564			
1108	65.37	66.03	1554	1554			
1109	65.17	65.77	1548	1548			
1110	65.27	65.90	1546	1547			
1111	65.43	65.87	1555	1555			
1112	65.23	65.93	1562	1562			
1113	65.27	65.67	1556	1556			
1114	65.47	65.97	1552	1552			
1115	65.40	65.93	1558	1559			
1116	65.37	65.80	1554	1555			
1117	65.50	65.93	1557	1557			

City of Berkely Flare
Process Data

	Flow		Flare Temp				
	Min	**Max**	**Min**	**Max**			
1118	65.23	65.83	1554	1555			
1119	65.17	65.77	1549	1550			
1120	65.43	65.77	1544	1545			
1121	65.23	65.60	1558	1559			
1122	65.53	65.93	1557	1558			
1123	65.43	66.03	1554	1554			
1124	65.17	65.77	1557	1557			
1125	65.27	65.60	1559	1560			
1126	65.27	65.83	1548	1549			
1127	65.27	65.63	1550	1550			
1128	65.33	65.83	1554	1554			
1129	65.20	65.87	1558	1558			
1130	65.27	65.87	1561	1562			
1131	65.40	65.83	1538	1539			
1132	65.40	65.97	1544	1545			
1133	65.43	65.90	1555	1556			
1134	65.30	65.83	1565	1565	**Stop**		
					Avg	**65.57**	**1554**

Calibration Certificate

Telstar Instruments Inc
1717 Solano Way, Suite #34, Concord Ca
Tel 925-671-2888 - Fax 925-671-9507

TELSTAR INSTRUMENTS

Certificate	**CC-WO-202-01**
Calibration date	**5/16/2022**
Next calibration due	**5/16/2023**

Customer information

Company name	**SCS Field Services**
Address	**1100 Spinnaker Way Berkley**
Contact	**Mike Flanagan**

Location of calibration

Company name	**SCS Field Services**
Address	**1100 Spinnaker Way, Berkley**

Instrument information

Manufacturer	**Kurz**
Model	**454FTB-12-HT**
Serial	**FD35746A**
Tag	
Description	**Flare flow**

Received	In Tolerance
Returned	In Tolerance

Calibrated range	0	to	300	SCFM
User Specified Tolerance			3.00	%
Instrument Output	4	to	20	mA

Test standards used This calibration certificate documents the traceability to national standards, which states the units of measurement according to the International System of Units (SI)

ID	Description	Serial number	Certificate	Due date
CAL210	**Fluke 725**	**1608092**	**185084**	**11/4/2022**

Procedure Used

☑ As Found = As Left

As Found

Cal. point(s)	Standard	Expected Output	UUT	Measured Output	Error	Output Error
1	**0**	**4.000**	**0**	**3.989**	**0.00**	**-0.07**
2	**50**	**6.667**	**50**	**6.722**	**0.00**	**0.35**
3						
4						
5						
6						
7						
8						
9						
10						
Units*	**SCFM**	**mA**	**SCFM**	**mA**	**%**	**%**

As Left

Standard	Expected Output	UUT	Measured Output	Error	Output Error
SCFM	**mA**	**SCFM**	**mA**	**%**	**%**

Error calculated as percent of span

Conformity

☐ **UUT conforms**

☑ **UUT does not conform**

☑ **INSTRUMENT RETURNED TO SERVICE (EXPLAIN IN REMARKS IF NOT)**

Remarks

Verified zero. Removed, cleaned and inspected. Sensor should be returned to OEM for factory wind tunnel calibration. Verified output corresponds to flow rate.

Service Engineer **Ben Marston** Date 5/16/2022

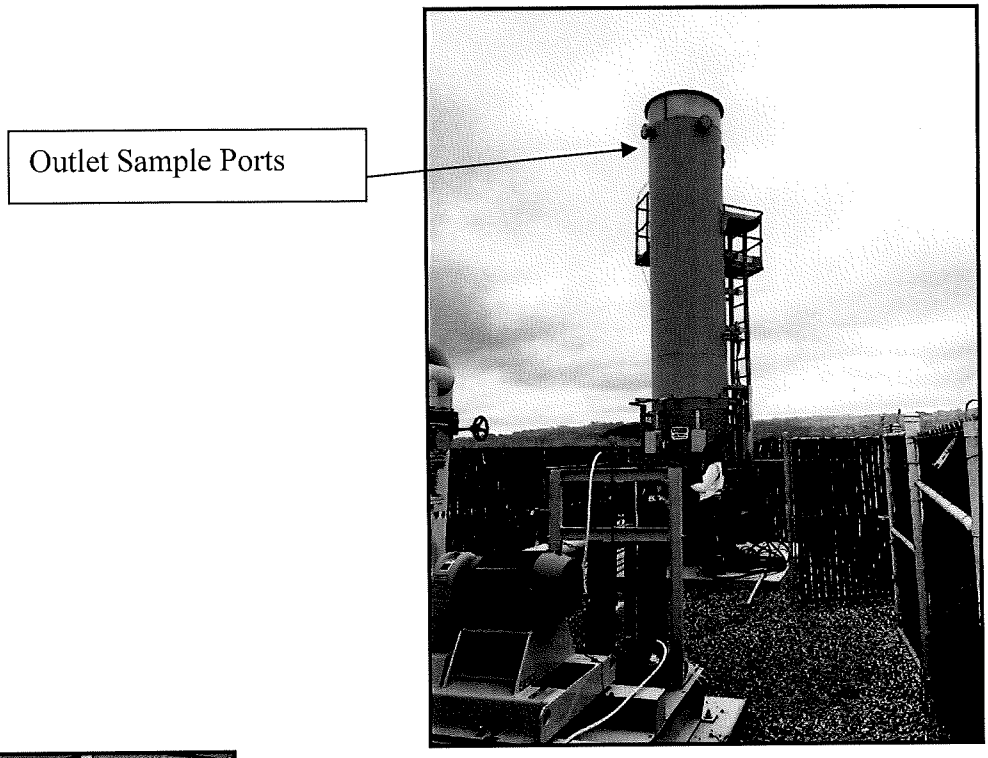
Signature *Ben Marston*

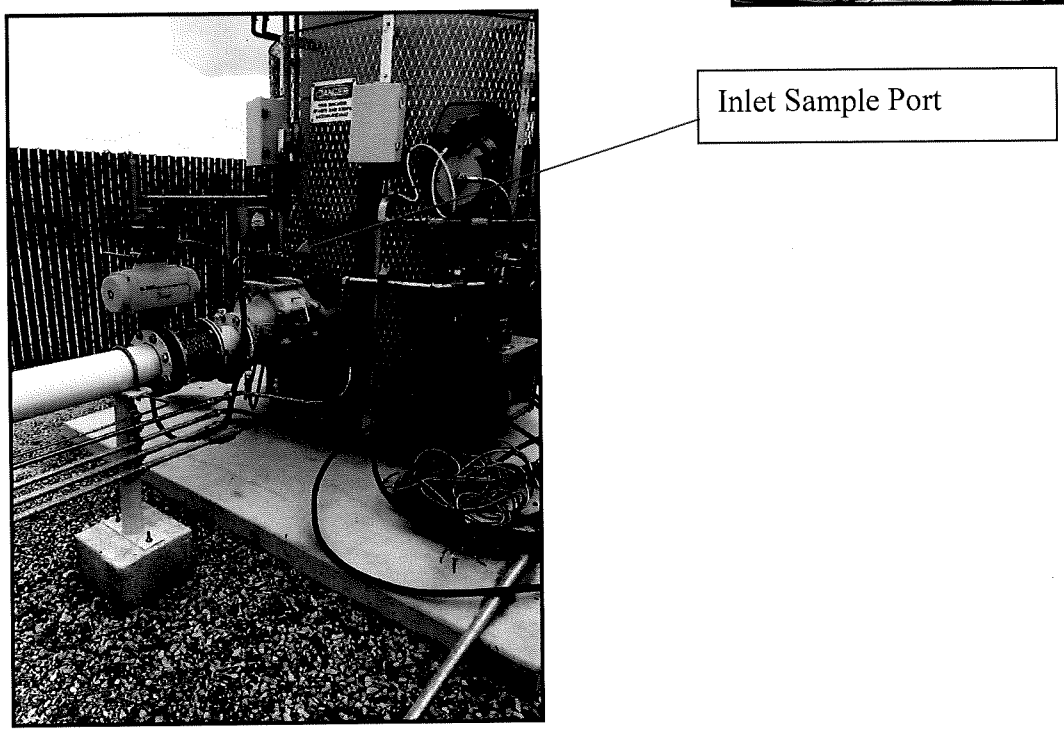
APPENDIX F
STACK DIAGRAMS

City of Berkeley

Berkeley, CA

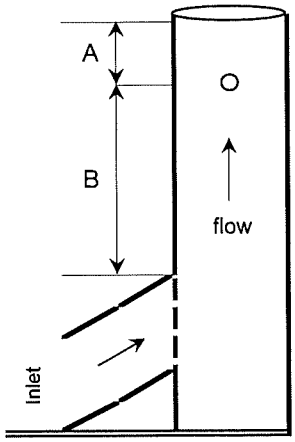
LFG Flare (A-4)





City Of Berkeley Landfill, Flare
TRAVERSE POINT LAYOUT (NON-PARTICULATE)
CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	56.0	*inches*
Upstream diameter (A):	56.0	*inches*
Downstream diameter (B):	280.0	*inches*
Port length:	6.50	*inches*
Number of ports being used:	2	*see note*
Equivalent upstream diameter (A):	1.000	*Pass*
Equivalent downstream diameter (B):	5.000	*Pass*
All points at least 1.0" from stack wall:	1.792	*Pass*
Total points:	16	
Points per port:	8	

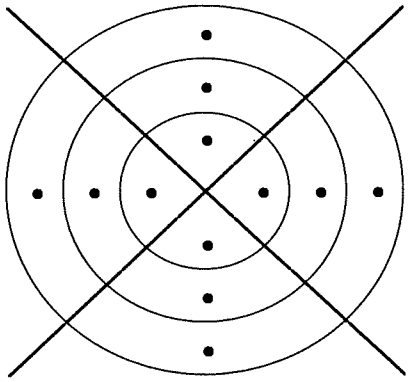


Typical vertical exhaust stack

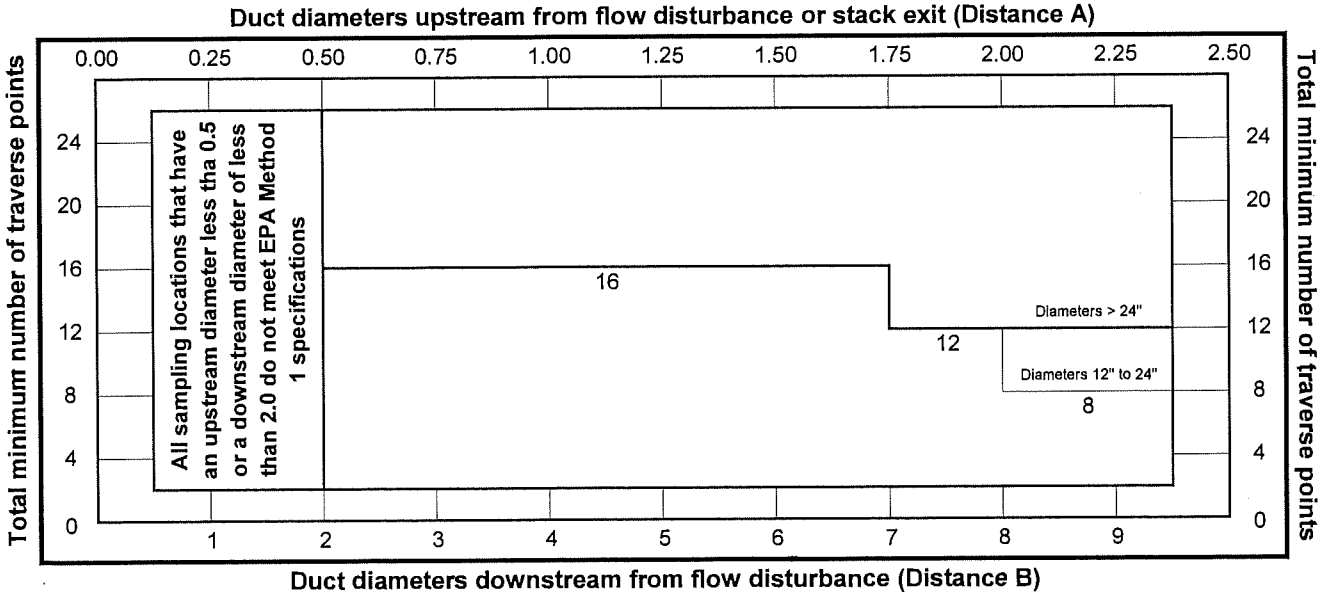
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	3.2	1.8	8.3
2	10.5	5.9	12.4
3	19.4	10.9	17.4
4	32.3	18.1	24.6
5	67.7	37.9	44.4
6	80.6	45.1	51.6
7	89.5	50.1	56.6
8	96.8	54.2	60.7
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A

Note: No traverse point shall be within 1.0" of the stack walls (see Sections 11.3.1)

DUCT AREA = 17.104 ft^3



Example: Location of 12 points



APPENDIX G
SAMPLING SYSTEM DIAGRAMS

EPA METHOD 1

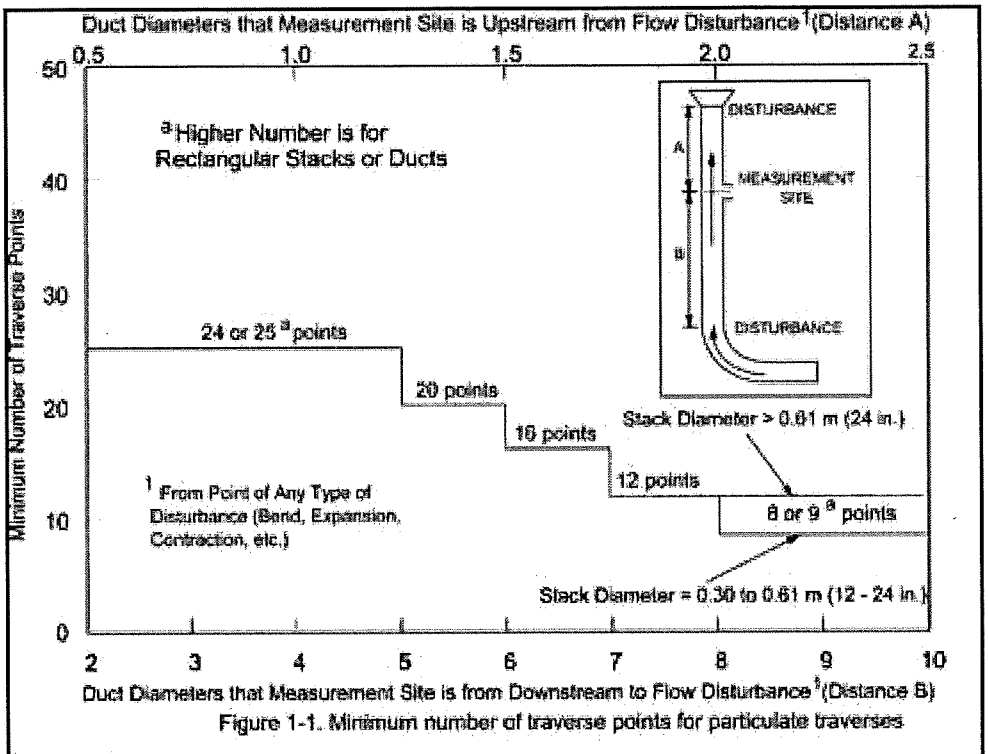


Figure 1-1. Minimum number of traverse points for particulate traverses

* * * * *

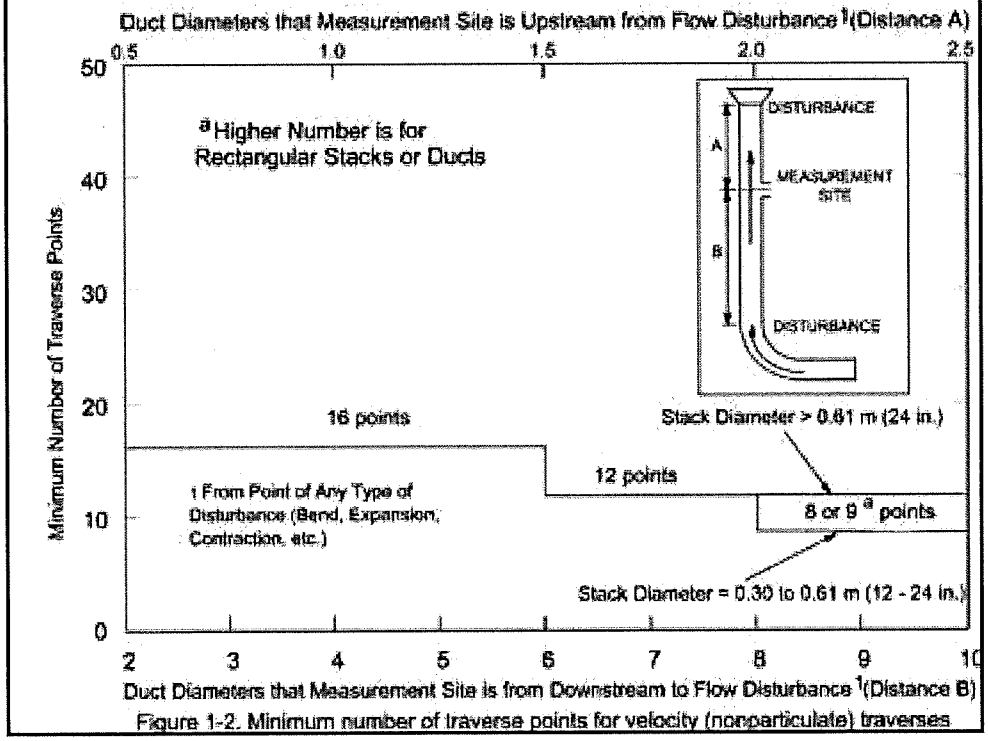


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses

EPA METHOD 1

TABLE 1-1 CROSS-SECTION LAYOUT FOR RECTANGULAR STACKS

Number of tranverse points layout	Matrix
9	3×3
12	4×3
16	4×4
20	5×4
25	5×5
30	6×5
36	6×6
42	7×6
49	7×7

TABLE 1-2—LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[Percent of stack diameter from inside wall to traverse point]

Traverse point number on a diameter	Number of traverse points on a diameter											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.0	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

EPA METHOD 1

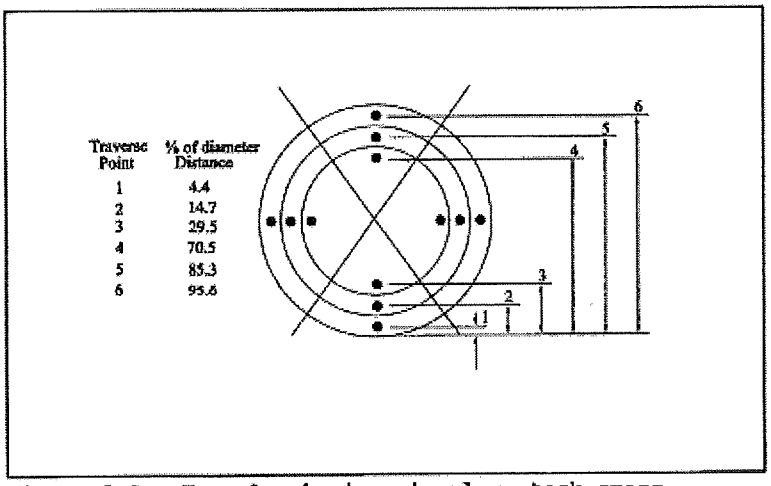


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points.

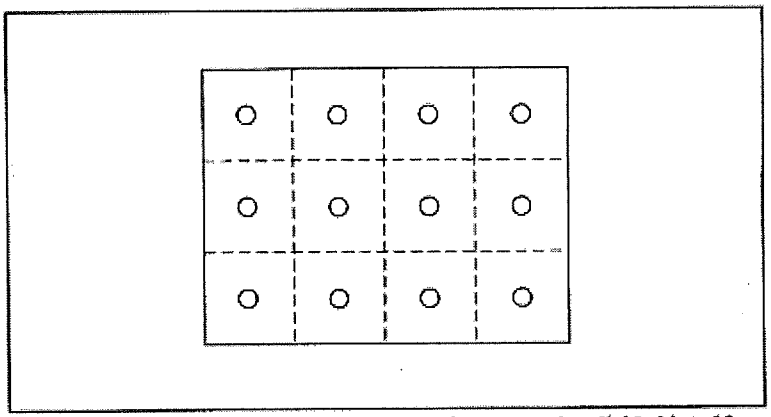
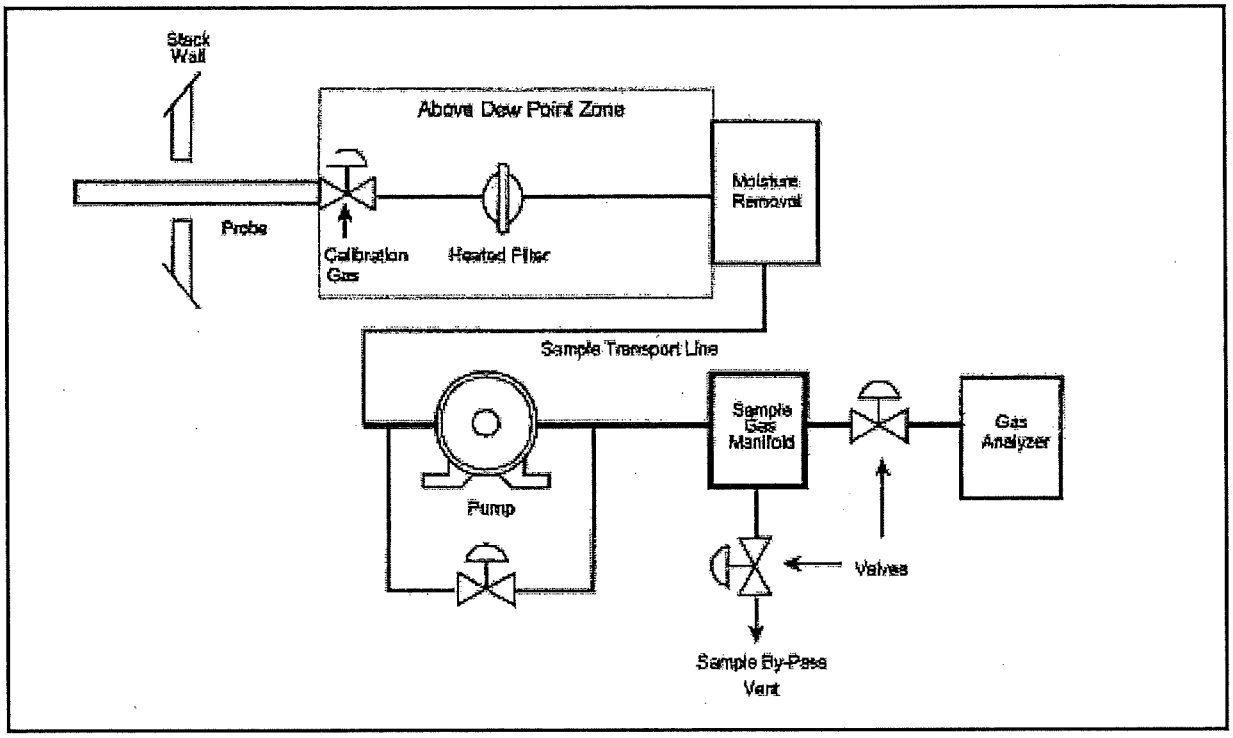


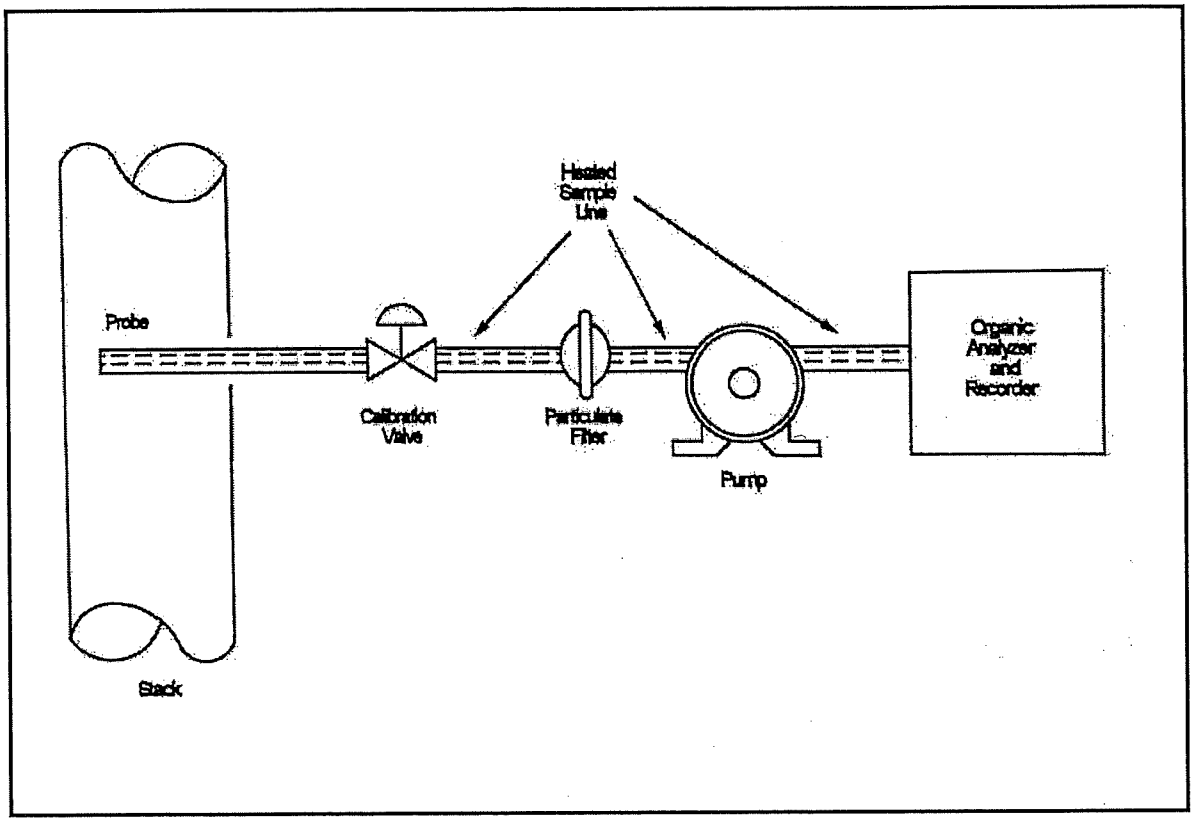
Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with traverse points at centroid of each area.

EPA Methods 3A, 6C, 7E & 10



CEM Sampling Train

EPA Method 25A



Organic Concentration Measurement System

APPENDIX H
SOURCE TEST PLAN

Bobby Asfour

From: Gloria Espena <GEspena@baaqmd.gov>
Sent: Thursday, June 30, 2022 11:14 AM
To: Bobby Asfour; Marco Hernandez
Cc: Harquail, Stephen
Subject: NST-7518: NST Request-City of Berkeley Marina Landfill
Attachments: Contractor ST Supplemental Form.docx

Follow Up Flag: Follow up
Flag Status: Flagged

NST-7518 has been assigned the pending 7/15/2022 work referenced below.

Also, we've introduced a new, supplemental form to be included when reports are submitted. It's just a sheet intended to help us with processing reports and prioritizing report review. The intention of the email is not to request additional testing. Please complete and submit the attached **"Contractor ST Supplemental Form"** with the final test report.

NST number(s) that are assigned for each source test notifications are for inner-office tracking purposes only, not an approval of the test plan. (For source testing methodologies please review permit conditions, BAAQMD Regulations and CFR, accordingly). Future notifications and report submittals should be made to **GEspena@baaqmd.gov** and **cc: MHernandez@baaqmd.gov.**

If you have other questions, please contact Marco Hernandez at mhernandez@baaqmd.gov.

