

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

RESOLUTION NO. 2016-03

**A Resolution of the Board of Directors of the
Bay Area Air Quality Management District
Adopting new District Regulation 12, Rule 15: Petroleum Refining Emissions
Tracking; and Adopting Air Monitoring Guidelines and a CEQA Negative
Declaration for the Project**

WHEREAS, public hearings have been properly noticed in accordance with the provisions of Health & Safety Code § 40725;

WHEREAS, the Board of Directors of the Bay Area Air Quality Management District (“Air District”) has determined that a need exists to augment District rules and regulations by adopting Regulation 12, Rule 15: Petroleum Refining Emissions Tracking; as set forth in Attachment A hereto (“Proposed Rule”);

WHEREAS, the Board of Directors of the Air District obtains its authority to adopt, amend or repeal rules and regulations from Sections 40000, 40001, 40702, and 40725 through 40728.5, of the California Health & Safety Code;

WHEREAS, the Board of Directors of the Air District has determined that the Proposed Rule is written and displayed so that its meaning can be easily understood by the persons directly affected by the rule;

WHEREAS, the Board of Directors of the Air District has determined that the Proposed Rule is in harmony with and not in conflict with or contradictory to existing statutes, court decisions, and state and federal regulations;

WHEREAS, the Board of Directors of the Air District has determined that, to the extent the Proposed Rule imposes the same or similar requirements as any existing state or federal regulation, these requirements are necessary and proper to execute the power and duties granted to, and imposed upon, the Air District;

WHEREAS, the Board of Directors of the Air District, by adopting the Proposed Rule, is implementing, interpreting or making specific the provisions of Health & Safety Code § 40001 (rules to achieve ambient air quality standards), and § 40702 (rulemaking actions that are necessary and proper to execute the powers and duties granted to it);

WHEREAS, the Board of Directors of the Air District adopted Resolution 2014-17 in October 2014, instructing District staff to develop a regulatory strategy that would further reduce emissions from petroleum refineries;

WHEREAS, Air District staff released an initial draft of Regulation 12, Rule 15 in March of 2013;

WHEREAS, the Air District prepared an initial draft rule, published it for comment, and held a series of public workshops in locations near refineries that would be affected by the rule in April of 2014, to discuss the draft rule with interested parties and the public;

WHEREAS, in March of 2015 the Air District held a second series of workshops to discuss Regulation 12, Rule 15;

WHEREAS, on September 21, 2015, Air District staff discussed the draft rule with the Stationary Source Committee of the Board of Directors of the Air District;

WHEREAS, on February 17, 2016, District staff discussed the draft rule with the Board of Directors of the Air District;

WHEREAS, subsequent to the public workshops, on March 21, 2016, Air District staff revised the draft rule based on comments received and published the revised draft rule for comment in advance of the public hearing to consider adoption of Regulation 12, Rule 15;

WHEREAS, on April 14, 2016, the Air District transmitted the text of the draft rule to California Air Resources Board;

WHEREAS, on or before January 29, 2016, Air District staff published in newspapers and distributed and published on the District's website a notice of a public hearing to be held on April 20, 2016 to consider adoption of the draft rule, and the notice included a request for public comments and input on the draft rule;

WHEREAS, the Board of Directors of the Air District held a public hearing on April 20, 2016 to consider the Proposed Rule in accordance with all provisions of law ("Public Hearing");

WHEREAS, at the Public Hearing, the subject matter of the Proposed Rule was discussed with interested persons in accordance with all provisions of law;

WHEREAS, Air District staff has prepared and presented to the Board of Directors a detailed Staff Report and a Response to Comments document regarding the Proposed Rule, which Staff Report and Response to Comments document have been considered by this Board and is incorporated herein by reference;

WHEREAS, Section 406 of Regulation 12, Rule 15 requires the Air District to publish air monitoring guidelines for Petroleum Refineries that describe the factors that the District will apply in reviewing fence-line monitoring systems required under Section 403 of Regulation 12, Rule 15;

WHEREAS, a draft of the air monitoring guidelines was released with an invitation for public comment. Comments received were considered and incorporated as appropriate;

WHEREAS, the Board of Directors wishes to enhance the transparency of the process for the air monitoring guidelines by adopting the draft set forth in Attachment B hereto (“Air Monitoring Guidelines”);

WHEREAS, the Air Monitoring Guidelines are guidance intended to be helpful in development of fence-line monitoring required under Regulation 12, Rule 15, but do not have the force and effect of law. The Board of Directors intends that its adoption of the Air Monitoring Guidelines in no way affects the status as guidance which does not have the force and effect of law;

WHEREAS, the Board of Directors finds and determines that the Proposed Rule is considered a “project” pursuant to the California Environmental Quality Act (“CEQA”) (Public Resources Code § 21000 *et seq.*);