Thank you,

Gloria M. Espena
Meteorology & Measurements
Source Test Section & Performance Evaluation Group
The Bay Area Air Quality Management District
375 Beale Street, Ste. 600 | San Francisco, CA 94105
Ofc (415) 749-4725 | Fax (510) 758-3087
gespena@baaqmd.gov | www.baaqmd.gov

From: Bobby Asfour <bobby@best-enviro.com>
Sent: Wednesday, June 29, 2022 2:55 PM
To: Gloria Espena <GEspena@baaqmd.gov>; Marco Hernandez <MHernandez@baaqmd.gov>
Cc: Harquail, Stephen <sharquail@scsengineers.com>
Subject: NST Request-City of Berkeley Marina Landfill

Hi Gloria,

Please accept this email as notification of source test for the above referenced facility.

Site Number: 3590
Plant Name: City of Berkeley-Marina Landfill, Cesar Chavez Park, 11 Spinnaker Way, Berkeley, CA 94710
Plant Contact: Stephen Harquail, SCS Field Services
Plant Contact Phone: (503) 867-2369, sharquail@scsengineers.com
Testing Company: Best Environmental
Testing Company Contact: Bobby Asfour
Testing Company Contact Phone: 925-455-9474 x 103, bobby@best-enviro.com
Purpose of Testing: Condition #1826 Annual Compliance
Source: A-4
Description: LFG Flare

Test Parameters & Methods:
Flare: Condition 1826
Outlet: NOx, CO, O2, CH4, NMOC, Flow
Inlet: Gas BTU, N2, O2, CO2, Total Reduced Sulfur, LFG speciation section 16/Flow Rate NMOC & CH4 DRE, Combustion zone Temperature, LFG Flow
Methods to be Used: Triplicate 30-minute runs for all samples/parameters:

Outlet: EPA 3A, 7E, 10, 18 , 19 & 25A

- stratification traverses
- Onsite NOx converter check

Inlet: ASTM D-1945/3588 & 6228, EPA Methods 18, 25C & TO-15

- Triplicate samples will be collected concurrently with outlet sampling.
- Appropriate sampling media containers will be used. (Multiple samples sample will be collected into various sampling media containers during each run to meet analytical/method/turnaround requirements)
- AAC lab will perform TO-15 and EPA Method 25C, BE will perform all other sample analysis.

Reporting units:

- Heat input. SCFM, Lbs/MMBtu (include fuel meter calibrations)
- Avg. combustion zone temperature (recorded data or strip chart will be included in final report)
- Pollutant mass emissions; ppm, lbs/hr. & lbs./MMBtu.
- Methane destruction efficiency by weight.

Test Dates: July 15, 2022

APPENDIX I
PERMIT TO OPERATE
OR
AUTHORITY TO CONSTRUCT

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

March 1, 2018

City of Berkeley/Engr Div/Public Works
1947 Center St, 4th fl
Berkeley, CA 94704

Attention: Lorin Jensen, P E

Application No.: 26799
Plant No. 3590
Equipment Location:
Cesar Chavez Prk
Berkeley, CA 94704

Dear Applicant:

SUBJECT: PERMIT TO OPERATE ABATEMENT EQUIPMENT

This letter is to advise you that your Permit to Operate the following is approved:

A-4 Landfill Gas Flare
Flare

Operation of this equipment is subject to condition no. 1826

We have made the necessary changes to our records so that your annual permit renewal billing will reflect the presence of this equipment. You are advised that all applicable existing permit conditions which apply to source(s) abated by this abatement device are still in effect and enforceable.

Please include you application number with any correspondence with the District. The District's regulations may be viewed online at www.baaqmd.gov If you have any questions on this matter, please call Catherine S Fortney, Senior Air Quality Engineer at (415) 749-4671.

Very truly yours,

Air Quality Engineering Manager
Acting Director of Engineering

CSF:SK
Attachment: Condition no. 1826

Plant Name: City of Berkeley/Engr Div/Public Works
A-4 Landfill Gas Flare
Condition No. 1826 Plant No. 3590 Application No. 26799

For: S-1 Landfill with Gas Collection System and A-3/A-4 Landfill Gas Flare

1. All collected landfill gas from the S-1 Landfill with Gas Collection System shall be abated by the properly maintained and properly operated A-3 or A-4 Landfill Gas Flare. Raw or untreated landfill gas shall not be vented to the atmosphere, except for unavoidable landfill gas emissions that occur during collection system installation, maintenance, or repair (which is performed in compliance with Regulation 8, Rule 34, Sections 113, 117, and/or, 118) and inadvertent component or surface leaks that do not exceed the limits specified in 8-34-301.2 or 8-34-303.

   Until the completion of the installation and start-up of A-4 Landfill Gas Flare, all collected landfill gas from the S-1 Landfill with Gas Collection System shall be continue to be abated by A-3 Landfill Gas Flare.

   (Basis: Regulation 8-34-301)

2. The Heat Input to the A-3 Landfill Gas Flare shall not exceed 63.9 million BTU per day and shall not exceed 23,330 million BTU per year. The Heat Input to the A-4 Landfill Gas Flare shall not exceed 57.6 million BTU per day and shall not exceed 21,024 million BTU per year. In order to demonstrate compliance with this part, the Permit Holder shall calculate and record, on a monthly basis, the maximum daily and total monthly heat input to the flare based on: (a) the landfill gas flow rate recorded pursuant to Regulation 8-34-508 and 8-34-501.10, (b) the average methane concentration in the landfill gas measured in most recent source test, and (c) a high heating value for methane of 1013 BTU per cubic foot at 60 degrees F.
   (Basis: Regulation 2-1-301)

3. Until the completion of the installation and start-up of A-4 Landfill Gas Flare, operation of A-3 Landfill Gas Flare shall be operated for a minimum of 312 hours in every month. Operation of the landfill gas collection system and flare may be discontinued if the methane concentration in the collected landfill gas is less than 20% methane by volume, or if the landfill gas flare flow rate falls below 250 cfm measured at the blower discharge. Landfill gas wells or collectors shall not be disconnected or removed and isolation valves shall not be shut completely off, without prior written authorization from the District, unless the Permit Holder complies with all applicable provisions of Regulation 8, Rule 34, Sections 113, 117, and 118.

Upon issuance of the Permit to Operate for A-4 Landfill Gas Flare, the gas collection and control system shall be operated continuously in accordance with Regulation 8-34-301.1.

(Basis: Regulations 8-34-301.1, 8-34-404).

4. The Permit Holder has been issued a Permit to Operate for the landfill gas collection system components listed below. Well and collector locations, depths, and lengths are as described in detail in Permit Applications #1507, #1665, and #2351. The Permit Holder shall apply for and receive an Authority to Construct before modifying the landfill gas collection system described in this part. Increasing or decreasing the number of wells or collectors, changing the length of collectors, or significantly changing the locations of wells or collectors are all considered to be modifications that are subject to the Authority to Construct requirement. (Basis: Regulations 8-34-301.1, 8-34-303, and 8-34-304)

Type of Component	Number of Components
Vertical Wells	42
Horizontal Collectors	2
Trench Collectors	14

5. A temperature monitor with a readout display and continuous recorder (recording thermocouple) shall be installed and maintained on the flare. One or more thermocouples shall be placed in the primary combustion zone of the flare and shall accurately indicate combustion zone temperature at all times. Temperature charts shall be retained for at least five years and made available at all times for District inspection. The temperature monitor and recorder are subject to the requirements of Regulation 1-523.
(Basis: Regulations 1-523, 8-34-501.3, 8-34-501.12, and 8-34-507)

6. The combustion zone temperature of the flare shall be maintained at a minimum of 1400 degrees F, averaged over any 3-hour period. If a source test demonstrates compliance with all applicable requirements at a different temperature, the APCO may revise this temperature limit, based on the following criteria. The minimum combustion zone temperature for A-4 shall be equal to the average combustion zone temperature determined during the most recent complying source test minus 50 degrees F, provided that the minimum combustion zone temperature is not less than 1400 degrees F.
(Basis: Regulations 2, Rule 5, 8-34-301.3)

7. Nitrogen oxide (NOx) emissions from the A-4 Landfill Gas Flare shall not exceed 0.06 lb/MM BTU.
(Basis: Cumulative Increase)

8. Carbon monoxide (CO) emissions from the A-4 Landfill Gas Flare shall not exceed 0.2 lb/MM BTU.
(Basis: Cumulative Increase)

9. Non methane organic compound (NMOC) emissions from the A-4 Landfill Gas Flare shall not exceed 30 ppmv as methane at 3% oxygen, dry.
(Basis: Cumulative Increase)

10. Operation of A-4 Landfill Gas Flare shall be conducted so as to ensure that methane (CH4) emissions are abated by at least 99% by weight. (Basis: CGR, Title 17, Subchapter 10, Section 95464(b)(2)(A))

11. Total reduced sulfur compounds in the collected landfill gas shall be monitored as a surrogate for monitoring sulfur dioxide in the landfill gas flare's exhaust. The concentration of total reduced sulfur compounds in the collected landfill gas shall not exceed 300 ppmv (dry) expressed as hydrogen sulfide.
(Basis: Regulation 9-1-302)

12. The A-4 Landfill Gas Flare shall be equipped with both local and remote alarm systems.
(Basis: Regulation 8-34-301)

13. In order to demonstrate compliance with Regulation 2-1-301, Regulation 8, Rule 34, Sections 301.3 and 412, and the CARB MSW Methane Mitigation Regulation, the permit holder shall conduct an initial District-approved source test on Landfill Gas Flare A-4. At a minimum, the initial source test shall determine the following:
   a. landfill gas flow rate to the flare (dry basis);
   b. concentrations (dry basis) of carbon dioxide (CO2), nitrogen (N2), oxygen (O2), methane (CH4), and total non-methane organic compounds (NMOC) in the landfill gas;
   c. concentrations (dry basis) of sulfur compounds in the landfill gas from laboratory analysis, if testing for SO2 in flare stack gas is not performed;
   d. stack gas flow rate from the flare (dry basis);
   e. concentrations (dry basis) of NOx, CO, CH4, NMOC, and O2 in the flare stack gas;
   f. concentration (dry basis) of SO2 in the flare stack gas, if laboratory analysis for sulfur compounds in landfill gas is not performed;
   g. the CH4, and NMOC destruction efficiencies achieved by the flare; and

h. the average combustion temperature in the flare during the test period.

The initial source test shall be conducted no later than 120 days after start-up of Landfill Gas Flare A-4. The permit holder shall obtain approval from the District's Source Test Section for all source testing procedures at least 14 days in advance of the source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion, a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition. (Basis: Cumulative Increase, Regulations 2-5, 2-1-301, 8-34-301.3 and 8-34-412, CCR Title 17, Subchapter 10, Sections 95464(b)(2)(A) and 95464(b)(4))

14. In order to demonstrate compliance with the CARB Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills, the permit holder shall conduct an annual District-approved source test on Landfill Gas Flare A-4. At a minimum, the annual source test shall determine the following:
    a. landfill gas flow rate to the flare (dry basis);
    b. concentration (dry basis) of methane (CH4), and total non-methane organic compounds (NMOC) in the landfill gas; and
    c. the CH4, and NMOC destruction efficiencies achieved by the flare.

    The annual source test shall be conducted no later than 45 days after the anniversary date of the initial source test performed under Part 13 above. The permit holder shall obtain approval from the District's Source Test Section for all source testing procedures at least 14 days in advance of the source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion, a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.

    Upon completion of three consecutive annual source tests demonstrating compliance with Parts 7 - 11 above, the permit holder may petition the BAAQMD to conduct this source test once every three years rather than annually. If a subsequent source test fails to demonstrate Compliance with Parts 7 - 11 above, the source test frequency will return to annual.

    (Basis: Cumulative Increase, CCR Title 17, Subchapter 10, Sections 95464(b)(2)(A) and 95464(b)(4))

15. The permit holder shall conduct a characterization of the landfill gas concurrent with the initial source test and annual source tests required by parts 13 and 14 above. The landfill gas sample shall be drawn from the main landfill gas header. The permit holder shall ensure that the landfill gas is analyzed for the following compounds:

1,1-Dichloroethane	Dichloromethane
1,1-Dichloroethene	Ethylene Dibromide
1,2-Dichloroethane	Ethylene Dichloride
1,4-Dichlorobenzene	Ethylbenzene
1,1,1-Trichloroethane	Fluorotrichloromethane
1,1,2,2-Tetrachloroethane	Hexane
Acrylonitrile	Isopropyl Alcohol
Benzene	Methyl Ethyl Ketone
Carbon Tetrachloride	Methyl Isobutyl Ketone
Chlorobenzene	Perchloroethylene
Chlorodifluoromethane	Toluene
Chloroethane	Trichloroethylene
Chloroform	Vinyl Chloride
Dichlorodifluoromethane	Xylenes

All concentrations shall be reported on a dry basis. The District shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.
(Basis: Regulations 2-5, 8-34-412)

16. In order to demonstrate compliance with the above conditions, the owner/operator shall maintain the following records in a District-approved logbook:
    a. Record the operating times and the landfill gas flow rate to the A-3/A-4 Landfill Gas Flare on a daily basis.
       Summarize these records on a monthly basis.
       Calculate and record the heat input to A-3/A-4 pursuant to part 2 above.
    b. Maintain continuous records of the combustion zone temperature for the A-3/A-4 Landfill Gas Flare during all hours of operation.
    c. Maintain records of all test dates and test results performed to maintain compliance with parts 7 - 11 above, or to maintain compliance with any applicable rule or regulation.

All records shall be maintained on site or shall be made readily available to District staff upon request for a period of at least two years from the date of entry. These recordkeeping requirements do not replace any

recordkeeping requirements contained in any other applicable rule or regulation.
(Basis; Cumulative Increase, Regulations 2-1-301, 2-6-501, 8-34-301, and 8-34-501)

End of Conditions

Permit to Operate

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

This document does not permit the holder to violate any BAAQMD regulation or any other law.

PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

City of Berkeley/Engr Div/Public Works
1947 Center St, 4th Floor
Berkeley, CA 94704

Location: Cesar Chavez Prk
Berkeley, CA 94704

S#	DESCRIPTION	[Schedule]	PAID
1	CHEM> Landfill with gas collection system, Multi-material		3338
	Landfill with Gas Collection System (42 Vert.& 2 Horz.Wells)	[K]	
	Abated by: A4 Flare		
	Emissions at: P4 Stack		
A4	Industrial Flare - Other (not refinery), 240K BTU/hr max		0
	Landfill Gas Flare	[exempt]	

1 Permitted Source, 1 Exempt Source

*** See attached Permit Conditions ***

The operating parameters described above are based on information supplied by permit holder and may differ from the limits set forth in the attached conditions of the Permit to Operate. The limits of operation in the permit conditions are not to be exceeded. Exceeding these limits is considered a violation of District regulations subject to enforcement action.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

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PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

Source#	Subject to Condition Numbers
1	1826

The operating parameters described above are based on information supplied by permit holder and may differ from the limits set forth in the attached conditions of the Permit to Operate. The limits of operation in the permit conditions are not to be exceeded. Exceeding these limits is considered a violation of District regulations subject to enforcement action.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

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JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

==========

COND# 1826 *applies to S#'s 1, A4*

For: S-1 Landfill with Gas Collection System and A-4 Landfill Gas Flare

1. All collected landfill gas from the S-1 Landfill with Gas Collection System shall be abated by the properly maintained and properly operated A-4 Landfill Gas Flare. Raw or untreated landfill gas shall not be vented to the atmosphere, except for unavoidable landfill gas emissions that occur during collection system installation, maintenance, or repair (which is performed in compliance with Regulation 8, Rule 34, Sections 113, 117, and/or, 118) and inadvertent component or surface leaks that do not exceed the limits specified in 8-34-301.2 or 8-34-303.
(Basis: Regulation 8-34-301)

2. The Heat Input to the A-4 Landfill Gas Flare shall not exceed 57.6 million BTU per day and shall not exceed 21,024 million BTU per year. In order to demonstrate compliance with this part, the Permit Holder shall calculate and record, on a monthly basis, the maximum daily and total monthly heat input to the flare based on: (a) the landfill gas flow rate recorded pursuant to Regulation 8-34-508 and 8-34-501.10, (b) the average methane concentration in the landfill gas measured in most recent source test, and (c) a high heating value for methane of 1013 BTU per cubic foot at 60 degrees F.
(Basis: Regulation 2-1-301)

3. The gas collection and control system shall be operated continuously in accordance with Regulation 8-34-301.1.

(Basis: Regulations 8-34-301.1, 8-34-404).

4. The Permit Holder has been issued a Permit to Operate for the landfill gas collection system components listed below. Well and collector locations, depths, and lengths are as described in detail in Permit Applications #1507, #1665, and #2351. The Permit Holder shall apply for and receive an Authority to Construct before modifying the landfill gas collection system described in this part. Increasing or decreasing the number of wells or

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PLANT# 3590

*** PERMIT CONDITIONS ***

collectors, changing the length of collectors, or significantly changing the locations of wells or collectors are all considered to be modifications that are subject to the Authority to Construct requirement. (Basis: Regulations 8-34-301.1, 8-34-303, and 8-34-304)

Type of Component	Number of Components
Vertical Wells	42
Horizontal Collectors	2
Trench Collectors	14

5. A temperature monitor with a readout display and continuous recorder (recording thermocouple) shall be installed and maintained on the flare. One or more thermocouples shall be placed in the primary combustion zone of the flare and shall accurately indicate combustion zone temperature at all times. Temperature charts shall be retained for at least five years and made available at all times for District inspection. The temperature monitor and recorder are subject to the requirements of Regulation 1-523. (Basis: Regulations 1-523, 8-34-501.3, 8-34-501.12, and 8-34-507)

6. The combustion zone temperature of the flare shall be maintained at a minimum of 1400 degrees F, averaged over any 3-hour period. If a source test demonstrates compliance with all applicable requirements at a different temperature, the APCO may revise this temperature limit, based on the following criteria. The minimum combustion zone temperature for A-4 shall be equal to the average combustion zone temperature determined during the most recent complying source test minus 50 degrees F, provided that the minimum combustion zone temperature is not less than 1400 degrees F. (Basis: Regulations 2, Rule 5, 8-34-301.3)

7. Nitrogen oxide (NOx) emissions from the A-4 Landfill Gas Flare shall not exceed 0.06 lb/MM BTU. (Basis: Cumulative Increase)

8. Carbon monoxide (CO) emissions from the A-4 Landfill Gas Flare shall not exceed 0.2 lb/MM BTU. (Basis:

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JUN 1, 2023

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*** PERMIT CONDITIONS ***

==========

Cumulative Increase)

9. Non methane organic compound (NMOC) emissions from the A-4 Landfill Gas Flare shall not exceed 30 ppmv as methane at 3% oxygen, dry.
(Basis: Cumulative Increase)

10. Operation of A-4 Landfill Gas Flare shall be conducted so as to ensure that methane (CH4) emissions are abated by at least 99% by weight. (Basis: CCR, Title 17, Subchapter 10, Section 95464(b)(2)(A))

11. Total reduced sulfur compounds in the collected landfill gas shall be monitored as a surrogate for monitoring sulfur dioxide in the landfill gas flare's exhaust. The concentration of total reduced sulfur compounds in the collected landfill gas shall not exceed 300 ppmv (dry) expressed as hydrogen sulfide.
(Basis: Regulation 9-1-302)

12. The A-4 Landfill Gas Flare shall be equipped with both local and remote alarm systems.
(Basis: Regulation 8-34-301)

13. Deleted Application 31264

14. In order to demonstrate compliance with the CARB Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills, the permit holder shall conduct a District-approved source test on Landfill Gas Flare A-4 every three years within 45 days of the anniversary date of the initial source test. At a minimum, the annual source test shall determine the following:
    a. landfill gas flow rate to the flare (dry basis);
    b. concentration (dry basis) of methane (CH4), and total non-methane organic compounds (NMOC) in the landfill gas; and
    c. the CH4, and NMOC destruction efficiencies achieved by the flare.

The permit holder shall obtain approval from the District's Source Test Section for all source testing procedures at least 14 days in advance of the source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days

PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

==========

of test completion, a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.

If a source test fails to demonstrate Compliance with Parts 7 - 11 above, the source test frequency will return to annual.

(Basis: Cumulative Increase, CCR Title 17, Subchapter 10, Sections 95464(b)(2)(A) and 95464(b)(4))

15. The permit holder shall conduct a characterization of the landfill gas concurrent with the source tests required by part 14 above. The landfill gas sample shall be drawn from the main landfill gas header. The permit holder shall ensure that the landfill gas is analyzed for the following compounds:

1,1-Dichloroethane	Dichloromethane
1,1-Dichloroethene	Ethylene Dibromide
1,2-Dichloroethane	Ethylene Dichloride
1,4-Dichlorobenzene	Ethylbenzene
1,1,1-Trichloroethane	Fluorotrichloromethane
1,1,2,2-Tetrachloroethane	Hexane
Acrylonitrile	Isopropyl Alcohol
Benzene	Methyl Ethyl Ketone
Carbon Tetrachloride	Methyl Isobutyl Ketone
Chlorobenzene	Perchloroethylene
Chlorodifluoromethane	Toluene
Chloroethane	Trichloroethylene
Chloroform	Vinyl Chloride
Dichlorodifluoromethane	Xylenes

All concentrations shall be reported on a dry basis. The District shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.
(Basis: Regulations 2-1-403, 2-5)

16. In order to demonstrate compliance with the above conditions, the owner/operator shall maintain the following records in a District-approved logbook:

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

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PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

a. Record the operating times and the landfill gas flow rate to the A-4 Landfill Gas Flare on a daily basis. Summarize these records on a monthly basis. Calculate and record the heat input to A-4 pursuant to part 2 above.
b. Maintain continuous records of the combustion zone temperature for the A-4 Landfill Gas Flare during all hours of operation.
c. Maintain records of all test dates and test results performed to demonstrate compliance with parts 7 - 11 above, and with any applicable rule or regulation.
d. Records required by the CARB Regulation "Methane Emissions from Municipal Solid Waste Landfills."

All records shall be maintained on site or shall be made readily available to District staff upon request for a period of at least five years from the date of entry. These recordkeeping requirements do not replace any recordkeeping requirements contained in any other applicable rule or regulation.
(Basis; Cumulative Increase, Regulations 2-1-301, 8-34-301, 8-34-501, CCR Title 17, Subchapter 10, Section 95470)

~~~~~~~~~~~~~~~~~~~~~~~~~~ END OF CONDITIONS ~~~~~~~~~~~~~~~~~~~~~~~~~~
~~~~~~~~~~~~~~~~~~~~~~~~~~

S#	Source Description	Annual Average lbs/day PART	ORG	NOx	SO2	CO
1	Landfill with Gas Collection System (42 Ve	-	1.89	.03	-	-
	T O T A L S	.26	2.12	.09	.72	.1

** PLANT TOTALS FOR EACH EMITTED TOXIC POLLUTANT **

Pollutant Name	Emissions lbs/day
Toluene	.02
Hydrogen Sulfide (H2S)	.03

POTENTIAL TO EMIT ESTIMATES FOR THE OFFLINE TIME OF GAS COLLECTION AND CONTROL SYSTEM
BERKELEY LANDFILL
BERKELEY, CALIFORNIA

CAS NUMBER	COMPOUNDS	Molecular Weight (g/Mol)	Ave. Concentration of Compounds Found In LFG (ppmv)[(b)]	Total Pollutant Flow Rate (lbs/hr)[(c)]	Pollutant Emission Rate from Landfill (Pounds for Event - 240 hours)
Hazardous Air Pollutants (HAPs)[(a)]					
71-55-6	1,1,1-Trichloroethane (methyl chloroform)*[(h)]	133.41	0.003	5.22E-06	1.25E-03
79-34-5	1,1,2,2-Tetrachloroethane*	167.85	0.003	6.57E-06	1.58E-03
75-34-3	1,1-Dichloroethane (ethylidene dichloride)*	98.97	0.003	3.88E-06	9.30E-04
75-35-4	1,1-Dichloroethene (vinylidene chloride)*	96.94	0.003	3.80E-06	9.11E-04
107-06-2	1,2-Dichloroethane (ethylene dichloride)*	98.96	0.003	3.88E-06	9.30E-04
78-87-5	1,2-Dichloropropane (propylene dichloride)*	112.99	0.003	4.42E-06	1.06E-03
67-63-0	2-Propanol (isopropyl alcohol)*	60.11	0.014	9.46E-06	2.27E-03
67-64-1	Acetone*[(h)]	58.08	0.014	9.14E-06	2.19E-03
107-13-1	Acrylonitrile*	53.06	0.007	4.16E-06	9.99E-04
75-25-2	Bromodichloromethane*	163.83	0.041	7.77E-05	1.86E-02
71-43-2	Benzene*	78.11	0.038	3.44E-05	8.27E-03
75-15-0	Carbon disulfide*	76.13	0.011	9.36E-06	2.25E-03
56-23-5	Carbon tetrachloride*	153.84	0.341	6.02E-04	1.45E-01
46-358-1	Carbonyl sulfide	60.07	0.183	1.26E-04	3.03E-02
108-90-7	Chlorobenzene*	112.56	0.089	1.15E-04	2.76E-02
75-00-3	Chloroethane (ethyl chloride)*	64.52	0.034	2.53E-05	6.06E-03
67-66-3	Chloroform*	119.39	0.034	4.68E-05	1.12E-02
75-45-6	Chlorodifluoromethane*[h]	86.47	0.173	1.72E-04	4.12E-02
74-87-3	Chloromethane (methyl chloride)*	50.49	0.034	1.98E-05	4.75E-03
106-46-7	Dichlorobenzene (1,4-Dichlorobenzene)*	147.00	0.039	6.55E-05	1.57E-02
75-43-4	Dichlorodifluoromethane*[(h)]	120.91	0.116	1.61E-04	3.87E-02
75-71-8	Dichlorofluoromethane*	102.92	0.051	6.04E-05	1.45E-02
75-09-2	Dichloromethane (Methylene Chloride)*[(h)]	84.94	0.068	6.66E-05	1.60E-02
64-17-5	Ethanol* **	46.08	0.135	7.14E-05	1.71E-02
100-41-4	Ethylbenzene*	106.16	0.006	7.49E-06	1.80E-03
106-93-4	Ethylene dibromide (1,2-Dibromoethane)*	187.88	0.003	7.36E-06	1.77E-03
75-69-4	Fluorotrichloromethane[(h)]	137.40	0.327	5.16E-04	1.24E-01
110-54-3	Hexane*	86.18	0.329	3.26E-04	7.81E-02
2148-87-8	Hydrogen Sulfide*	34.08	392.500	1.54E-01	3.69E+01
7439-97-6	Mercury (total)[(d)]	200.61	0.0003	6.73E-07	1.61E-04
78-93-3	Methyl ethyl ketone*	72.11	0.007	5.66E-06	1.36E-03
108-10-1	Methyl isobutyl ketone*	100.16	0.007	7.86E-06	1.89E-03
127-18-4	Perchloroethylene (tetrachloroethylene)*[(h)]	165.83	0.034	6.49E-05	1.56E-02
108-88-3	Toluene*	92.13	0.077	8.16E-05	1.96E-02
79-01-6	Trichloroethylene (trichloroethene)*	131.40	0.003	5.15E-06	1.23E-03
75-01-4	Vinyl chloride*	62.50	0.009	6.11E-06	1.47E-03
1330-20-7	Xylenes*	106.16	0.021	2.51E-05	6.02E-03
Single Highest HAP				0.0006	0.14
Totals: HAPs				0.002	0.50
Criteria Air Pollutants					
	Total Non-Methane Organics (NMOCs) as Hexane [(e)]	86.18	37.60	0.04	8.93
	VOCs [(f)]	86.18	37.60	0.04	8.69

Notes:

(a) List of hazardous air pollutants was from Title III Clean Air Act Amendments, 1990, and include compounds found in landfill gas, as determined from a list in AP-42 Tables 2.4-1 ("Default Concentrations for Landfill Gas Constituents, 11/98"). Compounds not identified as HAP by AP-42 indicated by "**".

(b) Average concentration of compounds found in LFG based on "Waste Industry Air Coalition Comparison of Recent Landfill Gas Analyses with Historic AP-42 Values" and site-specific values from 2023 LFG composition samples as indicated by "*".

(c) Total pollutant emission rate based on LFG average flow rate prior to event.

(d) Concentration of Mercury based on EPA AP-42 Section 2.4 Table 2.4-1 (11/98).

(e) Concentration of NMOC as hexane from Source Test for Berkeley Landfill, 2023. NMOC peak value as 226 ppmv as methane.

(f) VOCs assumed to equal NMOCs.

(g) Average LFG flow rate to the the flare was based on historical data of flare operations through 2023.

(h) Indicates compound designated as having a negligible contribution to photochemical reactivity by the U.S. Environmental Protection Agency as published in the Federal Register shall be considered a Non-Precursor Organic Compound in accordance with BAAQMD Rule 1-234 and USEPA Section 40 Code of Federal Regulation Section 51.100.

Variables:

MODEL INPUT VARIABLES:		
Methane Concentration (%) [(b)]	29%	
LFG Flow Rate [(g)]	74	SCFM
Duration of Event (Gas Collection and Control System Downtime)	240.00	hours

CONVERSIONS

lb conversion	453.6	g
hour conversion	60	min
mol conversion	24.04	L @ STP
cf conversion	28.32	L
mmbtu conversion	1,000,000	btu

EXAMPLE CALCULATIONS

(HAPS AND VOCS)

Total Pollutant Flow Rate (To Flare)= ((Molecular Weight of Compound[g/mol])*(Concentration of Compound[ppm]/1,000,000)*(Total LFG to Flare [cfm]) *(60min)*(1lb/453.6g)*(1mol/24.04L @ STP)*(28.32L/1cf)

SUMMARY OF POTENTIAL EMISSIONS

BERKELEY LANDFILL

BERKELEY, CALIFORNIA

Emission Source	Regulated Air Pollutant	PTE		
		lb/day	lbs/event	tpy
Landfill during GCCS Downtime	Volatile Organic Compounds	0.87	8.69	0.0043
	Non-Methane Organic Compounds	0.89	8.93	0.0045
	Total Hazardous Air Pollutants	0.05	0.50	0.0003

2022 Source Test Results

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

375 Beale Street, Suite 600
San Francisco, California 94105
(415) 771-6000

Contractor Source Test Supplemental Form

Site name: City of Berkeley

NST number: 7518

Testing company: BEST ENVIRONMETAL

Test purpose:

- [x] Routine compliance testing
- [ ] Compliance test required after previous source test failure
- [ ] Start-up test
- [ ] Other, ex: trial testing for permit changes, engineering studies

  Please explain:
- [ ] Revised report with corrections noted

  Revision number:

Preliminary test results:

- [x] **Values within range set by rule or regulation**
- [ ] **Values outside of range set by rule or regulation**
- [ ] N/A
- [ ] Please explain:

Source Test Report

CITY OF BERKELEY MARINA LANDFILL
Berkeley, CA

Landfill Gas Fired Flare (A-4)
Emission Results & Landfill Gas Characterization
Facility #3590, Condition #1826
NST-7518

Test Date: July 15, 2022
Report Date: August 17, 2022

Performed and Reported by:

BEST ENVIRONMENTAL
339 Stealth Court
Livermore, CA 94551
Phone: (925) 455-9474
Fax: (925) 455-9479

Prepared For:

SCS Field Services
4730 Enterprise Way
Modesto, Ca 95956
Attn: Mr. Stephen Harquail

For Submittal To:

Bay Area Air Quality Management District
375 Beale Street, STE 600
San Francisco, CA 94185

REVIEW AND CERTIFICATION

Team Leader:

The work performed herein was conducted under my supervision, and I certify that the details and results contained within this report are to the best of my knowledge an authentic and accurate representation of the test program. If this report is submitted for compliance purposes, it should only be reproduced in its entirety. If there are any questions concerning this report, please call the Team Leader or Reviewer at (925) 455-9474.

William Johnston
Project Manager

Reviewer:

I have reviewed this report for presentation and accuracy of content, and hereby certify that to the best of my knowledge the information is complete and correct.

Basim (Bobby) Asfour
Principal/QSTI

Source Test Information

Source Owner:	City of Berkeley/Engineering Division/Public Works 1947 Center St., 4th Fl Berkeley, CA 94704
Source Location:	Berkeley Marina Landfill Cesar Chaves Park (Berkeley Marina) Berkeley, California 94704
Engineering Firm:	SCS Field Services
Contact:	Stephen Harquail, (530) 867-2369
Source Description:	Site #3590, Landfill Gas Flare A4
PTO Number:	Condition 1826

Test Parameters & Limits:		**Average Result**
NOx:	**0.06 lbs/MMBtu**	**0.02 lbs/MMBtu**
CO:	**0.2 lbs/MMBtu**	**0.05 lbs/MMBtu**
NMOC:	**30 ppm @ 3% O_2 as methane**	**ppm @ 3% O_2**
CH_4:	**99% DRE**	**99.99% DRE**
Fuel Sulfur:	**300 ppm as H_2S**	**2 ppm as H_2S**

Source Testing Firm:	BEST ENVIRONMENTAL 339 Stealth Court Livermore, CA 94551 Phone (925) 455-9474 Fax (925) 455-9479
Contact:	Bobby Asfour
Test Date:	July 15, 2022
NST Number:	7518
Analytical Laboratories:	Atmospheric Analysis & Consultants (TO 15, M25C) Speciated VOC 1534 Eastman Avenue, Ste. A Ventura, CA 93003 Attn: John Yokoyama Phone: (805) 650-1642 BEST ENVIRONMENTAL (Fixed gases CH_4, H_2S, HHV& F factor) 339 Stealth Court Livermore, CA 94551

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SECTION 1. INTRODUCTION

1.1. Test Purpose

Best Environmental (BE) was contracted by SCS Field Services to perform emissions testing on one landfill gas flare (A-4) to comply with Bay Area Air Quality Management District (BAAQMD) Regulation 8 Rule 34 Sections 301.3 & 412 as well as Condition #1826 of the permit. A copy of the Permit is included in the appendices.

1.2. Test Location

The testing was conducted on the flare located at the City of Berkeley, Caesar Chavez Park, Berkeley Marina, CA 94704. (Facility #3590).

1.3. Test Date

Testing was conducted on July 15, 2022.

1.4. Test Parameters and Methods

The following emission parameters were measured:

Parameter	Monitoring & Analytical Protocols
NMOC, THC, NOx, CO & O_2	EPA Methods 3A, 7E, 10 & 25A
Flowrate (inlet/outlet)	Flowmeter/EPA Method 19
Inlet NMOC & CH_4	EPA Method 18 & 25C
Fixed Gases, Btu/CF & F Factor	ASTM D-1945 & 3588
LFG organics & TRS	Modified EPA TO-15 & D-6228

1.5. Sampling and Observing Personnel

Sampling was performed by Bobby Asfour and Bill Johnston of BE. The BAAQMD was notified of the test date; however, there was no representative present to witness the test program.

SECTION 2. SUMMARY OF RESULTS

2.1. Emission Results

Table 2.1 summarizes the flare outlet average test results. Triplicate 30-minute runs were performed according to BAAQMD and EPA test methods. Individual run results are presented in Table 1 on page 7. Landfill Gas Characterization (TO 15) results are in Appendix B.

Table 2.1: Flare Outlet (A-4)

Parameter	Average Results	Limits
NOx, lbs/MMBtu	0.0205	**0.06**
CO, lbs/MMBtu	0.0529	**0.20**
NMOC, ppm @ 3% O_2	6.47	**30**
CH_4 Destruction Efficiency	99.99	**≥ 99**

2.2. Process Data

Table 2.2 presents the Flare Operational Parameters as recorded by the flares data acquisition system. Process data and fuel meter calibration can be found in Appendix E.

Table 2.2: Operational Parameters

Parameter	Fuel Flow Meter, SCFM	Flare Temp., ^oF
Run # 1	65.56	1,550
Run # 2	65.59	1,555
Run # 3	65.57	1,554

2.3. Allowable Emissions

See Table 2.1 above. The test results show that the flare is operating within the PTO gaseous emission limits and is therefore in compliance.

2.4. Comments: Discussion of Quality Assurance and Errors

Quality assurance procedures listed in the above referenced test methods and referenced in the Source Test Plan were performed and documented. The QA/QC procedures are described in Section 4.3 of the report. Documentation of the QA/QC is provided in Appendix A, B & D.

SECTION 3. SOURCE OPERATION

3.1. Process Description

The landfill gas fired flare is a control device for the treatment of landfill gas (mainly methane, carbon dioxide and nitrogen) that is generated from the decomposition of waste. The gas is collected in a network of interconnected pipes from several landfill gas extraction wells that draw a vacuum on the vapors in the landfill. The vapors are treated to remove condensate and particulate material, and then they are incinerated in the flare.

3.2. Flow Diagram

A digital image of the flare stack is contained in Appendix F.

3.3. Process and Control Operating Parameters

The flare was operated at 1,553 ^{o}F at a fuel rate of 66 SCFM according to the flare's monitoring devices. Flare monitoring data was provided by the facility and can be found in Appendix E.

3.4. Normal Operating Parameters

The flare was operating normally during the test periods.

3.5. Testing or Process Interruptions and Changes

There were no testing or process interruptions during the test series.

SECTION 4. SAMPLING AND ANALYSIS PROCEDURES

4.1. Port Location

Emissions from the flare were sampled via a circular stack with two ports 90^o apart located approximately 5 stack diameters downstream of the burners and 1 stack diameter upstream from the exit. Access to the sampling ports was provided using a 40-foot boom-lift.

The dimensional cross-sections of the stack are 56-inches (Area SQFT = 17.104). The fuel line to the flare is a 6-inch stainless steel pipe. A single port/tap was located on the flame arrestor, 2-feet upstream from the flare wall.

4.2. Point Description/Labeling – Ports/Stack

The stack ports were not labeled but were designated as facing south and east.

4.3. Method Description, Equipment, Sampling, Analysis and QA/QC

Sampling and analytical procedures of the methods were followed as published in the EPA "Quality Assurance Handbook for Air Pollution Measurement Systems" Volume III, US EPA 600/4-77-027b.

The following is an overview of the Testing Performed

Parameter	Location	Method(s)	Duration	Runs
THC, CH_4, NMOC, NO_x, CO & O_2	Exhaust	EPA Methods 3A, 7E, 10, 18 & 25A	30 mins	3
Flow Rate	Exhaust	EPA 19	30 mins	3
LFG organics & TRS compounds	Inlet	TO-15	30 mins	3
TRS	Inlet	ASTM D-6228	30 mins	3
C1-C6, O_2, N_2, BTU-Fixed Gases	Inlet	ASTM D-1945/3588	30 mins	3
Flow Rate & Flare Temp.	Inlet	Flare Metering System	Concurrent	3
NMOC & CH_4	Inlet	EPA Method 18 & 25C	30 mins	3

EPA Method 7E, 10 & 3A are all continuous monitoring techniques using instrumental analyzers. Sampling is performed by extracting exhaust flue gas from the stack, conditioning the sample and analyzing the flue gas using continuous monitoring gas analyzers in a CEM test van. The sampling system consists of a stainless-steel sample probe, Teflon sample line, glass-fiber particulate filter, glass moisture-knockout condensers in ice, Teflon sample transfer tubing, diaphragm pump and a stainless steel/Teflon manifold and flow control/delivery system. A constant sample and calibration gas supply pressure of 5 PSI is provided to each analyzer to avoid pressure variable response differences. The entire sampling system is leak checked prior to and at the end of the sampling program. The BE sampling and analytical system is checked for linearity with zero, mid and high-level span calibration gases, and is checked for system bias at the beginning of the test day. System bias is determined by pulling calibration gas through the entire sampling system. Individual test run calibrations use the calibration gas, which most closely matches the stack gas effluent. The calibration gases are selected to fall approximately within the following instrument ranges; 80 to 95

percent for the high calibration, 40 to 60 percent for the mid-range and zero. Zero, calibration and bias drift values are determined for each test.

EPA 25A (THC as methane by FID) is an accepted method for the determination of Total Hydrocarbons (THC). A flame ionization detector (FID) total hydrocarbon continuous monitor is used for the sampling. The sampling and calibrations are performed through an all heated sample line connected directly to the THC analyzer. The FID in the analyzer is heated to 190 ^{o}C. The calibration gases are selected to fall within the following instrument ranges; 80 to 90 percent for the high calibration, 45 to 55 percent for the mid-range calibration, 25 to 35 percent for the low range calibration and zero. Zero and mid external calibration drift values are determined for each test run.

All BE calibration gases are EPA Protocol # 1. The analyzer data recording system consists of BE's Computer Data Acquisition System (DAS). The NO_2 converter is checked and confirmed to be > 90% efficient.

EPA Methods 7E, 10 & 3A met the following QA/QC method requirements:

System Criteria

Instrument Linearity	≤2% Calibration Span or ±0.5diff.
Instrument Bias	≤5% Calibration Span or ±0.5 diff.
NO_2 Converter Efficiency	≥90%
System Response Time	≤2 minutes

Test Criteria

Instrument Zero Drift	≤3% Calibration Span or ±0.5 diff.
Instrument Span Drift	≤3% Calibration Span or ±0.5 diff.

EPA Method 25A met the following QA/QC method requirements:

System Criteria

Instrument Linearity	≤5% Calibration Gas Conc.

Test Criteria

Instrument Zero Drift	≤3% Span Range
Instrument Span Drift	≤3% Span Range

The following continuous monitoring analyzers were used:

Parameter	Make	Model	Principle
NO_x	CAI	600CLD	Chemiluminescence
CO	TECO	48i	GFC IR analyzer
O_2	CAI	110P	Paramagnetic
THC	CAI	600	FID

EPA Method TO-15 & ASTM D-6228 analysis is used to determine emissions of Organic and inorganic compounds including sulfurs. Inlet gases are filled into tedlar bags corresponding to the test program. The bags are labeled respectively then sent to a laboratory and analyzed for GC/MS (gas chromatography/mass spectrometer) within 72 hours and GC/FPD (gas chromatography/flame photometric detector) within 24 hours for sulfur. For more information on the lab analysis, refer to Appendix B for method description and QA/QC.

EPA Method 18 is used to determine carbon speciated hydrocarbons (C_1, C_2 & C_3+) emissions by gas chromatograph / Flame Ionization Detection (GC/FID). Gaseous emissions are drawn through a Teflon sample line to a tedlar bag located in a rigid leak proof bag container.

Sample is drawn into the bag by evacuating the container to stack gas pressure to allow sample flow without using a pump to avoid contamination. Negative pressure is adjusted to maintain an integrated sample flow between 20 to 60 minutes. The bag samples are taken to a laboratory and analyzed within 72 hours. The results are reported as methane with a detection limit of 0.5 ppm for non-methane non-ethane organic compounds (C_3+).

EPA Method 19 is used to determine stack gas volumetric flow rates using oxygen-based F-factors. F-factors are ratios of combustion gas volumes generated from heat input. The heating value of the fuel in Btu per cubic foot is determined from the analysis of fuel gas samples using gas chromatography (GC). Dedicated fuel meters monitor total fuel consumption for the source. The total cubic feet per hour of fuel multiplied times the Btu/CF provides million Btu per hour (MMBTU) heat input. The heat input in MMBTU/hr is multiplied by the F-factor (DSCF/MMBTU) and adjusted for the measured oxygen content of the source to determine volumetric flow rate. This procedure is proposed for pollutants whose compliance standards are based on emission rates (lb/day) or emission factors (lb/MMBtu).

EPA Method 25C is used to determine the emissions of NMOC and can also be used to identify and quantify fixed gases (O_2, CO_2, N_2& CH_4) in conjunction with **EPA Method 3C**. Gaseous emissions are drawn through Teflon sample line to a tedlar bag. Positive pressure is adjusted to maintain an integrated sample flow between 30 to 60 minutes. The bag samples are taken to a laboratory and analyzed for Non-Methane Organic Compound (NMOC) referenced to methane and fixed gases using GC/FID (gas chromatography/flame ionization detector-total combustion analysis and thermal conductivity detector (TCD) within 72 hours.

ASTM D-1945 & D-3588 analysis is used to determine the composition of fuel gas (e.g. Methane, fixed gases & BTU Content). Inlet gases are filled into a tedlar bag, the bag is labeled respectively then sent to a Laboratory and analyzed for fixed gases, methane and C_1-C_6 using GC/FID (gas chromatography/flame ionization detector). Each compound has calorific values that are used to calculate the gas higher heating values.

4.4. Analytical Laboratories

Three summa canisters were sent to AAC Lab. for EPA Method 25C, TO-15 (NMOC, organic compound analyses). Three inlet and three outlet tedlar bag samples were brought to the BE Lab for ASTM D-1945/3588/6228 & EPA Method 18 (heat input, H_2S & C_1, C_2, C_3+). For more information on the analysis procedure and QA/QC refer to Appendix B.

TABLE #1

Test Results
City of Berkeley
Flare

TEST	1	2	3	AVERAGE	LIMIT
Test Date	7/15/22	7/15/22	7/15/22		
Test Time	926-1001	1014-1047	1101-1135		
Standard Temp., °F	70	70	70		
Process Data					
Flare Temp., ^{o}F	1,550	1,555	1,554	1,553	
Fuel F-Factor, DSCF/MMBtu @ 70^{o}F	10,553	10,686	10,438	10,559	
Inlet Methane (CH_4) Content, %	25.70	24.50	26.30	25.50	
Inlet Fuel Flow Rate, DSCFM	65.56	65.59	65.57	65.57	
Heat Input, MMBtu/hr	1.02	0.98	1.05	1.02	
Heat Input, MMBtu/day	24.55	23.42	25.21	24.39	
Outlet Flow Rate, DSCFM (M19)	506	491	523	507	
Outlet Emissions					
O_2, %	13.47	13.51	13.60	13.53	
CO, ppm	16.50	20.63	36.04	24.39	
CO, lbs/hr	0.0047	0.0059	0.0103	0.0069	
CO, lbs/MMBtu	0.0355	0.0452	0.0781	0.0529	**0.20**
NO_x, ppm	9.50	9.53	9.26	9.43	
NO_x, lbs/hr	0.0027	0.0027	0.0026	0.0027	
NO_x, lbs/MMBtu	0.0205	0.0209	0.0201	0.0205	**0.06**
THC, ppm as methane (25A)	5.27	7.29	6.16	6.24	
CH_4, ppm (M18)	3.45	3.48	3.79	3.57	
CH_4, lbs/hr	0.0043	0.0042	0.0049	0.0045	
NMOC, ppm (M25A)	1.82	3.81	2.37	2.67	
NMOC, ppm @ 3% O_2 as CH_4	4.39	9.23	5.80	6.47	**30**
VOC, lbs/hr as methane	0.0023	0.0047	0.0031	0.0039	
Inlet					
Inlet CH_4, ppm (M18)	257,000	245,000	263,000	255,000	
Inlet CH_4, lbs/hr	41.8	39.9	42.8	41.5	
Inlet VOC, ppm as methane (M25C)	226	187	185	199	
Inlet VOC, lbs/hr as methane	0.037	0.030	0.030	0.032	
Landfill Gas Sulfur Content					
Inlet Total Sulfur as H_2S, gr/100dscf	0.89	0.85	0.87	0.87	
Inlet Total Sulfur as H_2S, ppm	1.52	2.58	1.05	1.72	**300**
Destruction Efficiency					
CH_4, Destruction Efficiency %	99.99%	99.99%	99.99%	**99.99%**	**≥99%**
NMOC, Destruction Efficiency %	93.78%	84.73%	89.80%	**89.43%**	**≥98%**

WHERE:

MW = Molecular Weight
DSCFM = Dry Standard Cubic Feet Per Minute
ppm = Parts Per Million Concentration
lbs/hr = Pound Per Hour Emission Rate
lbs/MMBtu = Pounds per million BTU
CO = Carbon Monoxide (MW = 28)
NOx = Oxides of Nitrogen as NO_2 (MW = 46)
THC = Total Hydrocarbons as Methane (MW = 16)
VOC = Total Non-Methane Hydrocarbons as Methane-C1 (MW = 16) CH_4

CALCULATIONS:

VOC ppm = THC ppm - CH_4 ppm
lbs/hr = ppm * DSCFM * MW *60 / 379 x 10^6 (@60^{o}F)
ppm @ 3% O_2 = ppm * 17.9 / (20.9-stack O_2)
lbs/MMBtu = Fd * M.W.* ppm * 2.59E-9 * (20.9/(20.9-%O_2))
Removal Efficiency = (inlet lbs/hr-outlet lbs/hr) / Inlet lbs/hr

APPENDICES

APPENDIX A – CALCULATIONS & NOMENCLATURE

APPENDIX B - LABORATORY REPORTS

APPENDIX C - FIELD DATA SHEETS

APPENDIX D – CALIBRATION GAS CERTIFICATES

APPENDIX E - PROCESS DATA

APPENDIX F - STACK DIAGRAMS

APPENDIX G – SAMPLING SYSTEM DIAGRAMS

APPENDIX H – SOURCE TEST PLAN

APPENDIX I – PERMIT TO OPERATE

APPENDIX A
CALCULATIONS

Standard Abbreviations for Reports

Unit	Abbreviation	Unit	Abbreviation
		microgram	ug
Brake horsepower	bhp	milligram	mg
Brake horsepower hour	bhp-hr	milliliter	ml
British Thermal Unit	Btu	million	MM
capture efficiency	CE	minute	min
destruction efficiency	DE	Molecular Weight	M
Dry Standard Cubic Feet	DSCF	nanogram	ng
Dry Standard Cubic Feet per Minute	DSCFM	Parts per Billion	ppb
Dry Standard Cubic Meter	DSCM	Parts per Million	ppm
grains per dry standard cubic foot	gr/DSCF	pound	lb
gram	g	pounds per hour	lbs/hr
grams per Brake horsepower hour	g/bhp-hr	pounds per million Btu	lbs/MMBtu
kilowatt	kW	second	sec
liter	l	Specific Volume, ft^3/lb-mole	SV
Megawatts	MW	Thousand	K

Common Conversions / Calculations / Constants

1 gram = 15.432 grains

1 pound = 7000 grains

grams per pound = 453.6

bhp = 1.411 * Engine kW, (where Engine kW = Generator kW output / 0.95) @ 95% efficiency

g/bhp-hr = 453*ppm*(MW / (385E6))* 0.00848 * f-factor * (20.9 / (20.9-O_2)); **CARB**

g/bhp-hr = lbs/hr * 453.6 / bhp

2.59E-9 = Conversion factor for ppm to lbs/scf; **EPA 40CFR60.45 @ 68°F**

Correction Multiplier for Standard Temperature = (460 + $T_{std.}$ °F) / 528

F factor: dscf / MMBTU @ **60°F = 8579,** @ **68°F = 8710.** @ 70° F = **8743** for natural gas

Btu/ft^3: **1040**

lb/hr Part. Emission Rate = 0.00857 * gr/dscf * dscfm; **EPA Method 5**

lbs/hr = ppm * dscfm * MW * 0.00008223 / (Std Temp + 460)

Correction to 12% CO_2 = gr/dscf * 12% / stack CO_2%; **EPA Method 5**

Correction to 3% O_2 = ppm * 17.9 / (20.9 - stack O_2 %); **CARB Method 100**

Correction to 15% O_2 = ppm * 5.9 / (20.9 - stack O_2 %); **CARB Method 100**

dscfm = Gas Fd * MMBtu/min * 20.9 / (20.9 - stack O_2 %); **EPA Method 19**

Lb/MMBtu @ **60°F** = Fd * M * ppm * **2.64E-9** * 20.9 / (20.9 - stack O_2 %);
@ **68°F** = Fd * M * ppm * **2.59E-9** * 20.9 /(20.9 - stack O_2 %);
@**70F** = Fd * M * ppm * **2.58-9** * 20.9 / (20.9 - stack O_2 %)

Standard Temperatures by District

EPA	68 °F	NSAPCD - Northern Sonoma	68 °F
CARB	68 °F	PCAPCD - Placer	68 °F
BAAQMD - Bay Area	70 °F	SLOCAPCD - San Luis Obispo	60 °F
SJVUAPCD - San Joaquin	60 °F	SMAQMD - Sacramento	68°F de facto
SCAQMD - South Coast	60 °F	SCAQMD - Shasta County	68 °F
MBUAPCD - Monterey Bay	68 °F	YSAPCD - Yolo-Solano	68 °F
FRAQMD – Feather River	68 °F	AADBAPC – Amador County	68 °F

BEST ENVIRONMENTAL

CEM BIAS SYSTEM TEST SUMMARY FIELD DATA SHEET (EPA)

Facility: City of Berkeley **Date:** 7/15/2022 **Personnel:** BA / BJ

Location: Flare

	O_2		NO_x	CO	THC		Comments
Analyzer	CAI 110		600	48I	600		
Range	20.98		95.3	89.4	100		
Zero Value (N_2)	0.00		0.00	0.00	0.00		
Cal Value (low)					26.88		
Cyl. #					DT27824		
Cyl. Exp. Date					05/27/29		
Cal Value (mid)	11.59		45.30	54.50	43.50		
Cyl. #	CC50881		DT37052	CC707372	DT42922		
Cyl. Exp. Date	10/01/27		11/18/23	02/15/27	06/21/30		
Cal Value (Hi)	20.98		95.30	89.40	92.10		
Cyl. #	CC306150		CC308849	CC306150	CC506583		
Cyl. Exp. Date	11/22/29		10/02/27	11/22/29	03/10/29		

CALIBRATION ERROR CHECK

Zero cal (int)	-0.10		0.00	0.03	-0.69		
Abs. Difference	0.10		0.00	0.03	0.69		= or < 0.5 ppm
% Linearity	**-0.5**		**0.0**	**0.0**	**-0.7**		= or < 2%
low cal (int)					26.41		
Abs. Difference					0.47		= or < 0.5 ppm
% Linearity					**-1.7**		= or < 2%
mid cal (int)	11.52		45.56	54.51	44.39		
Abs. Difference	0.07		0.26	0.01	0.89		= or < 0.5 ppm
% Linearity	**-0.3**		**0.3**	**0.0**	**2.0**		= or < 2%
high cal (int)	20.98		95.14	89.60	93.96		
Abs. Difference	0.00		0.16	0.20	1.86		= or < 0.5 ppm
% Linearity	**0.0**		**-0.2**	**0.2**	**2.0**		= or < 2%

INITIAL SYSTEM BIAS CHECK

Zero (int)	-0.10		0.00	0.03	-0.69		
Zero (ext)	-0.08		0.00	-0.74	0.73		
Abs. Difference	0.02		0.00	0.77	1.42		
bias, % High Cal	**-0.1**		**0.0**	**0.9**	**-1.4**		Limit (±5%)

Cal (int)	11.52		45.56	54.51	44.39		
Cal (ext)	11.56		45.27	54.09	44.07		
Abs. Difference	0.04		0.29	0.42	0.31		
bias, % High Cal	**-0.2**		**0.3**	**0.5**	**0.3**		Limit (±5%)

System response time =

Zero to Cal	Cal to Zero
60.0	**60.0**

The time required (in seconds) to achieve a 95% difference between ext zero to ext span or ext span to ext zero.

EPA Method 25A (THC) QC
Cal. Error = <5% cal. Value
100 * (Cal Value - Cal Response) / Cal Value
System Drift = <3% of Scale
100 * (final cal - initial cal) / Range

System Bias (Limit ± 5%) = 100 * External cal - Internal cal / High Cal Gas Value

% Linearity (Limit ± 2%) = 100 * Span Value - Internal cal / High Cal Gas Value

% Converter Efficiency (Limit =/ >90%) = 100 * Internal Cal / NO_2 Cal Gas Value

NO_2 Converter Test

NO_2 Cal Gas	NO_2 Value	% of Efficiency	Cyl. #	Cyl. Exp. Date
5.98	**5.39**	**90.07%**	**CC503193**	**01/06/24**

BEST ENVIRONMENTAL

CEM BIAS SYSTEM TEST SUMMARY SHEET

Facility: City of Berkeley **Date:** 7/15/2022 **Personnel:** BA / BJ

Location: Flare

	O_2		Nox	CO	THC		Comments
Analyzer	CAI 110		600	48I	600		
Range	20.98		95.3	89.4	100		
Cal Value (low)					26.88		M25A only
Cyl. #					DT27824		M25A QC limits-below
Cal Value (mid)	11.59		45.3	54.5	43.5		
Cyl. #	CC50881		DT37052	CC707372	DT42922		
Cal Value (Hi)	20.98		95.30	89.40	92.1		Calibration Span
Cyl. #	CC306150		CC308849	CC306150	CC506583		

zero cal (int)	-0.10		0.00	0.03	-0.69		
% Linearity	**-0.48**		**0.00**	**0.03**	**-0.69**		<2% or +/-0.5diff.
low cal (int)					26.41		
% Linearity					**-1.7**		<2% or +/-0.5diff.
mid cal (int)	11.52		45.56	54.51	44.39		
% Linearity	**-0.3**		**0.3**	**0.0**	**2.0**		<2% or +/-0.5diff.
high cal (int)	20.98		95.14	89.60	93.96		
% Linearity	**0.0**		**-0.2**	**0.2**	**2.0**		<2% or +/-0.5diff.

Zero (int)	-0.10		0.00	0.03	-0.69		
Zero (ext)(i)	-0.08		0.00	-0.74	0.73		
% Bias	**0.1**		**0.0**	**-0.9**	**1.4**		Limit (±5%) or +/-0.5diff.
Cal (int)	11.52		45.56	54.51	44.39		
Cal (ext) 1(i)	11.56		45.27	54.09	44.07		
% Bias	**0.2**		**-0.3**	**-0.5**	**-0.3**		Limit (±5%) or +/-0.5diff.
Zero (ext) 1(f)	-0.17		0.01	-0.85	-0.74		926-1001
Cal (ext) 1(f)	11.54		45.02	53.62	42.46		Run 1
Zero % Drift	-0.4		0.0	-0.1	-1.5		Limit (±3%) or +/-0.5diff.
Cal % Drift	-0.1		-0.3	-0.5	-1.6		Limit (±3%) or +/-0.5diff.
Zero % Bias	-0.3		0.0	-1.0	-0.1		Limit (±5%) or +/-0.5diff.
Cal % Bias	0.1		-0.6	-1.0	-1.9		Limit (±5%) or +/-0.5diff.
Average	13.44		9.47	15.75	5.23		
Corr. Average	**13.47**		**9.50**	**16.50**	**5.27**		
Zero (ext) 2(f)	-0.17		0.00	-0.97	1.24		1014-1047
Cal (ext) 2(f)	11.56		44.96	53.29	42.55		Run 2
Zero % Drift	0.0		0.0	-0.1	2.0		Limit (±3%) or +/-0.5diff.
Cal % Drift	0.1		-0.1	-0.4	0.1		Limit (±3%) or +/-0.5diff.
Zero % Bias	-0.3		0.0	-1.1	1.9		Limit (±5%) or +/-0.5diff.
Cal % Bias	0.2		-0.6	-1.4	-1.8		Limit (±5%) or +/-0.5diff.
Average	13.48		9.47	19.67	7.33		
Corr. Average	**13.51**		**9.53**	**20.63**	**7.29**		
Zero (ext) 3(f)	-0.18		0.00	-1.01	0.83		1101-1135
Cal (ext) 3(f)	11.56		45.05	53.08	43.24		Run 3
Zero % Drift	-0.1		0.0	0.0	-0.4		Limit (±3%) or +/-0.5diff.
Cal % Drift	0.0		0.1	-0.2	0.7		Limit (±3%) or +/-0.5diff.
Zero % Bias	-0.4		0.0	-1.2	1.5		Limit (±5%) or +/-0.5diff.
Cal % Bias	0.2		-0.5	-1.6	-1.1		Limit (±5%) or +/-0.5diff.
Average	13.59		9.20	34.84	6.96		
Corr. Average	**13.60**		**9.26**	**36.04**	**6.16**		

System Drift (Limit ± 3%) = 100 * (External final cal - External Initial cal) / Cal Value (Hi)

System Bias (Limit ± 5%) = 100 * (External cal - Internal cal) / Cal Value (Hi)

% Linearity (Limit ± 2%) = 100 * (Span Value - Internal cal) / Cal Value (Hi)

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

EPA Method 25A (THC) QC
Cal. Error = <5% cal. Value
100 * (Cal Value - Cal Response) / Cal Value
System Drift = <3% of Scale
100 * (final cal - initial cal) / Range

A-4

STACK GAS FLOW RATE DETERMINATION -- FUEL USAGE
EPA Method 19

Facility: City of Berkeley
Unit: Flare
Condition: Normal
Date: 7/15/2022
Personell: BA / BJ
Time:

	926-1001 Run 1	1014-1047 Run 2	1101-1135 Run3	
Gross Calorific Value	260	248	267	Btu / ft³
Stack Oxygen	13.47	13.51	13.60	%
Gas Fd-Factor @ 70°F	10,553	10,686	10,438	DSCF/MMBtu
Standard Temperature (°F)	70	70	70	°F
Corrected Fuel Rate (SCFM)	65.56	65.59	65.57	SCFM
Fuel Flowrate (SCFH)	3,934	3,935	3,934	SCFH
Million Btu per minute	0.017	0.016	0.018	MMBtu/min
Heat Input (MMBtu/hour)	1.02	0.98	1.05	MMBtu/Hr
Stack Gas Flow Rate	**506**	**491**	**523**	**DSCFM**

WHERE:

Gas Fd-Factor = Fuel conversion factor (ratio of combustion gas volumes to heat inputs)
MMBtu = Milion Btu

CALCULATIONS:

SCFM = CFM * 528 * (gas line PSIA) / 14.7 / (gas °F + 460)
MMBtu/min = (SCFM * Btu/ft³) / 1,000,000
DSCFM = Gas Fd-Factor * MMBtu/min * 20.9/ (20.9 - stack oxygen%)
SCFH = SCFM * 60
Heat Input = MMBtu/min * 60

APPENDIX B
LAB REPORTS

BEST ENVIRONMENTAL
339 Stealth Court
Livermore, California 94551
(925) 455-9474 FAX (925) 455-9479
bestair@best-enviro.com

August 8, 2022

Subject: On July 15, 2021 Best Environmental collected three inlet and three outlet samples from the Berkeley Marina Landfill Source Test.

CLIENT: SCS Field Services
PROJECT NAME: Berkeley Marina Source Test
BE PROJECT NO: 312
ANALYSIS DATE: 7/16/22

Sample ID	Lab Sample Number
Run 1 Inlet	9030
Run 2 Inlet	9031
Run 3 Inlet	9032
Run 1 Outlet	9049
Run 2 Outlet	9050
Run 3 Outlet	9051

The samples were analyzed in accordance with EPA Method 18 (CH_4) & ASTM D-1945/3588/6228 (fuel composition analysis, High heat value calculations and Fuel Sulfur).

The following pages present the inlet and outlet VOC and LFG gas composition analytical results with calculated HHV. A chain of custody can also be found in this report. This Lab report contains a total of 12 pages.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples.

If you have any questions concerning these results, or if Best Environmental can be of any further assistance, please contact me at (925) 455-9474 x 103.

Submitted by,

Bobby Asfour
Lab Director

EPA Methods 3C, 18, 25C & ASTM D-1945/3588/6228

Facility: City of Berkeley Marina Landfill Source: LFG Flare

Test Date: 7/15/22 Lab Personnel: BA

Analysis Date: 7/16/22 Project #: 312

CH4 Analysis (M18)

M-18

Lab ID	Time	Inlet Run #	% CH4	ppm C2 as CH4		Duplicate CH4	Duplicate C2 as CH4	R1/Inlet	Limit
9030	926	Run 1	25.7	18.5		25.20	17.89		
9031	1014	Run 2	24.5	17.7		2.04	3.46		15%
9032	1101	Run 3	26.3	16.5					

		Outlet Run #	ppm CH4	ppm C2 as CH4	
9049	926	Run 1	3.45	ND	
9050	1014	Run 2	3.48	ND	
9051	1101	Run 3	3.79	ND	

Inlet	
H2S	ppmv
R1	1.52
R2	2.58
R3	1.05

DL	outlet	Inlet	
CH4	<1	<0.2	ppm/%
C2	<1	<1	ppm
C3+ as methane	<1	<1	ppm

GC/FID/FPD/TCD: SRI 8610C
Column: 3 foot Haysep D, 60M capillary, 12' 13x Packed column
Chromatic integration: Peak444 Peaksimple by SRI
Gas Standards: Propane in air/C1-C6 n-alkane in N2
H2S in N2
Natural gas standard in Methane

Fuel Analysis-R1 inlet

Helium	0.04	%
Hydrogen	0.11	%
Nitrogen	45.28	%
Oxygen	5.67	%
Carbon Mo	0.00	%
Carbon Dio	22.75	%
Methane	25.73	%
Ethane	0.00	%
Propane	0.00	%
Isobutane	0.00	%
n-Butane	0.00	%
Isopentane	0.00	%
n-Pentane	0.00	%
Hexanes	0.00	%

Fd-Factor	10,553	
HHV	260	

Fuel Analysis-R2 Inlet

Helium	0.01	%
Hydrogen	0.15	%
Nitrogen	45.63	%
Oxygen	5.99	%
Carbon Mo	0.00	%
Carbon Dio	22.42	%
Methane	24.52	%
Ethane	0.00	%
Propane	0.00	%
Isobutane	0.00	%
n-Butane	0.00	%
Isopentane	0.00	%
n-Pentane	0.00	%
Hexanes	0.00	%

Fd-Factor	10,686	
HHV	248	

Fuel Analysis-R3 Inlet

Helium	0.02	%
Hydrogen	0.38	%
Nitrogen	45.15	%
Oxygen	5.83	%
CO	0.00	%
CO2	22.17	%
Methane	26.35	%
Ethane	0.00	%
Propane	0.00	%
Isobutane	0.00	%
n-Butane	0.00	%
Isopentane	0.00	%
n-Pentane	0.00	%
Hexanes	0.00	%

Fd-Factor	10,438	dscf/MMBtu @
HHV	267	BTU/cf

BEST ENVIRONMENTAL Livermore, CA 925 455-9474

Gas Chromotography QA/QC Results

Facility: City of Berkeley Marina Landfill **Source:** LFG Flare

Test Date: 7/15/22 **Lab Personnel:** BA

Analysis Date: 7/16/22

Cal Curve Date: 7/1/22

	Daily Blank & R.T.			limit
	C1/CH4	C2/ethane	C3+/NMNEHC	DL
He Gas	ND	ND	ND	
C1-C6 gas	2.96	4.46	5.73	

* C1-C6 gas used to determine retention times

	initial cal propane as methane			
conc.	92.1	255.1	8970	
area ct.	20.8	58.64	2015.5	

	3 point Cal-3 injections each (area ct)			limit
	20.8	58.5	2015.5	
	20.9	59	2016	
	20.99	58.7	2014	
average	20.90	58.73	2015.17	
Deviation	0.10	0.25	1.04	
% diff	**0.45**	**0.43**	**0.05**	**<5**

H2S Caibration Check	area ct		
Cal value	171		
Response	172	3231	
% Diff.	**-0.58**		<15

	post cal			limit
	92.1	255.1	8322	
	91.1	244.2	8215	
% diff	**1.09**	**4.27**	**1.29**	**<15%**

EPA Method 3C/ASTM D-1945 Daily Calibrations			
Method Required Values	Actual Value	Results	**% Diff.**
N2	2	2.1	5.00
O2	1	1.006	0.60
CO	0.1	0.0995	-0.50
CO2	44	46	4.55
CH4	52	51	-1.92

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DocNumber: 444964

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22022

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 01/06/2022
Linde Order Number: 59001704
Part Number: EV NIHS170ME-AS
Customer PO Number: 32

Fill Date: 12/09/2021
Lot Number: 70086134305
Cylinder Style & Outlet: AS CGA 330
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	01/05/2025	NIST Traceable
Cylinder Number:	SA4842	Expanded Uncertainty
171 ppm	Hydrogen sulfide	± 2 ppm
Balance	Nitrogen	

Certification Information: Certification Date: 01/05/2022 Term: 36 Months Expiration Date: 01/05/2025

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Hydrogen sulfide

Requested Concentration: 170 ppm
Certified Concentration: 171 ppm
Instrument Used: Ametek Series 9900 S/N ZW-9900-S1330-1
Analytical Method: UV Spectrometry
Last Multipoint Calibration: 12/30/2021

Reference Standard: Type / Cylinder #: GMIS / DT0009254
Concentration / Uncertainty: 251 ppm ±2 ppm
Expiration Date: 07/17/2024
Traceable to: SRM # / Sample # / Cylinder #: PRM / C2103401 / D587474
SRM Concentration / Uncertainty: 400.4 ppm / ±3.2 ppm
SRM Expiration Date: 05/20/2024

First Analysis Data:						Date	12/29/2021
Z: 0	R: 251	C: 172	Conc: 172				
R: 251	Z: 0	C: 171	Conc: 171				
Z: 0	C: 173	R: 252	Conc: 173				
UOM: ppm			Mean Test Assay:	172	ppm		

Second Analysis Data:						Date	01/05/2022
Z: 0	R: 251	C: 171	Conc: 171				
R: 251	Z: 0	C: 171	Conc: 171				
Z: 0	C: 171	R: 251	Conc: 171				
UOM: ppm			Mean Test Assay:	171	ppm		

Analyzed By Jose Vasquez

Certified By Amalia Real

Making our world more productive

Linde Gas & Equipment Inc.
ISO 9001 Registered
37256 Highway 30
Gelsmar, LA 70734
Tel: 225-677-7700
Fax: 225-673-3531

Customer & Order Information:

LGEPKG FREMONT CA HP
41446 CHRISTY STREET,
FREMONT, CA 94538-5105

Linde Order Number: **71954931**
Customer PO Number: **79956654**

Certificate Issuance Date: **1/27/2022**

Certification Date: **1/27/2022**
Lot Number: **70340 2026 6J**
Part Number: **HE BU100X2C-A3**
DocNumber: **482274**
Expiration Date: **1/26/2024**

CERTIFICATE OF ANALYSIS

Certified Standard

Component	Requested Concentration (Molar)	Certified Concentration (Molar)	Analytical Reference	Analytical Uncertainty
Butane	58.12 100 ppm	**96.0 ppm**	1	**± 2 %**
Ethane	30 100 ppm	**95.5 ppm**	1	**± 2 %**
n-Hexane	86.18 100 ppm	**91.9 ppm**	1	**± 2 %**
Methane	16 100 ppm	**99.4 ppm**	1	**± 2 %**
n-Pentane	72.15 100 ppm	**93.7 ppm**	1	**± 2 %**
Propane	44 100 ppm	**97.6 ppm**	1	**± 2 %**
Helium	**99.94 %**	**99.94259 %**	2	**N/A**

Cylinder Style: **A3**
Cylinder Pressure @ 70 F: **1200 psig**
Cylinder Volume: **16.5 ft3**
Valve Outlet Connection: **CGA 350**
Cylinder Number(s): **EX0013583**

Fill Date: **1/26/2022**
Analysis Date: **1/26/2022**

Filling Method: **Gravimetric**

Analyst: **Craig Billiot**

QA Reviewer: **Kristen Hanna**

Key to Analytical Techniques:

Reference	Analytical Instrument - Analytical Principle
1	Agilent 7890B - Gas Chromatography with FID
2	N/A - By Difference of Other Components

The gas calibration cylinder standard prepared by Linde Gas & Equipment Inc. is considered a certified standard. It is prepared by gravimetric, volumetric, or partial pressure techniques. The calibration standard provided is certified against Linde Gas & Equipment Inc. Reference Materials which are traceable to the International System of Units (SI) through either weights traceable to the National Institute of Standards and Technology (NIST) or Measurement Canada, or through NIST Standard Reference Materials or equivalent where available.

Note: All expressions for concentration (e.g., % or ppm) are for gas phase, by mole unless otherwise noted. Analytical uncertainty is expressed as a Relative % unless otherwise noted.

PRAXAIR
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DocNumber: 405533

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 03/11/2021
Praxair Order Number: 36989506
Part Number: EV AIPR30ME-AS
Customer PO Number: 6

Fill Date: 02/25/2021
Lot Number: 70086105605
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	03/10/2029	NIST Traceable
Cylinder Number:	CC506583	Expanded Uncertainty
30.7 ppm	Propane	± 0.1 ppm
Balance	Air	

Certification Information:

Certification Date: 03/10/2021 *Term:* 96 Months *Expiration Date:* 03/10/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Propane**

Requested Concentration: 30 ppm
Certified Concentration: 30.7 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 03/05/2021

Reference Standard: Type / Cylinder #: GMIS / CC302220
Concentration / Uncertainty: 50.68 ppm ±0.13 ppm
Expiration Date: 07/06/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1667b / 83-J-17 / CAL017783
SRM Concentration (enter with units) / Uncertainty: 48.83 ppm / ±0.11 ppm
SRM Expiration Date: 08/17/2017

First Analysis Data:						Date	03/10/2021
Z:	0	R:	136.8	C:	82.9	Conc:	30.7
R:	136.8	Z:	0	C:	82.8	Conc:	30.7
Z:	0	C:	82.8	R:	136.9	Conc:	30.7
UOM:	ppm					Mean Test Assay:	30.7 ppm

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm					Mean Test Assay:	ppm

Analyzed By Jose Vasquez

Certified By Amalia Real

CH4
92.1 ppm

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DocNumber: 315881

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22020

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 10/20/2020
Praxair Order Number: 25533164
Part Number: EV AIPR85ME-AS
Customer PO Number: 9096

Fill Date: 10/14/2020
Lot Number: 70086028806
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	10/20/2028	NIST Traceable
Cylinder Number:	SA8052	Expanded Uncertainty
85.2 ppm	Propane	± 0.5 %
Balance	Air	

Certification Information: *Certification Date:* 10/20/2020 *Term:* 96 Months *Expiration Date:* 10/20/2028

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as relative expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Propane**

Requested Concentration: 85 ppm
Certified Concentration: 85.2 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 10/15/2020

Reference Standard: Type / Cylinder #: GMIS / CC86463
Concentration / Uncertainty: 101.5 ppm ±0.15%
Expiration Date: 01/04/2027
Traceable to: SRM # / Sample # / Cylinder #: SRM 1668b / 82-L-22 / FF10569
SRM Concentration / Uncertainty: 98.68 PPM / ±0.14 PPM
SRM Expiration Date: 09/12/2019

First Analysis Data:						Date	10/20/2020
Z: 0	R: 265.4	C: 222.9	Conc: 85.2				
R: 265.3	Z: 0	C: 223.3	Conc: 85.4				
Z: 0	C: 222.8	R: 265.9	Conc: 85.2				
UOM: ppm			Mean Test Assay:	85.2	ppm		

Second Analysis Data:						Date	
Z: 0	R: 0	C: 0	Conc: 0				
R: 0	Z: 0	C: 0	Conc: 0				
Z: 0	C: 0	R: 0	Conc: 0				
UOM: ppm			Mean Test Assay:		ppm		

Analyzed By: Jenna Lockman

Certified By: Jose Vasquez

CH_4 255.6 ppm

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DocNumber: 448691

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22022

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 02/21/2022
Linde Order Number: 61663855
Part Number: AI PR3000E-AS
Customer PO Number: 35

Fill Date: 02/16/2022
Lot Number: 70086204705
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	02/21/2030	NIST Traceable
Cylinder Number:	CC15394	Expanded Uncertainty
2990 ppm	Propane	± 25 ppm
Balance	Air	

Certification Information: Certification Date: 02/21/2022 Term: 96 Months Expiration Date: 02/21/2030

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard If Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Propane

Requested Concentration: 3000 ppm
Certified Concentration: 2990 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 02/07/2022

Reference Standard: Type / Cylinder #: GMIS / CC257728
Concentration / Uncertainty: 2497 ppm ±13 ppm
Expiration Date: 02/09/2025
Traceable to: SRM # / Sample # / Cylinder #: SRM 2647a / 104-C-21 / XF003205B
SRM Concentration / Uncertainty: 2467 ppm / ±13.0 ppm
SRM Expiration Date: 05/02/2024

First Analysis Data:				Date	02/21/2022
Z: 0	R: 7350	C: 8810	Conc:	2989	
R: 7360	Z: 0	C: 8810	Conc:	2989	
Z: 0	C: 8820	R: 7370	Conc:	2992	
UOM: ppm		Mean Test Assay:		2990	ppm

Second Analysis Data:				Date	
Z: 0	R: 0	C: 0	Conc:	0	
R: 0	Z: 0	C: 0	Conc:	0	
Z: 0	C: 0	R: 0	Conc:	0	
UOM: ppm		Mean Test Assay:			ppm

Analyzed By: Courtney Zielke

Certified By: Jose Vasquez

8970 ppm CH4


CALIBRATION
GAS MIXTURE
GAS COMPOSITION
Components
Concentrations (MOL%)
Hydrogen 1.00%
Oxygen 1.00%
Nitrogen 2.00%
Carbon Monoxide 0.100%
Carbon Dioxide 44.00%
Methane Balance
Part Number: F1035VMLF
Contents: 34 Liters @ 500 psi
Accuracy: 2% Certified Standard
Recommended Shelf Life: 3 Years
Lot #: 1-305-1
Date: November 01, 2007
Ref. #: 130813
MESA
MESA Specialty Gases & Equipment
TEL: (866) 470-MESA (6372) or (714) 424-0844
e-mail: mail@mesagas.com
www.mesagas.com

Best Environmental Ph (925) 455-9474; Fx (925) 455-9479

Project ID: City of Berkeley **SAMPLE CHAIN OF CUSTODY** **BE PROJECT MANAGER:**

Analyical Lab: BE

#	DATE	TIME	SAMPLE ID Run#/Method/Fraction/Source	CONTAINER size / type	Volume	Storage Temp °F	SAMPLE DESCRIPTION	ANALYSIS	TAT
1	7/15/22	926	9430 Run 1/inlet	10L/Tedlar	7.0	Amb.	LFG	M18 + Comp Fuel	Norm.
2		1014	9431 Run 2/Inlet	10L/Tedlar		Amb.	LFG	M18 + Comp Fuel	Norm.
3		1101	9432 Run 3/Inlet	10L/Tedlar		Amb.	LFG	M18 + Comp Fuel	Norm.
4									
5		926	9449 Run 1/outlet	10L/Tedlar		Amb.	Exhuast Gas	M18	Norm.
6		1014	9450 Run 2/outlet	10L/Tedlar		Amb.	Exhuast Gas	M18	Norm.
7		1101	9451 Run 3/outlet	10L/Tedlar		Amb.	Exhuast Gas	M18	Norm.
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									

SPECIAL INSTRUCTIONS: Record & Report all liquid sample volumes.

3 2

Submit Results to: Attn: Bobby Asfour BEST ENVIRONMENTAL 339 STEALTH COURT LIVERMORE CA. 94551

Relinquished by:_____ Received by:_____ Date:_____ Time:_____

Relinquished by:_____ Received by:_____ Date:_____ Time:_____

Relinquished by:_____ Received by:_____ Date:_____ Time:_____

SAMPLE CONDITION AS RECEIVED: OK or not OK

f:\forms\field\coc.xls - 6/4/99

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Best Environmental
PROJECT NAME	: City Berkeley Flare
AAC PROJECT NO.	: 221529
REPORT DATE	: 08/10/2022

On July 20th, 2022, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Summa Canisters for TNMOC analysis by EPA 25C. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab No.	Return Pressure (mmHg)
LFG R1	221529-33751	777.5
LFG R2	221529-33752	749.0
LFG R3	221529-33753	743.0

This analysis is performed in accordance with AAC's Quality Manual. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples. The Technical Director or his/her designee, as verified by the following signature, has authorized release of the data.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 4 pages.

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Laboratory Analysis Report

Client : Best Environmental
Project No. : 221529
Matrix : AIR
Units : ppmC

Sampling Date : 07/15/2022
Receiving Date : 07/20/2022
Analysis Date : 08/10/2022
Report Date : 08/10/2022

EPA 25C

Reporting Limit: 3.0 ppmC		*Canister Dilution Factor*	*Analysis Dilution Factor*	TNMOC*	SRL (RL x DF's)
Client Sample ID	AAC ID				
LFG R1	221529-33751	1.3	1.0	226	3.9
LFG R2	221529-33752	1.4	1.0	187	4.1
LFG R3	221529-33753	1.4	1.0	185	4.1

Sample Reporting Limit (SRL) is equal to Reporting Limit x Analysis Dil. Fac x Canister Dil. Fac.

**Total Non-Methane Organic Carbon*

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Quality Control/Quality Assurance Report

Analysis Date : 08/10/2022
Analyst : MR
Units : ppmv

Instrument ID: : GCTCA#2-FI
Calibration Date: : 7/18/2022

I - Opening Calibration Verification Standard - Method 25C

Analyte	xRF	DRF	%RPD*
Propane	119363	126680	5.9

II - TNMOC Response Factor - Method 25C

Analyte	xRF	CV RF	CV dp RF	CV tp RF	Average RF	% RPD***
Propane	119363	126680	125233	125159	125691	5.2

III - Method Blank - Method 25C

AAC ID	Analyte	Sample Result
MB	TNMOC	0.00

IV - Laboratory Control Spike & Duplicate - Method 25C

AAC ID	Analyte	Spike Added	LCS	LCSD	LCS % Rec **	LCSD % Rec **	% RPD***
LCS/LCSD	Propane	51.0	52.30	52.27	102.6	102.6	0.1

V - Closing Calibration Verification Standard - Method 25C

Analyte	xCF	dCF	%RPD*
Propane	119363	122523	2.6

xCF - Average Calibration Factor from Initial Calibration Curve
dCF - Daily Calibration Factor
* Must be <15%
** Must be 90-110 %
*** Must be <20%

2225 Sperry Ave., Ventura, CA 93003 www.aaclab.com (805) 650-1642

Ph (925) 455-9474; Fx (925) 455-9479

B-15

Project ID: City Berkeley Flare SAMPLE CHAIN OF CUSTODY BE PROJECT MANAGER: B Johnston

Analyical Lab: ARC

#	DATE	TIME	SAMPLE ID Run#/Method/Fraction/Source	CONTAINER size / type	Volume	Storage Temp °F	Method	ANALYSIS
1	7-15-22	930	LFG R1 33751	Can			TO 15	TO 15
2	↓	1017	R2 33752	↓				↓
3	↓	1105	R3 33753	↓				
4								
5								All cans 30" → 0"
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								

ord & Report all liquid sample volumes.

esults to: Attn: BEST ENVIRONMENTAL 339 STEALTH COURT, LIVERMORE CA. 94551

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: Bell _____ Received by: _____ Date: 7/20/22 Time: 0939

SAMPLE CONDITION AS RECEIVED: OK or not OK

Fx 4 cans (1c void)

f:\forms\field\coc.xls - 6/4/99

Atmospheric Analysis & Consulting, Inc.

CLIENT	: Best Environmental
PROJECT NAME	: City Berkeley Flare
AAC PROJECT NO.	: 221529
REPORT DATE	: 08/03/2022

On July 20, 2022, Atmospheric Analysis & Consulting, Inc. received three (3) Six-Liter Summa Canisters for Volatile Organic Compounds analysis by EPA Method TO-15. Upon receipt, the samples were assigned unique Laboratory ID numbers as follows:

Client ID	Lab ID	Return Pressure (mmHga)
LFG R1	221529-33751	777.5
LFG R2	221529-33752	749.0
LFG R3	221529-33753	743.0

This analysis is accredited under the laboratory's ISO/IEC 17025:2017 accreditation issued by the ANSI National Accreditation Board. Refer to certificate and scope of accreditation AT-1908. Test results apply to the sample(s) as received. For detailed information pertaining to specific EPA, NCASI, ASTM and SCAQMD accreditations (Methods & Analytes), please visit our website at www.aaclab.com.

I certify that this data is technically accurate, complete, and in compliance with the terms and conditions of the contract. No problems were encountered during receiving, preparation, and/or analysis of these samples.

The Technical Director or his designee, as verified by the following signature, has authorized release of the data contained in this hardcopy report.

If you have any questions or require further explanation of data results, please contact the undersigned.

Sucha Parmar, Ph.D.
Technical Director

This report consists of 10 pages.

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Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO : 221529
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R1			Sample Reporting Limit (SRL)	LFG R2			Sample Reporting Limit (SRL)	Method Reporting Limit (MRL)
AAC ID	221529-33751				221529-33752				
Date Sampled	07/15/2022				07/15/2022				
Date Analyzed	07/20/2022				07/20/2022				
Can Dilution Factor	1.31				1.35				
Compound	Result	Qualifier	Analysis DF	(MRLxDF's)	Result	Qualifier	Analysis DF	(MRLxDF's)	
Chlorodifluoromethane	173		5	3.27	142		5	3.38	0.50
Propene	247		5	6.55	189		5	6.75	1.00
Dichlorodifluoromethane	116		5	3.27	93.9		5	3.38	0.50
Chloromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Dichlorotetrafluoroethane	76.7		5	3.27	66.1		5	3.38	0.50
Vinyl Chloride	8.51		5	3.27	7.70		5	3.38	0.50
Methanol	8.32	J	5	32.7	8.64	J	5	33.8	5.00
1,3-Butadiene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Bromomethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Chloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Dichlorofluoromethane	5.11		5	3.27	4.52		5	3.38	0.50
Ethanol	<SRL	U	5	13.1	<SRL	U	5	13.5	2.00
Vinyl Bromide	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Acetone	<SRL	U	5	13.1	<SRL	U	5	13.5	2.00
Trichlorofluoromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
2-Propanol (IPA)	<SRL	U	5	13.1	<SRL	U	5	13.5	2.00
Acrylonitrile	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
1,1-Dichloroethene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Methylene Chloride (DCM)	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Allyl Chloride	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Carbon Disulfide	8.19		5	6.55	<SRL	U	5	6.75	1.00
Trichlorotrifluoroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
trans-1,2-Dichloroethene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1-Dichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Methyl Tert Butyl Ether (MTBE)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Vinyl Acetate	<SRL	U	5	6.55	108		5	6.75	1.00
2-Butanone (MEK)	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
cis-1,2-Dichloroethene	3.80		5	3.27	3.78		5	3.38	0.50
Hexane	329		5	3.27	259		5	3.38	0.50
Chloroform	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Ethyl Acetate	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Tetrahydrofuran	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,2-Dichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1,1-Trichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Benzene	38.4		5	3.27	32.1		5	3.38	0.50

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Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO : 221529
MATRIX : AIR
UNITS : PPB (v/v)

DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R1			Sample Reporting Limit (SRL) (MRLxDF's)	LFG R2			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	221529-33751				221529-33752				
Date Sampled	07/15/2022				07/15/2022				
Date Analyzed	07/20/2022				07/20/2022				
Can Dilution Factor	1.31				1.35				
Compound	Result	Qualifier	Analysis DF		Result	Qualifier	Analysis DF		
Carbon Tetrachloride	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Cyclohexane	43.6		5	3.27	42.7		5	3.38	0.50
1,2-Dichloropropane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Bromodichloromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,4-Dioxane	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Trichloroethene (TCE)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
2,2,4-Trimethylpentane	17.0		5	3.27	13.8		5	3.38	0.50
Heptane	105		5	3.27	98.9		5	3.38	0.50
cis-1,3-Dichloropropene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
4-Methyl-2-pentanone (MiBK)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
trans-1,3-Dichloropropene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1,2-Trichloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Toluene	7.73		5	3.27	8.58		5	3.38	0.50
2-Hexanone (MBK)	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Dibromochloromethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,2-Dibromoethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Tetrachloroethene (PCE)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Chlorobenzene	80.6		5	3.27	84.1		5	3.38	0.50
Ethylbenzene	4.19		5	3.27	6.14		5	3.38	0.50
m & p-Xylene	8.12		5	6.55	11.0		5	6.75	1.00
Bromoform	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
Styrene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,1,2,2-Tetrachloroethane	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
o-Xylene	8.25		5	3.27	9.59		5	3.38	0.50
4-Ethyltoluene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,3,5-Trimethylbenzene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,2,4-Trimethylbenzene	4.32		5	3.27	5.40		5	3.38	0.50
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,3-Dichlorobenzene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
1,4-Dichlorobenzene	36.9		5	3.27	39.0		5	3.38	0.50
1,2-Dichlorobenzene	4.26		5	3.27	4.59		5	3.38	0.50
1,2,4-Trichlorobenzene	<SRL	U	5	6.55	<SRL	U	5	6.75	1.00
Hexachlorobutadiene	<SRL	U	5	3.27	<SRL	U	5	3.38	0.50
BFB-Surrogate Std. % Recovery		95%				97%			70-130%

U - Compound was not detected at or above the SRL.

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Laboratory Analysis Report

CLIENT : Best Environmental
PROJECT NO : 221529
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UNITS : PPB (v/v)

DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R3			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	221529-33753				
Date Sampled	07/15/2022				
Date Analyzed	07/20/2022				
Can Dilution Factor	1.37				
Compound	Result	Qualifier	Analysis DF		
Chlorodifluoromethane	142		5	3.41	0.50
Propene	202		5	6.83	1.00
Dichlorodifluoromethane	98.2		5	3.41	0.50
Chloromethane	<SRL	U	5	3.41	0.50
Dichlorotetrafluoroethane	67.0		5	3.41	0.50
Vinyl Chloride	7.37		5	3.41	0.50
Methanol	8.74	J	5	34.1	5.00
1,3-Butadiene	<SRL	U	5	3.41	0.50
Bromomethane	<SRL	U	5	3.41	0.50
Chloroethane	<SRL	U	5	3.41	0.50
Dichlorofluoromethane	4.51		5	3.41	0.50
Ethanol	<SRL	U	5	13.7	2.00
Vinyl Bromide	<SRL	U	5	3.41	0.50
Acetone	<SRL	U	5	13.7	2.00
Trichlorofluoromethane	<SRL	U	5	3.41	0.50
2-Propanol (IPA)	<SRL	U	5	13.7	2.00
Acrylonitrile	<SRL	U	5	6.83	1.00
1,1-Dichloroethene	<SRL	U	5	3.41	0.50
Methylene Chloride (DCM)	<SRL	U	5	6.83	1.00
Allyl Chloride	<SRL	U	5	6.83	1.00
Carbon Disulfide	10.7		5	6.83	1.00
Trichlorotrifluoroethane	<SRL	U	5	3.41	0.50
trans-1,2-Dichloroethene	<SRL	U	5	3.41	0.50
1,1-Dichloroethane	<SRL	U	5	3.41	0.50
Methyl Tert Butyl Ether (MTBE)	<SRL	U	5	3.41	0.50
Vinyl Acetate	<SRL	U	5	6.83	1.00
2-Butanone (MEK)	<SRL	U	5	6.83	1.00
cis-1,2-Dichloroethene	3.89		5	3.41	0.50
Hexane	261		5	3.41	0.50
Chloroform	<SRL	U	5	3.41	0.50
Ethyl Acetate	<SRL	U	5	3.41	0.50
Tetrahydrofuran	<SRL	U	5	3.41	0.50
1,2-Dichloroethane	<SRL	U	5	3.41	0.50
1,1,1-Trichloroethane	<SRL	U	5	3.41	0.50
Benzene	32.5		5	3.41	0.50

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Laboratory Analysis Report

CLIENT : Best Environmental
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DATE RECEIVED : 07/20/2022
DATE REPORTED : 08/03/2022
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA TO-15

Client ID	LFG R3			Sample Reporting Limit (SRL) (MRLxDF's)	Method Reporting Limit (MRL)
AAC ID	221529-33753				
Date Sampled	07/15/2022				
Date Analyzed	07/20/2022				
Can Dilution Factor	1.37				
Compound	Result	Qualifier	Analysis DF		
Carbon Tetrachloride	<SRL	U	5	3.41	0.50
Cyclohexane	42.4		5	3.41	0.50
1,2-Dichloropropane	<SRL	U	5	3.41	0.50
Bromodichloromethane	<SRL	U	5	3.41	0.50
1,4-Dioxane	<SRL	U	5	6.83	1.00
Trichloroethene (TCE)	<SRL	U	5	3.41	0.50
2,2,4-Trimethylpentane	13.9		5	3.41	0.50
Heptane	99.8		5	3.41	0.50
cis-1,3-Dichloropropene	<SRL	U	5	3.41	0.50
4-Methyl-2-pentanone (MiBK)	<SRL	U	5	3.41	0.50
trans-1,3-Dichloropropene	<SRL	U	5	3.41	0.50
1,1,2-Trichloroethane	<SRL	U	5	3.41	0.50
Toluene	7.71		5	3.41	0.50
2-Hexanone (MBK)	<SRL	U	5	6.83	1.00
Dibromochloromethane	<SRL	U	5	3.41	0.50
1,2-Dibromoethane	<SRL	U	5	3.41	0.50
Tetrachloroethene (PCE)	<SRL	U	5	3.41	0.50
Chlorobenzene	81.9		5	3.41	0.50
Ethylbenzene	4.57		5	3.41	0.50
m & p-Xylene	8.60		5	6.83	1.00
Bromoform	<SRL	U	5	3.41	0.50
Styrene	<SRL	U	5	3.41	0.50
1,1,2,2-Tetrachloroethane	<SRL	U	5	3.41	0.50
o-Xylene	8.74		5	3.41	0.50
4-Ethyltoluene	<SRL	U	5	3.41	0.50
1,3,5-Trimethylbenzene	<SRL	U	5	3.41	0.50
1,2,4-Trimethylbenzene	4.51		5	3.41	0.50
Benzyl Chloride (a-Chlorotoluene)	<SRL	U	5	3.41	0.50
1,3-Dichlorobenzene	<SRL	U	5	3.41	0.50
1,4-Dichlorobenzene	38.8		5	3.41	0.50
1,2-Dichlorobenzene	4.51		5	3.41	0.50
1,2,4-Trichlorobenzene	<SRL	U	5	6.83	1.00
Hexachlorobutadiene	<SRL	U	5	3.41	0.50
BFB-Surrogate Std. % Recovery		97%			70-130%

U - Compound was not detected at or above the SRL.

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022
MATRIX : High Purity N_2
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : MSI-070822-02
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Continuing Calibration Verification of the 07/11/2022 Calibration

Analyte Compounds	*Source*[1]	*CCV*[2]	*% Recovery*[3]
4-BFB (surrogate standard)	10.00	9.39	94
Chlorodifluoromethane	10.50	11.29	108
Propene	10.60	11.58	109
Dichlorodifluoromethane	10.40	11.15	107
Dimethyl Ether	10.80	10.21	95
Chloromethane	10.40	10.23	98
Dichlorotetrafluoroethane	10.30	10.75	104
Vinyl Chloride	10.50	10.37	99
Acetaldehyde	22.50	25.87	115
Methanol	20.10	16.73	83
1,3-Butadiene	10.60	10.21	96
Bromomethane	10.40	10.37	100
Chloroethane	10.30	9.77	95
Dichlorofluoromethane	10.50	10.15	97
Ethanol	11.20	10.31	92
Vinyl Bromide	10.50	9.76	93
Acrolein	11.10	10.31	93
Acetone	10.60	10.58	100
Trichlorofluoromethane	10.50	10.71	102
2-Propanol (IPA)	11.00	11.33	103
Acrylonitrile	11.40	10.90	96
1,1-Dichloroethene	10.40	10.27	99
Methylene Chloride (DCM)	10.50	10.15	97
TertButanol (TBA)	11.30	10.56	93
Allyl Chloride	10.40	10.80	104
Carbon Disulfide	10.50	10.26	98
Trichlorotrifluoroethane	10.40	10.07	97
trans-1,2-Dichloroethene	10.60	10.98	104
1,1-Dichloroethane	10.50	11.60	110
Methyl Tert Butyl Ether (MTBE)	10.50	10.55	100
Vinyl Acetate	11.00	12.34	112
2-Butanone (MEK)	10.60	11.02	104
cis-1,2-Dichloroethene	10.50	10.86	103
Hexane	10.70	11.29	106
Chloroform	10.60	10.86	102
Ethyl Acetate	10.60	11.52	109
Tetrahydrofuran	10.20	10.24	100
1,2-Dichloroethane	10.50	10.81	103
1,1,1-Trichloroethane	10.40	10.57	102
Benzene	10.60	10.23	97
Carbon Tetrachloride	10.20	9.72	95
Cyclohexane	10.50	10.04	96

Analyte Compounds (Continued)	*Source*[1]	*CCV*[2]	*% Recovery*[3]
1,2-Dichloropropane	10.50	10.76	102
Bromodichloromethane	10.40	10.45	100
1,4-Dioxane	10.40	10.34	99
Trichloroethene (TCE)	10.40	10.34	99
2,2,4-Trimethylpentane	10.40	10.27	99
Methyl Methacrylate	11.00	11.11	101
Heptane	10.50	10.47	100
cis-1,3-Dichloropropene	10.40	10.36	100
4-Methyl-2-pentanone (MiBK)	10.40	10.48	101
trans-1,3-Dichloropropene	10.50	10.45	100
1,1,2-Trichloroethane	10.50	10.49	100
Toluene	10.60	10.15	96
2-Hexanone (MBK)	10.50	11.19	107
Dibromochloromethane	10.30	10.25	100
1,2-Dibromoethane	10.60	10.71	101
Tetrachloroethene (PCE)	10.40	9.83	95
Chlorobenzene	10.60	10.44	98
Ethylbenzene	10.50	10.76	102
m & p-Xylene	21.00	21.87	104
Bromoform	10.50	10.63	101
Styrene	10.50	10.82	103
1,1,2,2-Tetrachloroethane	10.50	11.69	111
o-Xylene	10.50	10.82	103
1,2,3-Trichloropropane	10.40	10.71	103
Isopropylbenzene (Cumene)	10.40	10.81	104
α-Pinene	11.40	9.97	87
2-Chlorotoluene	10.40	10.22	98
n-Propylbenzene	10.50	10.70	102
4-Ethyltoluene	10.30	11.22	109
1,3,5-Trimethylbenzene	10.30	11.08	108
β-Pinene	11.30	8.28	73
1,2,4-Trimethylbenzene	10.30	11.08	108
Benzyl Chloride (a-Chlorotoluene)	10.40	11.78	113
1,3-Dichlorobenzene	10.40	11.53	111
1,4-Dichlorobenzene	10.30	11.26	109
Sec-ButylBenzene	10.40	11.03	106
1,2-Dichlorobenzene	10.60	11.51	109
n-ButylBenzene	10.40	11.11	107
1,2-Dibromo-3-Chloropropane	10.40	11.00	106
1,2,4-Trichlorobenzene	11.00	11.42	104
Naphthalene	11.50	10.46	91
Hexachlorobutadiene	11.00	11.06	101

[1] Concentration of analyte compound in certified source standard.

[2] Measured result from daily Continuing Calibration Verification (CCV).

[3] The acceptable range for analyte recovery is 100±30%.

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022
MATRIX : High Purity N_2
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
CALIBRATION STD ID : MS1-070822-02
ANALYST : MB/DL

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Laboratory Control Spike Analysis

System Monitoring Compounds	*Sample Concentration*	*Spike Added*	*LCS[1] Recovery*	*LCSD[1] Recovery*	*LCS[1] % Recovery[2]*	*LCSD[1] % Recovery[2]*	*RPD[3]*
4-BFB (surrogate standard)	0.0	9.80	9.39	9.47	95.8	96.6	0.8
1,1-Dichloroethene	0.0	10.40	10.27	10.07	99	97	2.0
Methylene Chloride (DCM)	0.0	10.50	10.15	10.21	97	97	0.6
Benzene	0.0	10.60	10.23	10.65	97	100	4.0
Trichloroethene (TCE)	0.0	10.40	10.34	10.37	99	100	0.3
Toluene	0.0	10.60	10.15	10.09	96	95	0.6
Tetrachloroethene (PCE)	0.0	10.40	9.83	10.11	95	97	2.8
Chlorobenzene	0.0	10.60	10.44	10.28	98	97	1.5
Ethylbenzene	0.0	10.50	10.76	10.84	102	103	0.7
m & p-Xylene	0.0	21.00	21.87	21.96	104	105	0.4
o-Xylene	0.0	10.50	10.82	10.89	103	104	0.6

[1] Laboratory Control Spike (LCS) / Laboratory Control Spike Duplicate (LCSD)

[2] The acceptable range for analyte recovery is 100±30%.

[3] Relative Percent Difference (RPD) between LCS recovery and LCSD recovery (acceptable range is <25%).

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022 | **INSTRUMENT ID : GC/MS-02**
MATRIX : High Purity He or N_2 | **ANALYST : MB/DL**
UNITS : PPB (v/v)

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Method Blank Analysis

Analyte Compounds	*MB 072022*	*Reporting Limit (RL)*
4-BFB (surrogate standard)	83%	100±30%
Chlorodifluoromethane	<RL	0.5
Propene	<RL	1.0
Dichlorodifluoromethane	<RL	0.5
Dimethyl Ether	<RL	0.5
Chloromethane	<RL	0.5
Dichlorotetrafluoroethane	<RL	0.5
Vinyl Chloride	<RL	0.5
Acetaldehyde	<RL	5.0
Methanol	<RL	5.0
1,3-Butadiene	<RL	0.5
Bromomethane	<RL	0.5
Chloroethane	<RL	0.5
Dichlorofluoromethane	<RL	0.5
Ethanol	<RL	2.0
Vinyl Bromide	<RL	0.5
Acrolein	<RL	1.0
Acetone	<RL	2.0
Trichlorofluoromethane	<RL	0.5
2-Propanol (IPA)	<RL	2.0
Acrylonitrile	<RL	1.0
1,1-Dichloroethene	<RL	0.5
Methylene Chloride (DCM)	<RL	1.0
TertButanol (TBA)	<RL	0.5
Allyl Chloride	<RL	1.0
Carbon Disulfide	<RL	1.0
Trichlorotrifluoroethane	<RL	0.5
trans-1,2-Dichloroethene	<RL	0.5
1,1-Dichloroethane	<RL	0.5
Methyl Tert Butyl Ether (MTBE)	<RL	0.5
Vinyl Acetate	<RL	1.0
2-Butanone (MEK)	<RL	1.0
cis-1,2-Dichloroethene	<RL	0.5
Hexane	<RL	0.5
Chloroform	<RL	0.5
Ethyl Acetate	<RL	0.5
Tetrahydrofuran	<RL	0.5
1,2-Dichloroethane	<RL	0.5
1,1,1-Trichloroethane	<RL	0.5
Benzene	<RL	0.5
Carbon Tetrachloride	<RL	0.5
Cyclohexane	<RL	0.5

Analyte Compounds (Continued)	*MB 072022*	*Reporting Limit (RL)*
1,2-Dichloropropane	<RL	0.5
Bromodichloromethane	<RL	0.5
1,4-Dioxane	<RL	1.0
Trichloroethene (TCE)	<RL	0.5
2,2,4-Trimethylpentane	<RL	0.5
Methyl Methacrylate	<RL	0.5
Heptane	<RL	0.5
cis-1,3-Dichloropropene	<RL	0.5
4-Methyl-2-pentanone (MiBK)	<RL	0.5
trans-1,3-Dichloropropene	<RL	0.5
1,1,2-Trichloroethane	<RL	0.5
Toluene	<RL	0.5
2-Hexanone (MBK)	<RL	1.0
Dibromochloromethane	<RL	0.5
1,2-Dibromoethane	<RL	0.5
Tetrachloroethene (PCE)	<RL	0.5
Chlorobenzene	<RL	0.5
Ethylbenzene	<RL	0.5
m & p-Xylene	<RL	1.0
Bromoform	<RL	0.5
Styrene	<RL	0.5
1,1,2,2-Tetrachloroethane	<RL	0.5
o-Xylene	<RL	0.5
1,2,3-Trichloropropane	<RL	0.5
Isopropylbenzene (Cumene)	<RL	0.5
α-Pinene	<RL	0.5
2-Chlorotoluene	<RL	0.5
n-Propylbenzene	<RL	0.5
4-Ethyltoluene	<RL	0.5
1,3,5-Trimethylbenzene	<RL	0.5
β-Pinene	<RL	0.5
1,2,4-Trimethylbenzene	<RL	0.5
Benzyl Chloride (a-Chlorotoluene)	<RL	0.5
1,3-Dichlorobenzene	<RL	0.5
1,4-Dichlorobenzene	<RL	0.5
Sec-ButylBenzene	<RL	0.5
1,2-Dichlorobenzene	<RL	0.5
n-ButylBenzene	<RL	0.5
1,2-Dibromo-3-Chloropropane	<RL	0.5
1,2,4-Trichlorobenzene	<RL	1.0
Naphthalene	<RL	1.0
Hexachlorobutadiene	<RL	0.5

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QUALITY CONTROL / QUALITY ASSURANCE REPORT

ANALYSIS DATE : 07/20/2022
MATRIX : Air
UNITS : PPB (v/v)

INSTRUMENT ID : GC/MS-02
ANALYST : MB/DL
DILUTION FACTOR[1] : x1.95

VOLATILE ORGANIC COMPOUNDS BY EPA METHOD TO-15

Duplicate Analysis of AAC Sample ID: 221499-33593

Analyte Compounds	*Sample*	*Duplicate*	*RPD*[2]
4-BFB (surrogate standard)	8.50	8.75	2.9
Chlorodifluoromethane	<SRL	<SRL	*NA*
Propene	<SRL	<SRL	*NA*
Dichlorodifluoromethane	<SRL	<SRL	*NA*
Dimethyl Ether	<SRL	<SRL	*NA*
Chloromethane	<SRL	<SRL	*NA*
Dichlorotetrafluoroethane	<SRL	<SRL	*NA*
Vinyl Chloride	<SRL	<SRL	*NA*
Acetaldehyde	42.1	39.4	6.6
Methanol	12.2	11.9	2.1
1,3-Butadiene	<SRL	<SRL	*NA*
Bromomethane	<SRL	<SRL	*NA*
Chloroethane	<SRL	<SRL	*NA*
Dichlorofluoromethane	<SRL	<SRL	*NA*
Ethanol	6.32	6.11	3.5
Vinyl Bromide	<SRL	<SRL	*NA*
Acrolein	<SRL	<SRL	*NA*
Acetone	9.11	8.84	3.0
Trichlorofluoromethane	<SRL	<SRL	*NA*
2-Propanol (IPA)	<SRL	<SRL	*NA*
Acrylonitrile	<SRL	<SRL	*NA*
1,1-Dichloroethene	<SRL	<SRL	*NA*
Methylene Chloride (DCM)	<SRL	<SRL	*NA*
TertButanol (TBA)	10.3	10.2	0.6
Allyl Chloride	<SRL	<SRL	*NA*
Carbon Disulfide	4.20	4.14	1.4
Trichlorotrifluoroethane	<SRL	<SRL	*NA*
trans-1,2-Dichloroethene	<SRL	<SRL	*NA*
1,1-Dichloroethane	<SRL	<SRL	*NA*
Methyl Tert Butyl Ether (MTBE)	<SRL	<SRL	*NA*
Vinyl Acetate	<SRL	<SRL	*NA*
2-Butanone (MEK)	<SRL	<SRL	*NA*
cis-1,2-Dichloroethene	<SRL	<SRL	*NA*
Hexane	<SRL	<SRL	*NA*
Chloroform	<SRL	<SRL	*NA*
Ethyl Acetate	<SRL	<SRL	*NA*
Tetrahydrofuran	<SRL	<SRL	*NA*
1,2-Dichloroethane	<SRL	<SRL	*NA*
1,1,1-Trichloroethane	<SRL	<SRL	*NA*
Benzene	1.01	<SRL	*NA*
Carbon Tetrachloride	<SRL	<SRL	*NA*
Cyclohexane	<SRL	<SRL	*NA*

Analyte Compounds (Continued)	*Sample*	*Duplicate*	*RPD*[2]
1,2-Dichloropropane	<SRL	<SRL	*NA*
Bromodichloromethane	<SRL	<SRL	*NA*
1,4-Dioxane	<SRL	<SRL	*NA*
Trichloroethene (TCE)	<SRL	<SRL	*NA*
2,2,4-Trimethylpentane	<SRL	<SRL	*NA*
Methyl Methacrylate	<SRL	<SRL	*NA*
Heptane	<SRL	<SRL	*NA*
cis-1,3-Dichloropropene	<SRL	<SRL	*NA*
4-Methyl-2-pentanone (MiBK)	<SRL	<SRL	*NA*
trans-1,3-Dichloropropene	<SRL	<SRL	*NA*
1,1,2-Trichloroethane	<SRL	<SRL	*NA*
Toluene	1.46	1.17	22.2
2-Hexanone (MBK)	<SRL	<SRL	*NA*
Dibromochloromethane	<SRL	<SRL	*NA*
1,2-Dibromoethane	<SRL	<SRL	*NA*
Tetrachloroethene (PCE)	<SRL	<SRL	*NA*
Chlorobenzene	<SRL	<SRL	*NA*
Ethylbenzene	<SRL	<SRL	*NA*
m & p-Xylene	<SRL	<SRL	*NA*
Bromoform	<SRL	<SRL	*NA*
Styrene	<SRL	<SRL	*NA*
1,1,2,2-Tetrachloroethane	<SRL	<SRL	*NA*
o-Xylene	<SRL	<SRL	*NA*
1,2,3-Trichloropropane	<SRL	<SRL	*NA*
Isopropylbenzene (Cumene)	<SRL	<SRL	*NA*
α-Pinene	<SRL	<SRL	*NA*
2-Chlorotoluene	<SRL	<SRL	*NA*
n-Propylbenzene	<SRL	<SRL	*NA*
4-Ethyltoluene	<SRL	<SRL	*NA*
1,3,5-Trimethylbenzene	<SRL	<SRL	*NA*
β-Pinene	<SRL	<SRL	*NA*
1,2,4-Trimethylbenzene	<SRL	<SRL	*NA*
Benzyl Chloride (a-Chlorotoluene)	<SRL	<SRL	*NA*
1,3-Dichlorobenzene	<SRL	<SRL	*NA*
1,4-Dichlorobenzene	<SRL	<SRL	*NA*
Sec-ButylBenzene	<SRL	<SRL	*NA*
1,2-Dichlorobenzene	<SRL	<SRL	*NA*
n-ButylBenzene	<SRL	<SRL	*NA*
1,2-Dibromo-3-Chloropropane	<SRL	<SRL	*NA*
1,2,4-Trichlorobenzene	<SRL	<SRL	*NA*
Naphthalene	<SRL	<SRL	*NA*
Hexachlorobutadiene	<SRL	<SRL	*NA*

[1] Dilution factor is the product of the Canister Dilution Factor and the Analysis Dilution Factor.

[2] Relative Percent Difference (RPD) between Sample analysis and Duplicate analysis (acceptable range is <25%).

SRL - Sample Reporting Limit (minimum)

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22154 9

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B-25

Project ID: City Berkeley Flare SAMPLE CHAIN OF CUSTODY BE PROJECT MANAGER: B Johnston

Analyical Lab: Atc

#	DATE	TIME	SAMPLE ID Run#/Method/Fraction/Source	CONTAINER size / type	Volume	Storage Temp °F	Method	ANALYSIS
1	7-15-22	930	LFG R1 33751	Can			TO 15	TO 15
2	↓	1017	R2 33752	↓				↓
3	↓	1105	R3 33753	↓				
4								
5								All cans 30" → 0"
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								

ord & Report all liquid sample volumes.

esults to: Attn: BEST ENVIRONMENTAL 339 STEALTH COURT, LIVERMORE CA. 94551

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: _____ Received by: _____ Date: _____ Time: _____

Relinquished by: Bell Received by: _____ Date: 7/20/22 Time: 0979

SAMPLE CONDITION AS RECEIVED: OK or not OK

Ex 4 cans (1 void)

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APPENDIX C
FIELD DATA SHEETS

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	**Berkeley Landfill**	**Run #:**	**CEC**	**Date:**	**07/15/22**
Location:	**Flare**	**Barometric:**	**29.90**	**Leak ✔ :**	***OK***
Observers:		**Personnel:**	**BA**	**Strat.✔ :**	***OK***
Expected Run Time =	**30 min**	**Std. Temp:**	**60**		

Cylinder #s:

Analyte		**O2**		**NOx**	**CO**	**THC**				
Analyzer		CAI 110P		CAI 600	TECO 48i	CAI 300				
Range		20.98		95.30	89.40	100.00				
Span Value		11.59		45.30	54.50	43.50				
	Time									**Comments:**
	8:26	-0.08		0.00	0.17					
	8:27	-0.09		0.00	0.03					***Unit #***
	8:28	**-0.10**		**0.00**	**0.03**					
	8:29	18.24		0.00	50.28					
	8:30	20.98		0.00	87.46					***Operating Conditions***
	8:31	20.98		0.00	89.51					
	8:32	**20.98**		0.00	**89.60**					
	8:33	12.66		0.00	37.81					***Fuel***
	8:34	11.53		0.00	-0.59					
	8:35	**11.52**		0.00	-0.65					
	8:36	3.86		0.08	21.34					
	8:37	-0.13		0.00	54.66					
	8:38	-0.14		0.00	54.55					
	8:39	-0.14		0.00	**54.51**					
	8:40	-0.12		69.98	21.66					
	8:41	-0.15		94.88	-0.31					
	8:42	-0.15		95.10	-0.31					
	8:43	-0.15		**95.14**	-0.31					
	8:44	-0.11		55.01	-0.23					
	8:45	-0.15		45.59	-0.31					
	8:46	-0.16		45.59	-0.31					
	8:47	-0.16		**45.56**	-0.31					
	8:48	-0.01		13.32	-0.32					
	8:49	-0.05		5.42	-0.35					
	8:50	-0.06		5.40	-0.33					
	8:51	-0.06		**5.39**	-0.35					NOx Converter
	8:52					0.59				
	8:53					-0.31				
	8:54					**-0.69**				
	8:55					45.50				
	8:56					94.74				
	8:57					93.60				
	8:58					93.87				
	8:59					**93.96**				
	9:00					57.96				
	9:01					46.37				
	9:02					44.11				
	9:03					**44.39**				
	9:04					27.38				
	9:05					27.00				
	9:06					26.65				
	9:07					**26.41**				

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	Berkeley Landfill	**Run #:**	1	**Date:**	07/15/22
Location:	Flare	**Barometric:**	29.90	**Leak ✔ :**	*OK*
Observers:		**Personnel:**	BA	**Strat.✔ :**	*OK*
Expected Run Time =	30 min	**Std. Temp:**	60		

Cylinder #s:

Analyte		O2		NOx	CO	THC				
Analyzer		CAI 110P		CAI 600	TECO 48i	CAI 300H				
Range		20.98		95.30	89.40	100				
Span Value		11.59		45.30	54.50	43.50				
	Time									Comments:
	9:26	13.23		9.89	5.15	7.40				
	9:27	13.23		9.81	12.58	7.04				*Unit #*
	9:28	13.37		9.63	12.24	6.74				
	9:29	13.36		9.65	15.99	6.53				
	9:30	13.26		9.77	11.90	6.29				*Operating Conditions*
	9:31	13.45		9.49	15.18	6.17				
	9:32	13.23		9.80	13.79	5.97				
	9:33	13.34		9.64	25.68	5.80				*Fuel*
	9:34	13.63		9.25	25.77	5.74				
	9:35	13.52		9.43	21.36	5.56				
	9:36	13.64		9.22	14.14	5.50				
	9:37	13.22		9.82	12.84	5.27				
	9:38	13.47		9.48	12.65	5.22				
	9:39	13.28		9.66	10.51	5.15				
	9:40	13.38		9.60	9.07	5.09				Port Change
	9:46	13.96		8.60	23.29	6.13				
	9:47	13.39		9.37	25.66	5.31				
	9:48	13.37		9.49	16.68	4.90				
	9:49	13.36		9.49	11.70	4.70				
	9:50	13.58		9.24	11.30	4.63				
	9:51	13.44		9.44	15.51	4.53				
	9:52	13.61		9.24	15.00	4.41				
	9:53	13.41		9.40	20.44	4.33				
	9:54	13.63		9.25	7.64	4.32				
	9:55	13.40		9.49	6.05	4.20				
	9:56	13.33		9.61	15.23	4.06				
	9:57	13.43		9.49	24.44	4.04				
	9:58	13.40		9.51	23.49	3.97				
	9:59	13.61		9.29	14.33	4.00				
	10:00	13.77		9.03	22.91	4.03				
ZERO I	*9:11*	*-0.08*		*0.00*	*-0.74*	*0.73*				
SPAN I	*9:16*	*11.56*		*45.27*	*54.09*	*44.07*				
Average		*13.44*		*9.47*	*15.75*	*5.23*				
ZERO f	*10:05*	*-0.17*		*0.01*	*-0.85*	*-0.74*				
SPAN f	*10:10*	*11.54*		*45.02*	*53.62*	*42.46*				
Zero Drift %		*-0.4%*		*0.0%*	*-0.1%*	*-1.5%*				
Span Drift %		*-0.1%*		*-0.3%*	*-0.5%*	*-1.6%*				
Corr. Avg.		*13.47*		*9.50*	*16.50*	*5.27*				

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

Zero Drift % = 100 * (Zf - Zi)/Intrument Range

Span Drift % = 100 * (Sf - Si)/Instrument Range

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	**Berkeley Landfill**	**Run #:**	**2**	**Date:**	**07/15/22**
Location:	**Flare**	**Barometric:**	**29.90**	**Leak ✔ :**	***OK***
Observers:		**Personnel:**	**BA**	**Strat.✔ :**	***OK***
Expected Run Time =	**30 min**	**Std. Temp:**	**60**		

Cylinder #s:

Analyte		**O2**		**NOx**	**CO**	**THC**				
Analyzer		CAI 110P		CAI 600	TECO 48	CAI 300H				
Range		20.98		95.30	89.40	100				
Span Value		11.59		45.30	54.50	43.50				
Time										**Comments:**
	10:14	13.68		9.27	19.00	9.22				
	10:15	13.66		9.25	31.24	8.73				***Unit #***
	10:16	13.80		9.08	23.16	8.39				
	10:17	13.62		9.31	18.39	8.06				
	10:18	13.41		9.56	14.48	7.80				***Operating Conditions***
	10:19	13.39		9.63	13.74	7.58				
	10:20	13.64		9.34	18.01	7.48				
	10:21	13.41		9.66	15.18	7.30				***Fuel***
	10:22	13.51		9.56	11.57	7.28				
	10:23	13.58		9.42	19.79	7.09				
	10:24	13.62		9.26	33.40	7.05				
	10:25	13.70		9.15	50.84	7.02				
	10:26	13.58		9.32	41.03	6.91				
	10:27	13.36		9.61	19.33	6.89				
	10:28	13.38		9.58	9.61	6.85				Port Change
	10:32	13.35		9.62	9.58	8.16				
	10:33	13.44		9.53	11.12	7.65				
	10:34	13.36		9.59	14.55	7.42				
	10:35	13.38		9.58	11.23	7.28				
	10:36	13.39		9.57	12.47	7.17				
	10:37	13.46		9.51	15.01	7.08				
	10:38	13.50		9.46	17.82	7.02				
	10:39	13.39		9.59	16.93	6.91				
	10:40	13.44		9.52	17.92	6.88				
	10:41	13.42		9.52	20.13	6.85				
	10:42	13.37		9.59	14.58	6.85				
	10:43	13.33		9.62	16.12	6.79				
	10:44	13.42		9.55	18.22	6.75				
	10:45	13.44		9.49	22.99	6.72				
	10:46	13.49		9.38	32.62	6.74				
ZERO I	*10:05*	***-0.17***		***0.01***	***-0.85***	***-0.74***				
SPAN I	*10:10*	***11.54***		***45.02***	***53.62***	***42.46***				
Average		***13.48***		***9.47***	***19.67***	***7.33***				
ZERO f	*10:52*	***-0.17***		***0.00***	***-0.97***	***1.24***				
SPAN f	*10:57*	***11.56***		***44.96***	***53.29***	***42.55***				
Zero Drift %		***0.0%***		***0.0%***	***-0.1%***	***2.0%***				
Span Drift %		***0.1%***		***-0.1%***	***-0.4%***	***0.1%***				
Corr. Avg.		***13.51***		***9.53***	***20.63***	***7.29***				

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

Zero Drift % = 100 * (Zf - Zi)/Intrument Range

Span Drift % = 100 * (Sf - Si)/Instrument Range

DAS CONTINUOUS EMISSIONS MONITORING DATA SHEET

Facility:	Berkeley Landfill	**Run #:**	3	**Date:**	07/15/22
Location:	Flare	**Barometric:**	29.90	**Leak ✔ :**	*OK*
Observers:		**Personnel:**	BA	**Strat.✔ :**	*OK*
Expected Run Time =	30 min	**Std. Temp:**	60		
Cylinder #s:					

Analyte		O2		NOx	CO	THC				
Analyzer		CAI 110P		CAI 600	TECO 48i	CAI 300H				
Range		20.98		95.30	89.40	100				
Span Value		11.59		45.30	54.50	43.50				
Time										Comments:
	11:01	13.35		9.51	18.32	8.57				
	11:02	13.55		9.28	31.24	8.18				*Unit #*
	11:03	13.50		9.36	25.61	7.88				
	11:04	13.48		9.36	39.97	7.66				
	11:05	13.48		9.35	34.70	7.46				*Operating Conditions*
	11:06	13.46		9.41	33.43	7.28				
	11:07	13.79		9.00	28.11	7.24				
	11:08	13.61		9.11	36.40	7.15				*Fuel*
	11:09	13.76		9.03	31.23	7.08				
	11:10	13.35		9.50	16.56	6.93				
	11:11	13.47		9.41	19.70	6.87				
	11:12	13.66		9.13	21.08	6.87				
	11:13	13.61		9.12	38.54	6.84				
	11:14	13.48		9.33	42.32	6.80				
	11:15	13.67		9.13	31.92	6.79				Port Change
	11:20	13.78		8.94	38.33	6.84				
	11:21	13.62		9.12	34.06	6.76				
	11:22	13.73		9.00	47.28	6.82				
	11:23	13.55		9.21	37.95	6.69				
	11:24	13.60		9.19	33.99	6.63				
	11:25	13.66		9.06	44.51	6.68				
	11:26	13.74		8.93	54.70	6.69				
	11:27	13.80		8.92	47.37	6.65				
	11:28	13.66		9.06	41.13	6.62				
	11:29	13.64		9.15	41.21	6.57				
	11:30	13.56		9.26	30.02	6.52				
	11:31	13.54		9.29	32.82	6.46				
	11:32	13.56		9.23	46.69	6.46				
	11:33	13.55		9.29	39.72	6.37				
	11:34	13.55		9.34	26.28	6.36				
ZERO I	*10:52*	*-0.17*		*0.00*	*-0.97*	*1.24*				
SPAN I	*10:57*	*11.56*		*44.96*	*53.29*	*42.55*				
Average		*13.59*		*9.20*	*34.84*	*6.96*				
ZERO f	*11:40*	*-0.18*		*0.00*	*-1.01*	*0.83*				
SPAN f	*11:46*	*11.56*		*45.05*	*53.08*	*43.24*				
Zero Drift %		*-0.1%*		*0.0%*	*0.0%*	*-0.4%*				
Span Drift %		*0.0%*		*0.1%*	*-0.2%*	*0.7%*				
Corr. Avg.		*13.60*		*9.26*	*36.04*	*6.16*				

Corrected Average = [Test Avg. - ((Zi+Zf) / 2)] * Span Gas Value / [((Si+Sf) / 2)-((Zi+Zf) / 2)]

Zero Drift % = 100 * (Zf - Zi)/Intrument Range

Span Drift % = 100 * (Sf - Si)/Instrument Range

BEST ENVIRONMENTAL

CEMS CALIBRATION SHEET

Facility: City Berkley Date: 7-15-2- Personnel: BS+BA

Location: Flare Barometric Pressure: 29.9

	O_2		NOx	CO	THC		Comments
Analyzer	CAI 110		CAI 60V	Teco 48.	CAI 300		
Range	20.98		95.3	89.4	100		
Cal Value (low)					26.88		
Cyl. #					DT27824		
Expiration					5-27-29		
Cal Value (mid)	11.59		45.3	54.5	43.5		
Cyl. #	CC508881		DT37052	CC707372	DT42922		
Expiration	10-1-27		11-18-23	2-15-27	6-21-30		NO2
Cal Value (Hi)	20.98		95.3	89.4	92.1		5.979
Cyl #	CC306150		CC308849	CC306150	CC506583		CC503193
Expiration	11-22-29		10-2-27	11-22-29	3-16-29		1-6-24

	Start	Stop
Run 1	926	1001
Run 2	1014	1047
Run 3	1101	1135

Flow ~~Temp~~	Temp ~~Flow~~	Can ID	
66	1551	504	Traverse
67	1554	24	↓
66	1552	153	

Leak Check: 0 Heated Line Temp (F): ~250

Calculations

% Linearity (Limit ± 2%) = 100 * Span Value - Internal cal / Span Range

Zero and Calibration Drift = 100 x (Cfb - Cib) / range

Cbcal = (Cib + Cfb) / 2 for cal gas

APPENDIX D
CALIBRATION GAS CERTIFICATES

PRAXAIR
Making our planet more productive

DocNumber: 405533

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 03/11/2021
Praxair Order Number: 36989506
Part Number: EV AIPR30ME-AS
Customer PO Number: 6

Fill Date: 02/25/2021
Lot Number: 70086105605
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	03/10/2029	NIST Traceable
Cylinder Number:	CC506583	Expanded Uncertainty
30.7 ppm	Propane	± 0.1 ppm
Balance	Air	

Certification Information:

Certification Date: 03/10/2021 *Term:* 96 Months *Expiration Date:* 03/10/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Propane**

Requested Concentration: 30 ppm
Certified Concentration: 30.7 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 03/05/2021

Reference Standard: Type / Cylinder #: GMIS / CC302220
Concentration / Uncertainty: 50.68 ppm ±0.13 ppm
Expiration Date: 07/06/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1667b / 83-J-17 / CAL017783
SRM Concentration (enter with units) / Uncertainty: 48.83 ppm / ±0.11 ppm
SRM Expiration Date: 08/17/2017

First Analysis Data:						Date	03/10/2021
Z: 0	R: 136.8	C: 82.9				Conc:	30.7
R: 136.8	Z: 0	C: 82.8				Conc:	30.7
Z: 0	C: 82.8	R: 136.9				Conc:	30.7
UOM: ppm				Mean Test Assay:		30.7	ppm

Second Analysis Data:						Date	
Z: 0	R: 0	C: 0				Conc:	0
R: 0	Z: 0	C: 0				Conc:	0
Z: 0	C: 0	R: 0				Conc:	0
UOM: ppm				Mean Test Assay:			ppm

Analyzed By Jose Vasquez

Certified By Amalia Real

CH4
92.1 ppm

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DocNumber: 477448

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22022

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 06/24/2022
Linde Order Number: 67255744
Part Number: EV AIPR15ME-AS
Customer PO Number: 43

Fill Date: 06/14/2022
Lot Number: 70086216502
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	06/21/2030	NIST Traceable
Cylinder Number:	EB0018485	Expanded Uncertainty
14.5 ppm	Propane	± 0.1 ppm
Balance	Air	

Certification Information: Certification Date: 06/21/2022 Term: 96 Months Expiration Date: 06/21/2030

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. Component: Propane

Requested Concentration: 15 ppm
Certified Concentration: 14.5 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 06/06/2022

First Analysis Data:						Date	06/21/2022
Z:	0	R:	150.7	C:	43.3	Conc:	14.5
R:	151.7	Z:	0	C:	43.5	Conc:	14.6
Z:	0	C:	43.5	R:	151.6	Conc:	14.6
UOM:	ppm			Mean Test Assay:		14.5	ppm

Reference Standard: Type / Cylinder #: GMIS / CC302220
Concentration / Uncertainty: 50.68 ppm ±0.13 ppm
Expiration Date: 07/06/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1667b / 83-J-17 / CAL017783
SRM Concentration / Uncertainty: 48.83 ppm / ±0.11 ppm
SRM Expiration Date: 08/17/2017

Second Analysis Data:						Date	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			ppm

Analyzed By: Courtney Zielke

Certified By: Henry Koung

43.5 ppm CI

PRAXAIR
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DocNumber: 411093

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

TESLA INC
47700 KATO RD
FREMONT CA 94538

Certificate Issuance Date: 05/27/2021
Praxair Order Number: 42827444
Part Number: AI PR9ME-AS
Customer PO Number: 4900225193

Fill Date: 05/20/2021
Lot Number: 70086114010
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	05/27/2029	NIST Traceable
Cylinder Number:	DT0027824	Expanded Uncertainty
8.96 ppm	Propane	± 0.04 ppm
Balance	Air	

Certification Information:

Certification Date: 05/27/2021 *Term:* 96 Months *Expiration Date:* 05/27/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Propane**

Requested Concentration: 9 ppm
Certified Concentration: 8.96 ppm
Instrument Used: Horiba FIA-510, 851135122
Analytical Method: FID Total Hydrocarbon Analyzer
Last Multipoint Calibration: 05/05/2021

Reference Standard: Type / Cylinder #: GMIS / CC130474
Concentration / Uncertainty: 9.952 ppm ±0.035 ppm
Expiration Date: 10/16/2023
Traceable to: SRM # / Sample # / Cylinder #: SRM 1666b / 84-K-35 / FF10676
SRM Concentration (enter with units) / Uncertainty: 9.888 ppm / ±0.032 ppm
SRM Expiration Date: 10/05/2019

First Analysis Data:						Date	05/27/2021
Z: 0	R: 12.44	C: 11.21				Conc:	8.96
R: 12.44	Z: 0	C: 11.22				Conc:	8.97
Z: 0	C: 11.2	R: 12.46				Conc:	8.96
UOM: ppm			Mean Test Assay:				8.96 ppm

Second Analysis Data:						Date	
Z: 0	R: 0	C: 0				Conc:	0
R: 0	Z: 0	C: 0				Conc:	0
Z: 0	C: 0	R: 0				Conc:	0
UOM: ppm			Mean Test Assay:				ppm

Analyzed By Jose Vasquez

Certified By Amalia Real

26.88 ppm
CH4

PRAXAIR
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DocNumber: 270077

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 10/03/2019
Praxair Order Number: 86375369
Part Number: NI NO95ME-AS
Customer PO Number: 9014

Fill Date: 09/17/2019
Lot Number: 70086926008
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	10/02/2027	NIST Traceable
Cylinder Number:	CC308849	Expanded Uncertainty
95.0 ppm	Nitric oxide	± 0.5 %
Balance	Nitrogen	

For Reference Only: *NOx 95.3 ppm*

Certification Information: *Certification Date:* 10/02/2019 *Term:* 96 Months *Expiration Date:* 10/02/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.
Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. *Component:* Nitric oxide

Requested Concentration: 95 ppm
Certified Concentration: 95.0 ppm
Instrument Used: Thermo Electron 42I S/N 0726024326
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 09/09/2019

Reference Standard: Type / Cylinder #: GMIS / CC703030
Concentration / Uncertainty: 96.9 ppm ±0.52%
Expiration Date: 05/20/2027
Traceable to: SRM # / Sample # / Cylinder #: 1684b / 44-T-89 / FF9260
SRM Concentration / Uncertainty: 99.75 PPM / 0.5 PPM
SRM Expiration Date: 01/26/2020

First Analysis Data:						Date	09/26/2019
Z:	0	R:	96.9	C:	95.2	Conc:	95.2
R:	96.9	Z:	0	C:	95.4	Conc:	95.4
Z:	0	C:	95.4	R:	96.9	Conc:	95.4
UOM:	ppm			Mean Test Assay:		95.3	ppm

Second Analysis Data:						Date	10/02/2019
Z:	0	R:	96.9	C:	94.5	Conc:	94.5
R:	96.9	Z:	0	C:	94.6	Conc:	94.6
Z:	0	C:	94.6	R:	96.9	Conc:	94.6
UOM:	ppm			Mean Test Assay:		94.6	ppm

Analyzed By: Quinn Hailes

Certified By: Amalia Real

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DocNumber: 317670

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22020

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 11/18/2020
Praxair Order Number: 27982553
Part Number: NI NO45ME-AS
Customer PO Number: 9099

Fill Date: 11/04/2020
Lot Number: 70086030909
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	**11/18/2023**	NIST Traceable
Cylinder Number:	**DT0037052**	Expanded Uncertainty
45.1 ppm	**Nitric oxide**	**± 0.2 ppm**
Balance	**Nitrogen**	

For Reference Only: *NOx 45.3 ppm*

Certification Information: *Certification Date:* 11/18/2020 *Term:* 36 Months *Expiration Date:* 11/18/2023

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Nitric oxide**

Requested Concentration: 45 ppm
Certified Concentration: 45.1 ppm
Instrument Used: Thermo Electron 42i-LS S/N 1030645077
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 11/11/2020

Reference Standard: Type / Cylinder #: GMIS / CC324044
Concentration / Uncertainty: 50.02 ppm ±0.21 ppm
Expiration Date: 04/27/2028
Traceable to: SRM # / Sample # / Cylinder #: APEX1324323 / N/A / APEX1324323
SRM Concentration / Uncertainty: 50.04 PPM / ±0.20 PPM
SRM Expiration Date: 12/09/2022

First Analysis Data:								**Date**	11/11/2020
Z:	0	R:	50	C:	45	Conc:	45		
R:	50	Z:	0	C:	45.1	Conc:	45.1		
Z:	0	C:	45.1	R:	49.9	Conc:	45.1		
UOM:	ppm					**Mean Test Assay:**		45.1	ppm

Second Analysis Data:								**Date**	11/18/2020
Z:	0	R:	50	C:	45	Conc:	45.1		
R:	49.9	Z:	0	C:	44.9	Conc:	45		
Z:	0	C:	44.9	R:	49.9	Conc:	45		
UOM:	ppm					**Mean Test Assay:**		45	ppm

Analyzed By **Henry Koung**

Certified By **Leeanna Flores**

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
11711 S. Alameda Street
Los Angeles, CA 90059
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15WC004	Reference Number:	48-401989410-1
Cylinder Number:	CC503193	Cylinder Volume:	144.0 CF
Laboratory:	124 - Los Angeles (SAP) - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32021	Valve Outlet:	660
Gas Code:	NO2,BALN	Certification Date:	Jan 06, 2021

Expiration Date: Jan 06, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	6.000 PPM	5.979 PPM	G1	+/- 2.1% NIST Traceable	12/28/2020, 01/06/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	401206803104	CC511311	9.690 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.1%	May 02, 2022
PRM	12386	D685025	9.91 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 20, 2020

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR NO2 018335821	FTIR	Jan 06, 2021

Triad Data Available Upon Request

Approved for Release

D-7

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DocNumber: 442525

Linde Gas & Equipment Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22021

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 11/22/2021
Linde Order Number: 56224584
Part Number: NI CD19CO10E-AS
Customer PO Number: 27

Fill Date: 11/01/2021
Lot Number: 70086130505
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 156 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date: 11/22/2029		NIST Traceable
Cylinder Number: CC306150		Expanded Uncertainty
18.98 %	Carbon dioxide	± 0.06 %
89.4 ppm	Carbon monoxide	± 0.4 ppm
20.98 %	Oxygen	± 0.03 %
Balance	Nitrogen	

Certification Information:

Certification Date: 11/22/2021 *Term:* 96 Months *Expiration Date:* 11/22/2029

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Uncertainty above is expressed as absolute expanded uncertainty at a level of confidence of approximately 95% with a coverage factor k = 2. Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference. CO responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. *Component:* Carbon dioxide

Requested Concentration: 19 %
Certified Concentration: 18.98 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 11/19/2021

First Analysis Data:					Date 11/22/2021
Z: 0	R: 19.34	C: 18.98	Conc: 18.98		
R: 19.34	Z: 0	C: 18.99	Conc: 18.99		
Z: 0	C: 18.99	R: 19.35	Conc: 18.99		
UOM: %		Mean Test Assay:	18.98 %		

Reference Standard: Type / Cylinder #: NTRM / CC726055
Concentration / Uncertainty: 19.34 % ±0.03 %
Expiration Date: 01/12/2027
Traceable to: SRM # / Sample # / Cylinder #: NTRM / 190701 / CC725973
SRM Concentration / Uncertainty: 19.34% / ±0.031%
SRM Expiration Date: 01/12/2027

Second Analysis Data:					Date
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: %		Mean Test Assay:	%		

2. *Component:* Carbon monoxide

Requested Concentration: 90 ppm
Certified Concentration: 89.4 ppm
Instrument Used: Horiba VIA-510 S/N 576876015
Analytical Method: NDIR
Last Multipoint Calibration: 10/22/2021

First Analysis Data:					Date 11/22/2021
Z: 0	R: 98.1	C: 89.4	Conc: 89.4		
R: 98.1	Z: 0	C: 89.5	Conc: 89.5		
Z: 0	C: 89.5	R: 98.2	Conc: 89.5		
UOM: ppm		Mean Test Assay:	89.4 ppm		

Reference Standard: Type / Cylinder #: GMIS / DT0019705
Concentration / Uncertainty: 98.1 ppm ±0.4 ppm
Expiration Date: 01/23/2028
Traceable to: SRM # / Sample # / Cylinder #: SRM 1679c / 3-I-45 / FF28593
SRM Concentration / Uncertainty: 98.40 ppm / ±0.40 ppm
SRM Expiration Date: 01/28/2020

Second Analysis Data:					Date
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: ppm		Mean Test Assay:	ppm		

3. *Component:* Oxygen

Requested Concentration: 21 %
Certified Concentration: 20.98 %
Instrument Used: Siemens Oxymat 6E S/N 7MB20211AA000CA1
Analytical Method: Paramagnetic
Last Multipoint Calibration: 11/12/2021

First Analysis Data:					Date 11/22/2021
Z: 0	R: 20.9	C: 20.98	Conc: 20.98		
R: 20.9	Z: 0	C: 20.99	Conc: 20.99		
Z: 0	C: 20.99	R: 20.91	Conc: 20.99		
UOM: %		Mean Test Assay:	20.98 %		

Reference Standard: Type / Cylinder #: GMIS / ND29287
Concentration / Uncertainty: 20.90 % ±0.02 %
Expiration Date: 09/01/2028
Traceable to: SRM # / Sample # / Cylinder #: SRM 2659a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
SRM Expiration Date: 08/23/2021

Second Analysis Data:					Date
Z: 0	R: 0	C: 0	Conc: 0		
R: 0	Z: 0	C: 0	Conc: 0		
Z: 0	C: 0	R: 0	Conc: 0		
UOM: %		Mean Test Assay:	%		

Analyzed By: Jose Vasquez

Certified By: Nelson Ma

PRAXAIR
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DocNumber: 270196

Praxair Distribution, Inc.
5700 S. Alameda Street
Los Angeles CA 90058
Tel: 323-585-2154
Fax: 714-542-6689
PGVP ID: F22019

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information

BEST ENVIRONMENTAL SERVICES
339 STEALTH CT
LIVERMORE CA 94551

Certificate Issuance Date: 10/01/2019
Praxair Order Number: 86601158
Part Number: NI CD6.25O5E-AS
Customer PO Number: 9017

Fill Date: 09/26/2019
Lot Number: 70086927001
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure and Volume: 2000 psig 140 ft3

Certified Concentration

ProSpec EZ Cert

Expiration Date:	10/01/2027	NIST Traceable
Cylinder Number:	CC50881	Expanded Uncertainty
6.23 %	Carbon dioxide	± 0.3 %
11.59 %	Oxygen	± 0.2 %
Balance	Nitrogen	

Certification Information:

Certification Date: 10/01/2019 *Term:* 96 Months *Expiration Date:* 10/01/2027

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1.

Do Not Use this Standard if Pressure is less than 100 PSIG.

CO2 responses have been corrected for Oxygen IR Broadening effect. O2 responses have been corrected for CO2 interference.

Analytical Data:

(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)

1. ***Component:*** **Carbon dioxide**

Requested Concentration: 6.25 %
Certified Concentration: 6.23 %
Instrument Used: Horiba VIA-510 S/N 20C194WK
Analytical Method: NDIR
Last Multipoint Calibration: 09/18/2019

Reference Standard: Type / Cylinder #: GMIS / CC243646
Concentration / Uncertainty: 6.91 % ±0.208%
Expiration Date: 06/07/2026
Traceable to: SRM # / Sample # / Cylinder #: SRM 1674b / 7-H-07 / FF10631
SRM Concentration / Uncertainty: 6.944% / ±0.013%
SRM Expiration Date: 06/17/2019

First Analysis Data:							Date	10/01/2019
Z:	0	R:	6.91	C:	6.23	Conc:	6.23	
R:	6.91	Z:	0	C:	6.23	Conc:	6.23	
Z:	0	C:	6.23	R:	6.91	Conc:	6.23	
UOM:	%			Mean Test Assay:		6.23	%	

Second Analysis Data:							Date	
Z:	0	R:	0	C:	0	Conc:	0	
R:	0	Z:	0	C:	0	Conc:	0	
Z:	0	C:	0	R:	0	Conc:	0	
UOM:	%			Mean Test Assay:			%	

2. ***Component:*** **Oxygen**

Requested Concentration: 11.5 %
Certified Concentration: 11.59 %
Instrument Used: OXYMAT 5E
Analytical Method: Paramagnetic
Last Multipoint Calibration: 09/18/2019

Reference Standard: Type / Cylinder #: GMIS / SGAL2761
Concentration / Uncertainty: 14.98 % ±0.119%
Expiration Date: 07/19/2026
Traceable to: SRM # / Sample # / Cylinder #: 2659a / 71-E-19 / FF22331
SRM Concentration / Uncertainty: 20.863% / ±0.021%
SRM Expiration Date: 08/23/2021

First Analysis Data:							Date	10/01/2019
Z:	0	R:	14.98	C:	11.6	Conc:	11.59	
R:	15	Z:	0	C:	11.6	Conc:	11.59	
Z:	0	C:	11.58	R:	14.98	Conc:	11.57	
UOM:	%			Mean Test Assay:		11.59	%	

Second Analysis Data:							Date	
Z:	0	R:	0	C:	0	Conc:	0	
R:	0	Z:	0	C:	0	Conc:	0	
Z:	0	C:	0	R:	0	Conc:	0	
UOM:	%			Mean Test Assay:			%	

Analyzed By Jenna Leckman

Certified By Jose Vasquez

APPENDIX E
PROCESS DATA

City of Berkely Flare
Process Data

	Flow		Flare Temp				
	Min	Max	Min	Max			
926	65.20	65.67	1303	1311	**Run 1**		
927	65.30	65.83	1486	1490			
928	65.33	65.83	1564	1565			
929	65.20	65.77	1591	1591			
930	65.27	65.93	1576	1577			
931	65.33	65.90	1567	1567			
932	65.23	65.80	1571	1571			
933	65.37	65.93	1578	1578			
934	65.27	65.80	1565	1566			
935	65.23	65.77	1554	1554			
936	65.17	65.87	1554	1554			
937	65.20	65.83	1556	1557			
938	65.30	65.93	1555	1555			
939	65.37	65.87	1557	1557			
940	65.37	65.80	1561	1561			
941	65.37	65.77	1565	1565			
942	65.27	65.70	1562	1563			
943	65.33	65.77	1558	1558			
944	65.47	65.93	1553	1553			
945	65.03	65.77	1553	1553			
946	65.33	66.07	1552	1552			
947	65.30	65.83	1553	1553			
948	65.43	65.87	1556	1556			
949	65.30	65.87	1561	1561			
950	65.17	65.80	1560	1560			
951	65.30	65.80	1554	1554			
952	65.27	65.97	1553	1554			
953	65.10	65.67	1553	1553			
954	65.30	65.83	1553	1553			
955	65.30	65.93	1550	1550			
956	65.30	65.83	1553	1553			
957	65.40	65.93	1553	1553			
958	65.23	65.80	1553	1553			
959	65.23	65.87	1552	1552			
1000	65.33	65.80	1556	1556	**Stop**		
1001	65.37	65.83	1559	1560	**Avg**	**65.56**	**1550**
1002	65.50	66.10	1557	1557			
1003	65.37	65.80	1556	1556			
1004	65.43	65.83	1556	1556			
1005	65.37	65.80	1558	1558			
1006	65.30	65.90	1555	1556			
1007	65.43	65.87	1555	1555			
1008	65.23	65.97	1555	1555			
1009	65.40	65.87	1554	1554			
1010	65.43	65.90	1553	1553			
1011	65.27	65.93	1547	1547			
1012	65.40	65.80	1554	1554			
1013	65.30	65.77	1554	1555			
1014	65.20	65.93	1553	1553	**Run 2**		
1015	65.20	65.73	1550	1551			
1016	65.33	65.87	1548	1548			
1017	65.17	65.77	1558	1558			
1018	65.43	66.10	1564	1564			
1019	65.40	65.90	1560	1561			
1020	65.30	65.87	1557	1557			
1021	65.37	66.00	1558	1558			

City of Berkely Flare
Process Data

	Flow		Flare Temp				
	Min	Max	Min	Max			
1022	65.50	66.10	1557	1558			
1023	65.43	65.87	1560	1560			
1024	65.37	65.97	1557	1557			
1025	65.67	65.90	1551	1551			
1026	65.43	65.93	1551	1551			
1027	65.17	65.87	1555	1555			
1028	65.40	65.80	1558	1558			
1029	65.43	65.83	1559	1559			
1030	65.23	65.87	1551	1551			
1031	65.33	65.77	1548	1548			
1032	65.37	66.03	1552	1553			
1033	65.37	65.83	1556	1557			
1034	65.23	65.90	1558	1558			
1035	65.30	65.77	1557	1557			
1036	65.17	65.77	1559	1560			
1037	65.23	65.77	1555	1555			
1038	65.13	65.60	1542	1543			
1039	65.43	65.83	1549	1549			
1040	65.40	65.83	1554	1554			
1041	65.30	66.03	1556	1557			
1042	65.33	65.80	1557	1557			
1043	65.17	65.70	1552	1553			
1044	65.43	65.90	1559	1559			
1045	65.37	65.73	1560	1560			
1046	65.17	65.73	1556	1556	**Stop**		
1047	65.27	65.93	1554	1555	**Avg**	**65.59**	**1555**
1048	65.17	65.73	1544	1544			
1049	65.27	65.87	1549	1549			
1050	65.43	65.87	1547	1548			
1051	65.27	65.87	1549	1549			
1052	65.13	65.73	1554	1554			
1053	65.33	65.93	1557	1557			
1054	65.30	65.87	1559	1559			
1055	65.27	65.83	1559	1559			
1056	65.27	65.70	1550	1550			
1057	65.37	65.90	1556	1556			
1058	65.37	65.77	1558	1558			
1059	65.33	65.93	1555	1556			
1100	65.37	65.80	1558	1558			
1101	65.30	65.83	1553	1553	**Run 3**		
1102	65.30	65.70	1555	1555			
1103	65.30	65.70	1555	1555			
1104	65.33	65.97	1550	1550			
1105	65.20	65.70	1549	1550			
1106	65.17	65.87	1558	1559			
1107	65.17	65.77	1563	1564			
1108	65.37	66.03	1554	1554			
1109	65.17	65.77	1548	1548			
1110	65.27	65.90	1546	1547			
1111	65.43	65.87	1555	1555			
1112	65.23	65.93	1562	1562			
1113	65.27	65.67	1556	1556			
1114	65.47	65.97	1552	1552			
1115	65.40	65.93	1558	1559			
1116	65.37	65.80	1554	1555			
1117	65.50	65.93	1557	1557			

City of Berkely Flare
Process Data

	Flow		Flare Temp				
	Min	**Max**	**Min**	**Max**			
1118	65.23	65.83	1554	1555			
1119	65.17	65.77	1549	1550			
1120	65.43	65.77	1544	1545			
1121	65.23	65.60	1558	1559			
1122	65.53	65.93	1557	1558			
1123	65.43	66.03	1554	1554			
1124	65.17	65.77	1557	1557			
1125	65.27	65.60	1559	1560			
1126	65.27	65.83	1548	1549			
1127	65.27	65.63	1550	1550			
1128	65.33	65.83	1554	1554			
1129	65.20	65.87	1558	1558			
1130	65.27	65.87	1561	1562			
1131	65.40	65.83	1538	1539			
1132	65.40	65.97	1544	1545			
1133	65.43	65.90	1555	1556			
1134	65.30	65.83	1565	1565	**Stop**		
					Avg	**65.57**	**1554**

Calibration Certificate

Telstar Instruments Inc
1717 Solano Way, Suite #34, Concord Ca
Tel 925-671-2888 - Fax 925-671-9507

TELSTAR INSTRUMENTS

Certificate	**CC-WO-202-01**
Calibration date	**5/16/2022**
Next calibration due	**5/16/2023**

Customer information

Company name	**SCS Field Services**
Address	**1100 Spinnaker Way Berkley**
Contact	**Mike Flanagan**

Location of calibration

Company name	**SCS Field Services**
Address	**1100 Spinnaker Way, Berkley**

Instrument information

Manufacturer	**Kurz**
Model	**454FTB-12-HT**
Serial	**FD35746A**
Tag	
Description	**Flare flow**

Received	In Tolerance
Returned	In Tolerance

Calibrated range	0	to	300	SCFM
User Specified Tolerance			3.00	%
Instrument Output	4	to	20	mA

Test standards used

This calibration certificate documents the traceability to national standards, which states the units of measurement according to the International System of Units (SI)

ID	Description	Serial number	Certificate	Due date
CAL210	**Fluke 725**	**1608092**	**185084**	**11/4/2022**

Procedure Used

☑ As Found = As Left

As Found

Cal. point(s)	Standard	Expected Output	UUT	Measured Output	Error	Output Error
1	**0**	**4.000**	**0**	**3.989**	**0.00**	**-0.07**
2	**50**	**6.667**	**50**	**6.722**	**0.00**	**0.35**
3						
4						
5						
6						
7						
8						
9						
10						
Units*	**SCFM**	**mA**	**SCFM**	**mA**	**%**	**%**

As Left

Standard	Expected Output	UUT	Measured Output	Error	Output Error
SCFM	**mA**	**SCFM**	**mA**	**%**	**%**

Error calculated as percent of span

Conformity

☐ **UUT conforms**

☑ **UUT does not conform**

☑ **INSTRUMENT RETURNED TO SERVICE (EXPLAIN IN REMARKS IF NOT)**

Remarks

Verified zero. Removed, cleaned and inspected. Sensor should be returned to OEM for factory wind tunnel calibration. Verified output corresponds to flow rate.

Service Engineer **Ben Marston** Date 5/16/2022

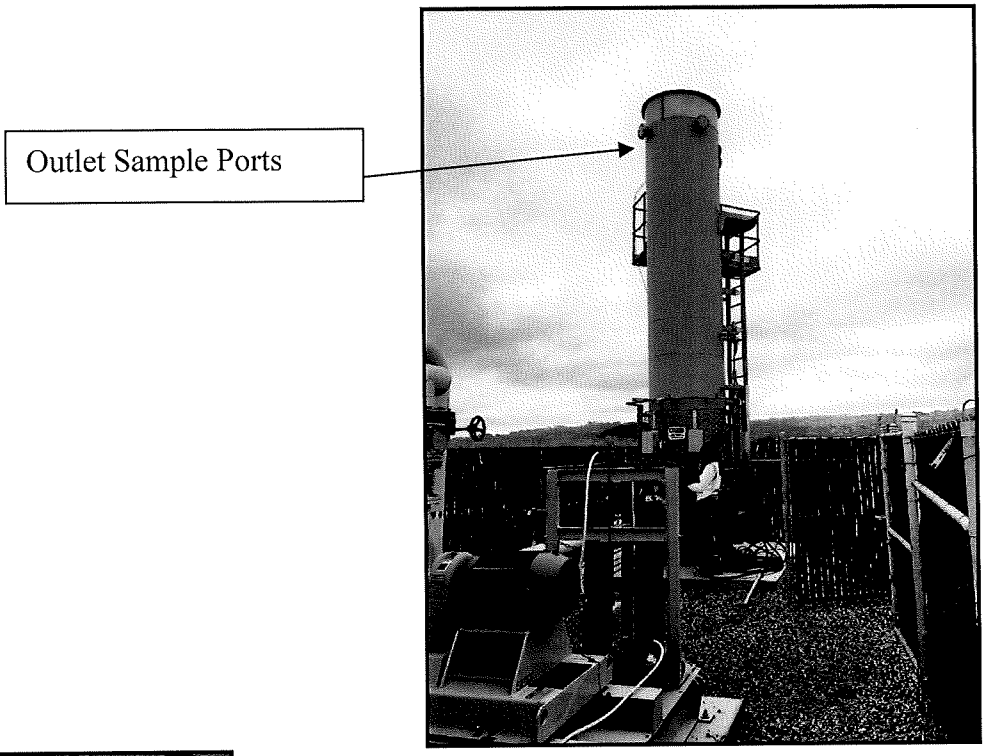
Signature *Ben Marston*

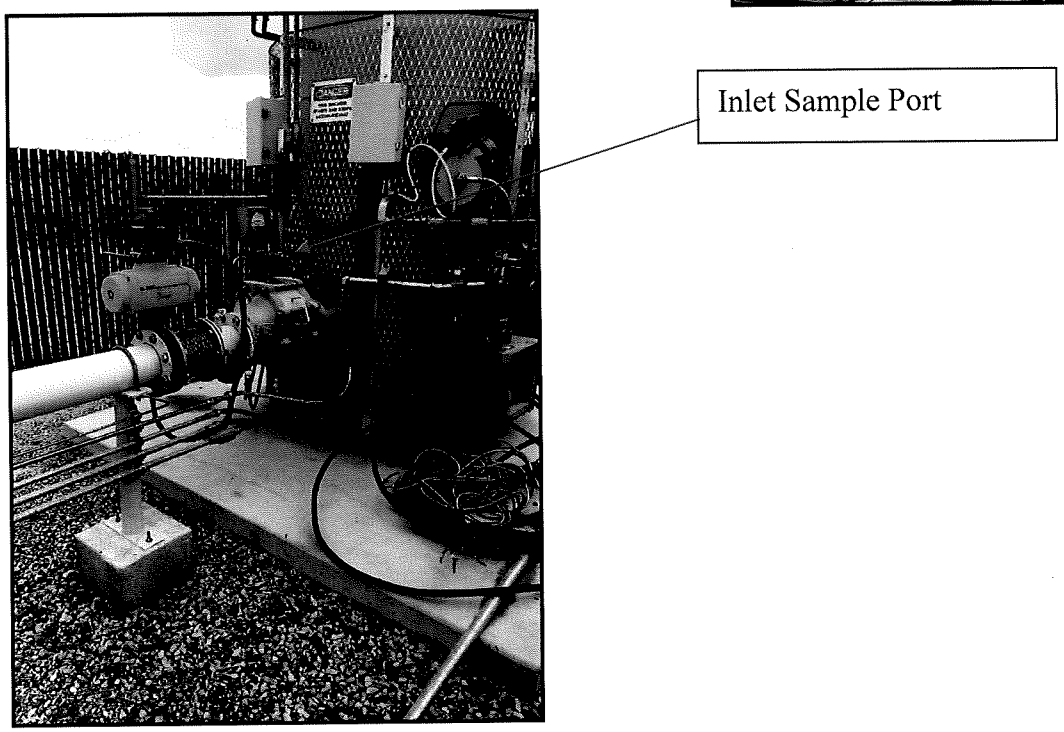
APPENDIX F
STACK DIAGRAMS

City of Berkeley

Berkeley, CA

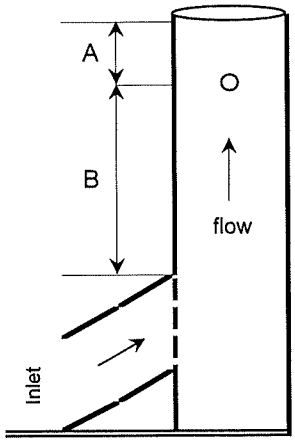
LFG Flare (A-4)





City Of Berkeley Landfill, Flare
TRAVERSE POINT LAYOUT (NON-PARTICULATE)
CIRCULAR STACKS OVER 24 INCHES

Stack diameter:	56.0	*inches*
Upstream diameter (A):	56.0	*inches*
Downstream diameter (B):	280.0	*inches*
Port length:	6.50	*inches*
Number of ports being used:	2	*see note*
Equivalent upstream diameter (A):	1.000	*Pass*
Equivalent downstream diameter (B):	5.000	*Pass*
All points at least 1.0" from stack wall:	1.792	*Pass*
Total points:	16	
Points per port:	8	

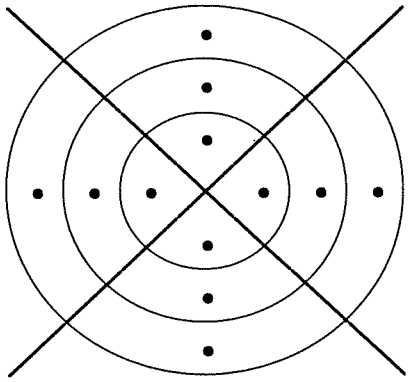


Typical vertical exhaust stack

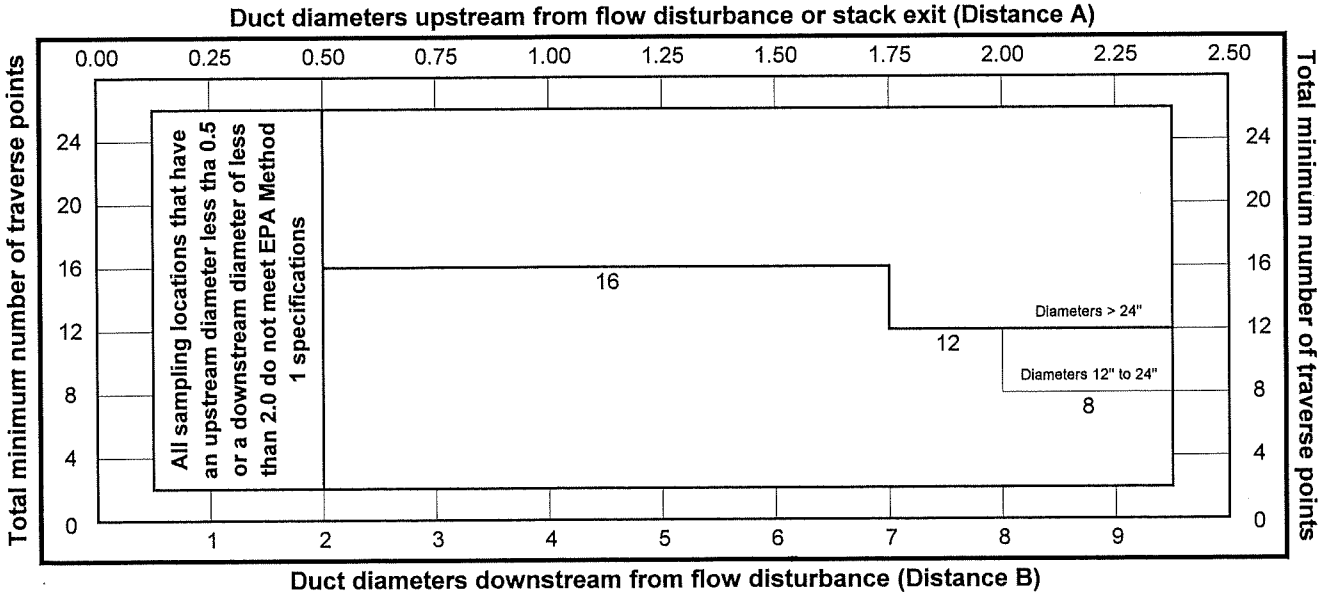
Point	% Diameter	Inside wall Distance (in)	Outside port Distance (in)
1	3.2	1.8	8.3
2	10.5	5.9	12.4
3	19.4	10.9	17.4
4	32.3	18.1	24.6
5	67.7	37.9	44.4
6	80.6	45.1	51.6
7	89.5	50.1	56.6
8	96.8	54.2	60.7
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A
N/A	#N/A	#N/A	#N/A

Note: No traverse point shall be within 1.0" of the stack walls (see Sections 11.3.1)

DUCT AREA = 17.104 ft^3



Example: Location of 12 points



APPENDIX G
SAMPLING SYSTEM DIAGRAMS

EPA METHOD 1

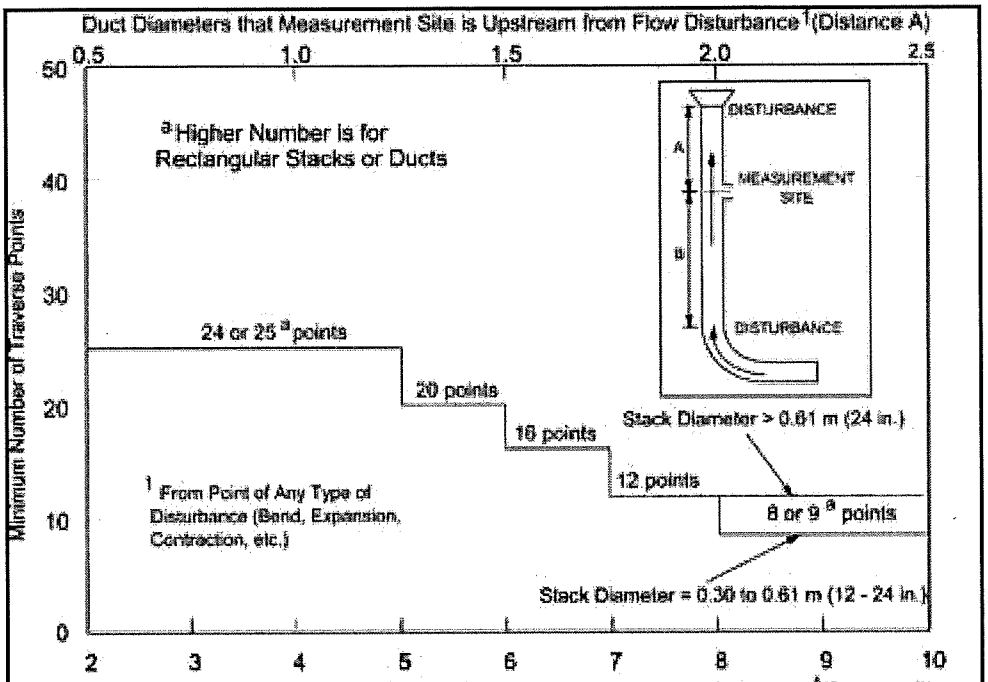


Figure 1-1. Minimum number of traverse points for particulate traverses

* * * * *

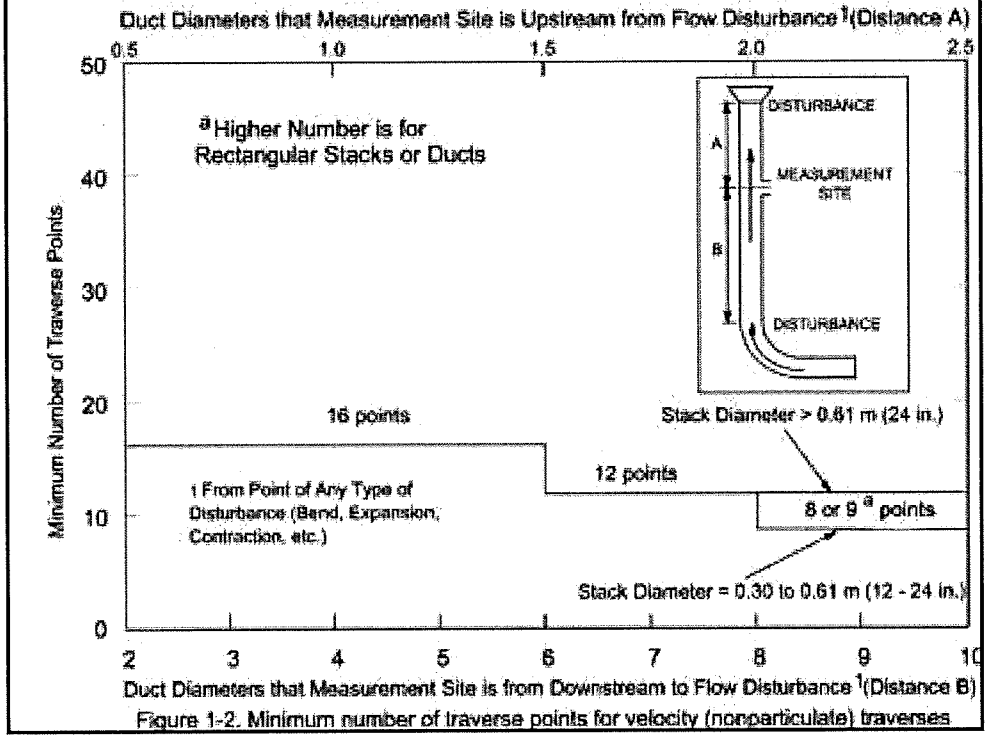


Figure 1-2. Minimum number of traverse points for velocity (nonparticulate) traverses

EPA METHOD 1

TABLE 1-1 CROSS-SECTION LAYOUT FOR RECTANGULAR STACKS

Number of tranverse points layout	Matrix
9	3×3
12	4×3
16	4×4
20	5×4
25	5×5
30	6×5
36	6×6
42	7×6
49	7×7

TABLE 1-2—LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[Percent of stack diameter from inside wall to traverse point]

Traverse point number on a diameter	Number of traverse points on a diameter											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.8	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	38.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.0	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

EPA METHOD 1

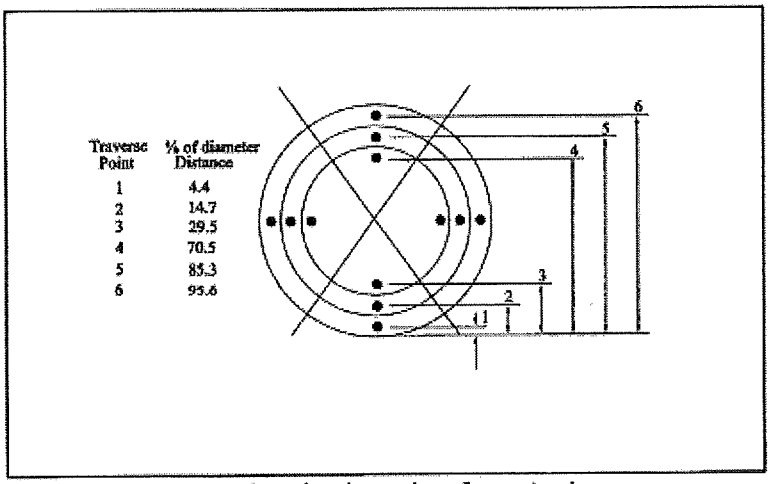


Figure 1-3. Example showing circular stack cross section divided into 12 equal areas, with location of traverse points.

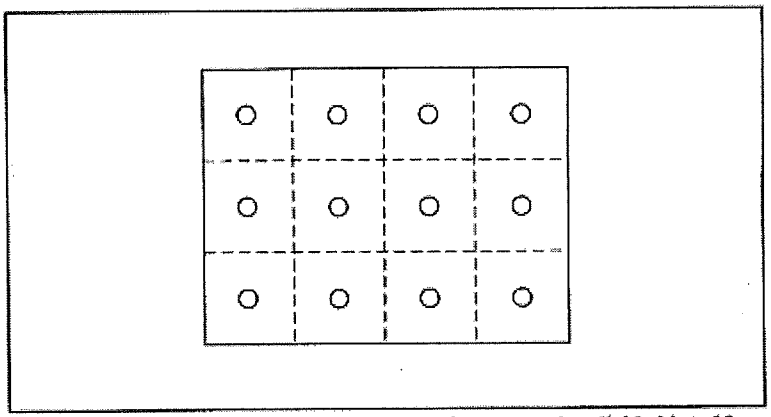
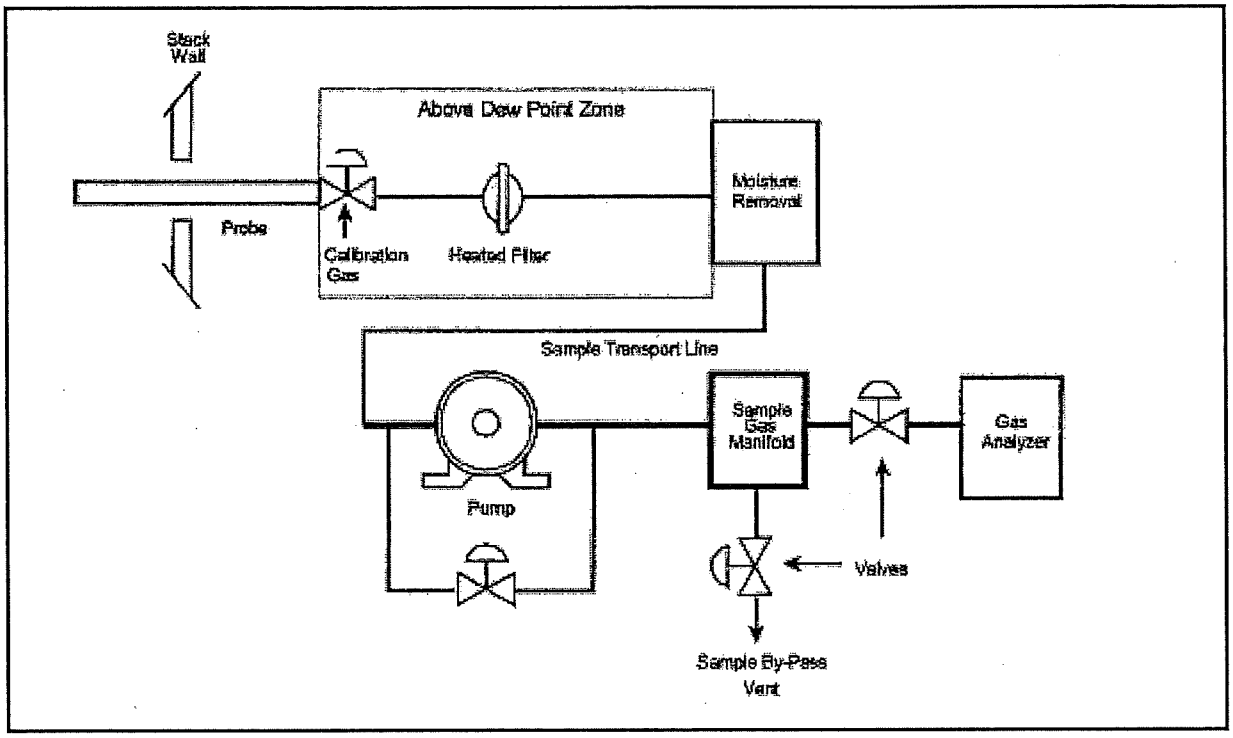


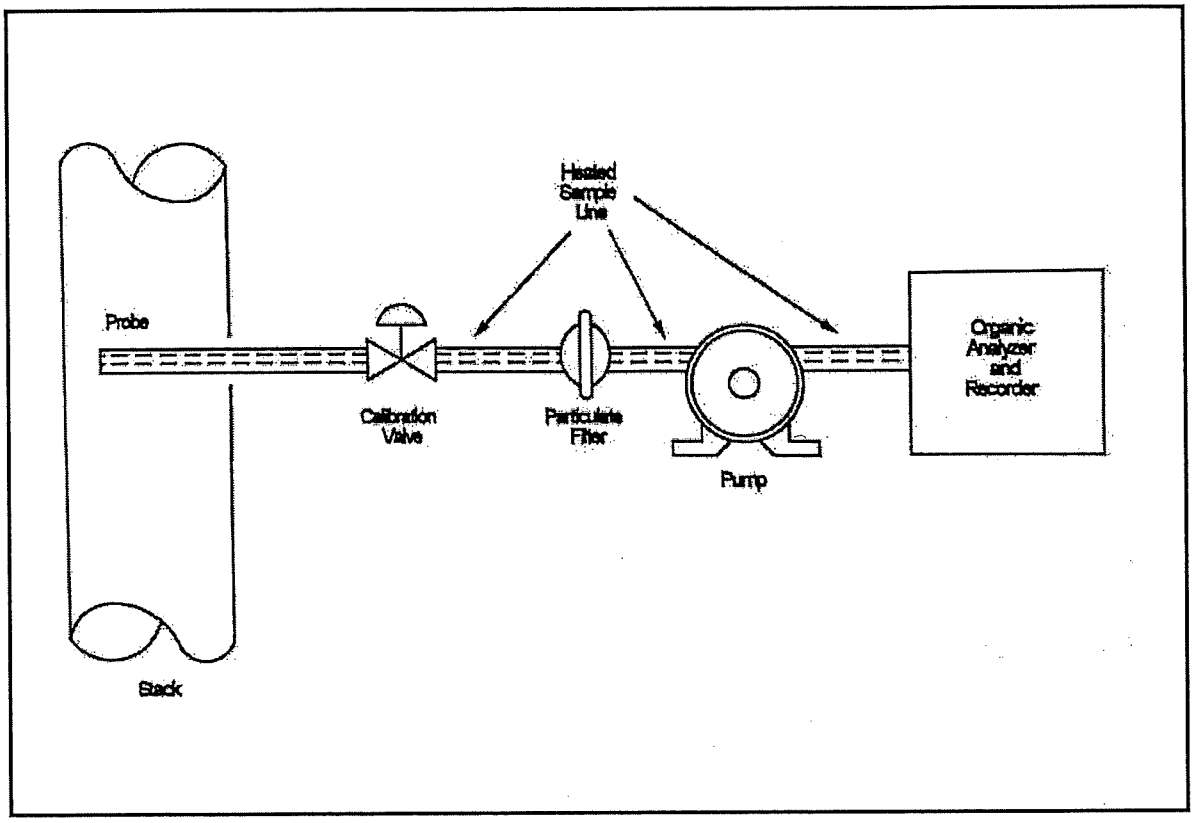
Figure 1-4. Example showing rectangular stack cross section divided into 12 equal areas, with traverse points at centroid of each area.

EPA Methods 3A, 6C, 7E & 10



CEM Sampling Train

EPA Method 25A



Organic Concentration Measurement System

APPENDIX H
SOURCE TEST PLAN

Bobby Asfour

From: Gloria Espena <GEspena@baaqmd.gov>
Sent: Thursday, June 30, 2022 11:14 AM
To: Bobby Asfour; Marco Hernandez
Cc: Harquail, Stephen
Subject: NST-7518: NST Request-City of Berkeley Marina Landfill
Attachments: Contractor ST Supplemental Form.docx

Follow Up Flag: Follow up
Flag Status: Flagged

NST-7518 has been assigned the pending 7/15/2022 work referenced below.

Also, we've introduced a new, supplemental form to be included when reports are submitted. It's just a sheet intended to help us with processing reports and prioritizing report review. The intention of the email is not to request additional testing. Please complete and submit the attached **"Contractor ST Supplemental Form"** with the final test report.

NST number(s) that are assigned for each source test notifications are for inner-office tracking purposes only, not an approval of the test plan. (For source testing methodologies please review permit conditions, BAAQMD Regulations and CFR, accordingly). Future notifications and report submittals should be made to **GEspena@baaqmd.gov** and **cc: MHernandez@baaqmd.gov.**

If you have other questions, please contact Marco Hernandez at mhernandez@baaqmd.gov.

Thank you,

Gloria M. Espena
Meteorology & Measurements
Source Test Section & Performance Evaluation Group
The Bay Area Air Quality Management District
375 Beale Street, Ste. 600 | San Francisco, CA 94105
Ofc (415) 749-4725 | Fax (510) 758-3087
gespena@baaqmd.gov | www.baaqmd.gov


Please Think Before You Print

From: Bobby Asfour <bobby@best-enviro.com>
Sent: Wednesday, June 29, 2022 2:55 PM
To: Gloria Espena <GEspena@baaqmd.gov>; Marco Hernandez <MHernandez@baaqmd.gov>
Cc: Harquail, Stephen <sharquail@scsengineers.com>
Subject: NST Request-City of Berkeley Marina Landfill

Hi Gloria,

Please accept this email as notification of source test for the above referenced facility.

Site Number: 3590
Plant Name: City of Berkeley-Marina Landfill, Cesar Chavez Park, 11 Spinnaker Way, Berkeley, CA 94710
Plant Contact: Stephen Harquail, SCS Field Services
Plant Contact Phone: (503) 867-2369, sharquail@scsengineers.com
Testing Company: Best Environmental
Testing Company Contact: Bobby Asfour
Testing Company Contact Phone: 925-455-9474 x 103, bobby@best-enviro.com
Purpose of Testing: Condition #1826 Annual Compliance
Source: A-4
Description: LFG Flare

Test Parameters & Methods:
Flare: Condition 1826
Outlet: NOx, CO, O2, CH4, NMOC, Flow
Inlet: Gas BTU, N2, O2, CO2, Total Reduced Sulfur, LFG speciation section 16/Flow Rate NMOC & CH4 DRE, Combustion zone Temperature, LFG Flow
Methods to be Used: Triplicate 30-minute runs for all samples/parameters:

Outlet: EPA 3A, 7E, 10, 18 , 19 & 25A

- stratification traverses
- Onsite NOx converter check

Inlet: ASTM D-1945/3588 & 6228, EPA Methods 18, 25C & TO-15

- Triplicate samples will be collected concurrently with outlet sampling.
- Appropriate sampling media containers will be used. (Multiple samples sample will be collected into various sampling media containers during each run to meet analytical/method/turnaround requirements)
- AAC lab will perform TO-15 and EPA Method 25C, BE will perform all other sample analysis.

Reporting units:

- Heat input. SCFM, Lbs/MMBtu (include fuel meter calibrations)
- Avg. combustion zone temperature (recorded data or strip chart will be included in final report)
- Pollutant mass emissions; ppm, lbs/hr. & lbs./MMBtu.
- Methane destruction efficiency by weight.

Test Dates: July 15, 2022

APPENDIX I
PERMIT TO OPERATE
OR
AUTHORITY TO CONSTRUCT

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

March 1, 2018

City of Berkeley/Engr Div/Public Works
1947 Center St, 4th fl
Berkeley, CA 94704

Attention: Lorin Jensen, P E

Application No.: 26799
Plant No. 3590
Equipment Location:
Cesar Chavez Prk
Berkeley, CA 94704

Dear Applicant:

SUBJECT: PERMIT TO OPERATE ABATEMENT EQUIPMENT

This letter is to advise you that your Permit to Operate the following is approved:

A-4 Landfill Gas Flare
Flare

Operation of this equipment is subject to condition no. 1826

We have made the necessary changes to our records so that your annual permit renewal billing will reflect the presence of this equipment. You are advised that all applicable existing permit conditions which apply to source(s) abated by this abatement device are still in effect and enforceable.

Please include you application number with any correspondence with the District. The District's regulations may be viewed online at www.baaqmd.gov If you have any questions on this matter, please call Catherine S Fortney, Senior Air Quality Engineer at (415) 749-4671.

Very truly yours,

Air Quality Engineering Manager
Acting Director of Engineering

CSF:SK
Attachment: Condition no. 1826

Plant Name: City of Berkeley/Engr Div/Public Works
A-4 Landfill Gas Flare
Condition No. 1826 Plant No. 3590 Application No. 26799

For: S-1 Landfill with Gas Collection System and A-3/A-4 Landfill Gas Flare

1. All collected landfill gas from the S-1 Landfill with Gas Collection System shall be abated by the properly maintained and properly operated A-3 or A-4 Landfill Gas Flare. Raw or untreated landfill gas shall not be vented to the atmosphere, except for unavoidable landfill gas emissions that occur during collection system installation, maintenance, or repair (which is performed in compliance with Regulation 8, Rule 34, Sections 113, 117, and/or, 118) and inadvertent component or surface leaks that do not exceed the limits specified in 8-34-301.2 or 8-34-303.

   Until the completion of the installation and start-up of A-4 Landfill Gas Flare, all collected landfill gas from the S-1 Landfill with Gas Collection System shall be continue to be abated by A-3 Landfill Gas Flare.

   (Basis: Regulation 8-34-301)

2. The Heat Input to the A-3 Landfill Gas Flare shall not exceed 63.9 million BTU per day and shall not exceed 23,330 million BTU per year. The Heat Input to the A-4 Landfill Gas Flare shall not exceed 57.6 million BTU per day and shall not exceed 21,024 million BTU per year. In order to demonstrate compliance with this part, the Permit Holder shall calculate and record, on a monthly basis, the maximum daily and total monthly heat input to the flare based on: (a) the landfill gas flow rate recorded pursuant to Regulation 8-34-508 and 8-34-501.10, (b) the average methane concentration in the landfill gas measured in most recent source test, and (c) a high heating value for methane of 1013 BTU per cubic foot at 60 degrees F.
   (Basis: Regulation 2-1-301)

3. Until the completion of the installation and start-up of A-4 Landfill Gas Flare, operation of A-3 Landfill Gas Flare shall be operated for a minimum of 312 hours in every month. Operation of the landfill gas collection system and flare may be discontinued if the methane concentration in the collected landfill gas is less than 20% methane by volume, or if the landfill gas flare flow rate falls below 250 cfm measured at the blower discharge. Landfill gas wells or collectors shall not be disconnected or removed and isolation valves shall not be shut completely off, without prior written authorization from the District, unless the Permit Holder complies with all applicable provisions of Regulation 8, Rule 34, Sections 113, 117, and 118.

Upon issuance of the Permit to Operate for A-4 Landfill Gas Flare, the gas collection and control system shall be operated continuously in accordance with Regulation 8-34-301.1.

(Basis: Regulations 8-34-301.1, 8-34-404).

4. The Permit Holder has been issued a Permit to Operate for the landfill gas collection system components listed below. Well and collector locations, depths, and lengths are as described in detail in Permit Applications #1507, #1665, and #2351. The Permit Holder shall apply for and receive an Authority to Construct before modifying the landfill gas collection system described in this part. Increasing or decreasing the number of wells or collectors, changing the length of collectors, or significantly changing the locations of wells or collectors are all considered to be modifications that are subject to the Authority to Construct requirement. (Basis: Regulations 8-34-301.1, 8-34-303, and 8-34-304)

Type of Component	Number of Components
Vertical Wells	42
Horizontal Collectors	2
Trench Collectors	14

5. A temperature monitor with a readout display and continuous recorder (recording thermocouple) shall be installed and maintained on the flare. One or more thermocouples shall be placed in the primary combustion zone of the flare and shall accurately indicate combustion zone temperature at all times. Temperature charts shall be retained for at least five years and made available at all times for District inspection. The temperature monitor and recorder are subject to the requirements of Regulation 1-523.
(Basis: Regulations 1-523, 8-34-501.3, 8-34-501.12, and 8-34-507)

6. The combustion zone temperature of the flare shall be maintained at a minimum of 1400 degrees F, averaged over any 3-hour period. If a source test demonstrates compliance with all applicable requirements at a different temperature, the APCO may revise this temperature limit, based on the following criteria. The minimum combustion zone temperature for A-4 shall be equal to the average combustion zone temperature determined during the most recent complying source test minus 50 degrees F, provided that the minimum combustion zone temperature is not less than 1400 degrees F.
(Basis: Regulations 2, Rule 5, 8-34-301.3)

7. Nitrogen oxide (NOx) emissions from the A-4 Landfill Gas Flare shall not exceed 0.06 lb/MM BTU.
(Basis: Cumulative Increase)

8. Carbon monoxide (CO) emissions from the A-4 Landfill Gas Flare shall not exceed 0.2 lb/MM BTU.
(Basis: Cumulative Increase)

9. Non methane organic compound (NMOC) emissions from the A-4 Landfill Gas Flare shall not exceed 30 ppmv as methane at 3% oxygen, dry.
(Basis: Cumulative Increase)

10. Operation of A-4 Landfill Gas Flare shall be conducted so as to ensure that methane (CH4) emissions are abated by at least 99% by weight. (Basis: CGR, Title 17, Subchapter 10, Section 95464(b)(2)(A))

11. Total reduced sulfur compounds in the collected landfill gas shall be monitored as a surrogate for monitoring sulfur dioxide in the landfill gas flare's exhaust. The concentration of total reduced sulfur compounds in the collected landfill gas shall not exceed 300 ppmv (dry) expressed as hydrogen sulfide.
(Basis: Regulation 9-1-302)

12. The A-4 Landfill Gas Flare shall be equipped with both local and remote alarm systems.
(Basis: Regulation 8-34-301)

13. In order to demonstrate compliance with Regulation 2-1-301, Regulation 8, Rule 34, Sections 301.3 and 412, and the CARB MSW Methane Mitigation Regulation, the permit holder shall conduct an initial District-approved source test on Landfill Gas Flare A-4. At a minimum, the initial source test shall determine the following:
    a. landfill gas flow rate to the flare (dry basis);
    b. concentrations (dry basis) of carbon dioxide (CO2), nitrogen (N2), oxygen (O2), methane (CH4), and total non-methane organic compounds (NMOC) in the landfill gas;
    c. concentrations (dry basis) of sulfur compounds in the landfill gas from laboratory analysis, if testing for SO2 in flare stack gas is not performed;
    d. stack gas flow rate from the flare (dry basis);
    e. concentrations (dry basis) of NOx, CO, CH4, NMOC, and O2 in the flare stack gas;
    f. concentration (dry basis) of SO2 in the flare stack gas, if laboratory analysis for sulfur compounds in landfill gas is not performed;
    g. the CH4, and NMOC destruction efficiencies achieved by the flare; and

h. the average combustion temperature in the flare during the test period.

The initial source test shall be conducted no later than 120 days after start-up of Landfill Gas Flare A-4. The permit holder shall obtain approval from the District's Source Test Section for all source testing procedures at least 14 days in advance of the source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion, a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition. (Basis: Cumulative Increase, Regulations 2-5, 2-1-301, 8-34-301.3 and 8-34-412, CCR Title 17, Subchapter 10, Sections 95464(b)(2)(A) and 95464(b)(4))

14. In order to demonstrate compliance with the CARB Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills, the permit holder shall conduct an annual District-approved source test on Landfill Gas Flare A-4. At a minimum, the annual source test shall determine the following:
    a. landfill gas flow rate to the flare (dry basis);
    b. concentration (dry basis) of methane (CH4), and total non-methane organic compounds (NMOC) in the landfill gas; and
    c. the CH4, and NMOC destruction efficiencies achieved by the flare.

    The annual source test shall be conducted no later than 45 days after the anniversary date of the initial source test performed under Part 13 above. The permit holder shall obtain approval from the District's Source Test Section for all source testing procedures at least 14 days in advance of the source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion, a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.

    Upon completion of three consecutive annual source tests demonstrating compliance with Parts 7 - 11 above, the permit holder may petition the BAAQMD to conduct this source test once every three years rather than annually. If a subsequent source test fails to demonstrate Compliance with Parts 7 - 11 above, the source test frequency will return to annual.

    (Basis: Cumulative Increase, CCR Title 17, Subchapter 10, Sections 95464(b)(2)(A) and 95464(b)(4))

15. The permit holder shall conduct a characterization of the landfill gas concurrent with the initial source test and annual source tests required by parts 13 and 14 above. The landfill gas sample shall be drawn from the main landfill gas header. The permit holder shall ensure that the landfill gas is analyzed for the following compounds:

1,1-Dichloroethane	Dichloromethane
1,1-Dichloroethene	Ethylene Dibromide
1,2-Dichloroethane	Ethylene Dichloride
1,4-Dichlorobenzene	Ethylbenzene
1,1,1-Trichloroethane	Fluorotrichloromethane
1,1,2,2-Tetrachloroethane	Hexane
Acrylonitrile	Isopropyl Alcohol
Benzene	Methyl Ethyl Ketone
Carbon Tetrachloride	Methyl Isobutyl Ketone
Chlorobenzene	Perchloroethylene
Chlorodifluoromethane	Toluene
Chloroethane	Trichloroethylene
Chloroform	Vinyl Chloride
Dichlorodifluoromethane	Xylenes

All concentrations shall be reported on a dry basis. The District shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.
(Basis: Regulations 2-5, 8-34-412)

16. In order to demonstrate compliance with the above conditions, the owner/operator shall maintain the following records in a District-approved logbook:
    a. Record the operating times and the landfill gas flow rate to the A-3/A-4 Landfill Gas Flare on a daily basis.
       Summarize these records on a monthly basis.
       Calculate and record the heat input to A-3/A-4 pursuant to part 2 above.
    b. Maintain continuous records of the combustion zone temperature for the A-3/A-4 Landfill Gas Flare during all hours of operation.
    c. Maintain records of all test dates and test results performed to maintain compliance with parts 7 - 11 above, or to maintain compliance with any applicable rule or regulation.

All records shall be maintained on site or shall be made readily available to District staff upon request for a period of at least two years from the date of entry. These recordkeeping requirements do not replace any

recordkeeping requirements contained in any other applicable rule or regulation.
(Basis; Cumulative Increase, Regulations 2-1-301, 2-6-501, 8-34-301, and 8-34-501)

End of Conditions

Permit to Operate

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

This document does not permit the holder to violate any BAAQMD regulation or any other law.

PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

City of Berkeley/Engr Div/Public Works
1947 Center St, 4th Floor
Berkeley, CA 94704

Location: Cesar Chavez Prk
Berkeley, CA 94704

S#	DESCRIPTION	[Schedule]	PAID
1	CHEM> Landfill with gas collection system, Multi-material		3338
	Landfill with Gas Collection System (42 Vert.& 2 Horz.Wells)	[K]	
	Abated by: A4 Flare		
	Emissions at: P4 Stack		
A4	Industrial Flare - Other (not refinery), 240K BTU/hr max		0
	Landfill Gas Flare	[exempt]	

1 Permitted Source, 1 Exempt Source

*** See attached Permit Conditions ***

The operating parameters described above are based on information supplied by permit holder and may differ from the limits set forth in the attached conditions of the Permit to Operate. The limits of operation in the permit conditions are not to be exceeded. Exceeding these limits is considered a violation of District regulations subject to enforcement action.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

This document does not permit the holder to violate any BAAQMD regulation or any other law.

PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

Source#	Subject to Condition Numbers
1	1826

The operating parameters described above are based on information supplied by permit holder and may differ from the limits set forth in the attached conditions of the Permit to Operate. The limits of operation in the permit conditions are not to be exceeded. Exceeding these limits is considered a violation of District regulations subject to enforcement action.

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

This document does not permit the holder to violate any BAAQMD regulation or any other law.

PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

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COND# 1826 *applies to S#'s 1, A4*

For: S-1 Landfill with Gas Collection System and A-4 Landfill Gas Flare

1. All collected landfill gas from the S-1 Landfill with Gas Collection System shall be abated by the properly maintained and properly operated A-4 Landfill Gas Flare. Raw or untreated landfill gas shall not be vented to the atmosphere, except for unavoidable landfill gas emissions that occur during collection system installation, maintenance, or repair (which is performed in compliance with Regulation 8, Rule 34, Sections 113, 117, and/or, 118) and inadvertent component or surface leaks that do not exceed the limits specified in 8-34-301.2 or 8-34-303.
(Basis: Regulation 8-34-301)

2. The Heat Input to the A-4 Landfill Gas Flare shall not exceed 57.6 million BTU per day and shall not exceed 21,024 million BTU per year. In order to demonstrate compliance with this part, the Permit Holder shall calculate and record, on a monthly basis, the maximum daily and total monthly heat input to the flare based on: (a) the landfill gas flow rate recorded pursuant to Regulation 8-34-508 and 8-34-501.10, (b) the average methane concentration in the landfill gas measured in most recent source test, and (c) a high heating value for methane of 1013 BTU per cubic foot at 60 degrees F.
(Basis: Regulation 2-1-301)

3. The gas collection and control system shall be operated continuously in accordance with Regulation 8-34-301.1.

(Basis: Regulations 8-34-301.1, 8-34-404).

4. The Permit Holder has been issued a Permit to Operate for the landfill gas collection system components listed below. Well and collector locations, depths, and lengths are as described in detail in Permit Applications #1507, #1665, and #2351. The Permit Holder shall apply for and receive an Authority to Construct before modifying the landfill gas collection system described in this part. Increasing or decreasing the number of wells or

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*** PERMIT CONDITIONS ***

collectors, changing the length of collectors, or significantly changing the locations of wells or collectors are all considered to be modifications that are subject to the Authority to Construct requirement. (Basis: Regulations 8-34-301.1, 8-34-303, and 8-34-304)

Type of Component	Number of Components
Vertical Wells	42
Horizontal Collectors	2
Trench Collectors	14

5. A temperature monitor with a readout display and continuous recorder (recording thermocouple) shall be installed and maintained on the flare. One or more thermocouples shall be placed in the primary combustion zone of the flare and shall accurately indicate combustion zone temperature at all times. Temperature charts shall be retained for at least five years and made available at all times for District inspection. The temperature monitor and recorder are subject to the requirements of Regulation 1-523. (Basis: Regulations 1-523, 8-34-501.3, 8-34-501.12, and 8-34-507)

6. The combustion zone temperature of the flare shall be maintained at a minimum of 1400 degrees F, averaged over any 3-hour period. If a source test demonstrates compliance with all applicable requirements at a different temperature, the APCO may revise this temperature limit, based on the following criteria. The minimum combustion zone temperature for A-4 shall be equal to the average combustion zone temperature determined during the most recent complying source test minus 50 degrees F, provided that the minimum combustion zone temperature is not less than 1400 degrees F. (Basis: Regulations 2, Rule 5, 8-34-301.3)

7. Nitrogen oxide (NOx) emissions from the A-4 Landfill Gas Flare shall not exceed 0.06 lb/MM BTU. (Basis: Cumulative Increase)

8. Carbon monoxide (CO) emissions from the A-4 Landfill Gas Flare shall not exceed 0.2 lb/MM BTU. (Basis:

PERMIT EXPIRATION DATE
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PLANT# 3590

*** PERMIT CONDITIONS ***

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Cumulative Increase)

9. Non methane organic compound (NMOC) emissions from the A-4 Landfill Gas Flare shall not exceed 30 ppmv as methane at 3% oxygen, dry.
(Basis: Cumulative Increase)

10. Operation of A-4 Landfill Gas Flare shall be conducted so as to ensure that methane (CH4) emissions are abated by at least 99% by weight. (Basis: CCR, Title 17, Subchapter 10, Section 95464(b)(2)(A))

11. Total reduced sulfur compounds in the collected landfill gas shall be monitored as a surrogate for monitoring sulfur dioxide in the landfill gas flare's exhaust. The concentration of total reduced sulfur compounds in the collected landfill gas shall not exceed 300 ppmv (dry) expressed as hydrogen sulfide.
(Basis: Regulation 9-1-302)

12. The A-4 Landfill Gas Flare shall be equipped with both local and remote alarm systems.
(Basis: Regulation 8-34-301)

13. Deleted Application 31264

14. In order to demonstrate compliance with the CARB Regulation to Reduce Methane Emissions from Municipal Solid Waste Landfills, the permit holder shall conduct a District-approved source test on Landfill Gas Flare A-4 every three years within 45 days of the anniversary date of the initial source test. At a minimum, the annual source test shall determine the following:
    a. landfill gas flow rate to the flare (dry basis);
    b. concentration (dry basis) of methane (CH4), and total non-methane organic compounds (NMOC) in the landfill gas; and
    c. the CH4, and NMOC destruction efficiencies achieved by the flare.

The permit holder shall obtain approval from the District's Source Test Section for all source testing procedures at least 14 days in advance of the source test. The Source Test Section shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days

PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

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of test completion, a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.

If a source test fails to demonstrate Compliance with Parts 7 - 11 above, the source test frequency will return to annual.

(Basis: Cumulative Increase, CCR Title 17, Subchapter 10, Sections 95464(b)(2)(A) and 95464(b)(4))

15. The permit holder shall conduct a characterization of the landfill gas concurrent with the source tests required by part 14 above. The landfill gas sample shall be drawn from the main landfill gas header. The permit holder shall ensure that the landfill gas is analyzed for the following compounds:

1,1-Dichloroethane	Dichloromethane
1,1-Dichloroethene	Ethylene Dibromide
1,2-Dichloroethane	Ethylene Dichloride
1,4-Dichlorobenzene	Ethylbenzene
1,1,1-Trichloroethane	Fluorotrichloromethane
1,1,2,2-Tetrachloroethane	Hexane
Acrylonitrile	Isopropyl Alcohol
Benzene	Methyl Ethyl Ketone
Carbon Tetrachloride	Methyl Isobutyl Ketone
Chlorobenzene	Perchloroethylene
Chlorodifluoromethane	Toluene
Chloroethane	Trichloroethylene
Chloroform	Vinyl Chloride
Dichlorodifluoromethane	Xylenes

All concentrations shall be reported on a dry basis. The District shall be notified of the scheduled test date at least 7 days in advance of the source test. Within 45 days of test completion a comprehensive report of the test results shall be submitted to the Manager of the District's Source Test Section for review and disposition.
(Basis: Regulations 2-1-403, 2-5)

16. In order to demonstrate compliance with the above conditions, the owner/operator shall maintain the following records in a District-approved logbook:

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

PERMIT TO OPERATE

This document does not permit the holder to violate any BAAQMD regulation or any other law.

PERMIT EXPIRATION DATE
JUN 1, 2023

PLANT# 3590

*** PERMIT CONDITIONS ***

a. Record the operating times and the landfill gas flow rate to the A-4 Landfill Gas Flare on a daily basis. Summarize these records on a monthly basis. Calculate and record the heat input to A-4 pursuant to part 2 above.
b. Maintain continuous records of the combustion zone temperature for the A-4 Landfill Gas Flare during all hours of operation.
c. Maintain records of all test dates and test results performed to demonstrate compliance with parts 7 - 11 above, and with any applicable rule or regulation.
d. Records required by the CARB Regulation "Methane Emissions from Municipal Solid Waste Landfills."

All records shall be maintained on site or shall be made readily available to District staff upon request for a period of at least five years from the date of entry. These recordkeeping requirements do not replace any recordkeeping requirements contained in any other applicable rule or regulation.
(Basis; Cumulative Increase, Regulations 2-1-301, 8-34-301, 8-34-501, CCR Title 17, Subchapter 10, Section 95470)

~~~~~~~~~~~~~~~~~~~~~~~~~~ END OF CONDITIONS ~~~~~~~~~~~~~~~~~~~~~~~~~~
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S#	Source Description	Annual Average lbs/day PART	ORG	NOx	SO2	CO
1	Landfill with Gas Collection System (42 Ve	-	1.89	.03	-	-
	T O T A L S	.26	2.12	.09	.72	.1

** PLANT TOTALS FOR EACH EMITTED TOXIC POLLUTANT **

Pollutant Name	Emissions lbs/day
Toluene	.02
Hydrogen Sulfide (H2S)	.03