WHEREAS, the Air District is the CEQA lead agency for this project pursuant to CEQA Guidelines § 15050 (14 California Code of Regulations (“CCR”) § 15050);

WHEREAS, Air District staff contracted with Environmental Audit, Inc., of Placentia, California to prepare an assessment of the potential environmental effects from the adoption and implementation of the Proposed Rule;

WHEREAS, Environmental Audit, Inc., prepared an Initial Study as required by CEQA, in which the potential environmental effects from the adoption and implementation of the Proposed Rule were analyzed, and subsequently prepared a Draft Negative Declaration for the proposed rulemaking project because the Initial Study identified no potentially significant effects on the environment and because there is no evidence in the record before the District that there could be a significant effect on the environment from the adoption and implementation of this rulemaking project;

WHEREAS, that Draft Negative Declaration and Initial Study were offered for and subjected to public review and comment (Public Resources Code §§ 21082.1, 21091, 21092; California Code of Regulations, title 14, § 15070 *et seq.*);

WHEREAS, public notice was provided and copies of the Draft Negative Declaration were made available to all interested persons and provided an adequate comment period of at least 20 days pursuant to CEQA Guidelines § 15105, subdivision (b);

WHEREAS, comments on the CEQA document were received from interested persons and responses to those comments were included in the final Response to Comments document;

WHEREAS, Air District staff, in exercising its independent judgment, has determined that there is no substantial evidence, in light of the whole record before the Air District, that the adoption and implementation of the Proposed Rule could have a significant effect on the environment;

WHEREAS, it is necessary that the adequacy of the Draft Negative Declaration be determined by the Board of Directors prior to its adoption;

WHEREAS, the members of the Board of Directors voting on this Resolution have reviewed and considered the Draft Negative Declaration;

WHEREAS, the Board of Directors finds and determines that in light of the whole record before it (which specifically includes the Initial Study and the Draft Negative Declaration), the Proposed Rule will not have any significant effect on the environment, and the Negative Declaration reflects the Air District's independent judgment and analysis;

WHEREAS, the Board of Directors, pursuant to the requirements of Health & Safety Code § 40728.5, has actively considered the socioeconomic impacts of the Proposed Rule and has reviewed and considered the "Socio-Economic Analysis of Regulation 12, Rule 15: Petroleum Refinery Emissions Tracking," prepared for the Air District by Applied Development Economics of Walnut Creek, California, which concludes that the Proposed Rule will have a less than significant economic impact and will not disproportionately impact small businesses;

WHEREAS, the Board of Directors, pursuant to the requirements of Health & Safety Code § 40920.6, has actively considered the incremental cost-effectiveness of the Proposed Rule in meeting emission reduction goals under the California Clean Air Act as set forth in the Staff Report, and finds and determines that there are no incrementally more cost-effective potential control options that would achieve the emission reduction objectives of the Proposed Rule;

WHEREAS, the Air District has prepared, pursuant to the requirements of Health & Safety Code § 40727.2, a written analysis of federal, state, and District requirements applicable to this source category and has found that the Proposed Rule would not be conflict with any federal, state, or other Air District rules, and the Board of Directors has agreed with these findings;

WHEREAS, the documents and other materials that constitute the record of proceedings on which this rulemaking project is based are located at the Bay Area Air Quality Management District, 939 Ellis Street, San Francisco, 94109, and the custodian for these documents is the Bay Area Air Quality Management District Clerk of the Boards;

WHEREAS, Air District staff recommends adoption of the Proposed Rule and adoption of the Negative Declaration for this rulemaking project;

WHEREAS, the Board of Directors concurs with Air District staff's recommendations and desires to adopt the Proposed Rule and to adopt the Negative Declaration for the Proposed Rule to comply with CEQA;

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of the Bay Area Air Quality Management District does hereby adopt the Proposed Rule, pursuant to the

authority granted by law, as set forth in Attachment A hereto, and discussed in the Staff Report (including Appendices), with instructions to Air District staff to correct any typographical or formatting errors before final publication of the Proposed Rule.

BE IT FURTHER RESOLVED, that the Board of Directors of the Bay Area Air Quality Management District does hereby adopt the Negative Declaration pursuant to CEQA for the Proposed Rule.

BE IT FURTHER RESOLVED, that the Board of Directors of the Bay Area Air Quality Management District does hereby adopt the Air Monitoring Guidelines, as set forth in Attachment B.

The foregoing Resolution was duly and regularly introduced, passed and adopted at a regular meeting of the Board of Directors of the Bay Area Air Quality Management District on the Motion of Director Kaplan, seconded by Director Mitchoff, on the 20th day of April, 2016 by the following vote of the Board:

AYES: AVALOS, BARRETT, BATES, CHAVEZ, GIOIA, GROOM, KAPLAN, KNISS, MAR, MILEY, MITCHOFF, RAPHAEL, RICE, ROSS, SINKS, SLOCUM, WAGENKNECHT, ZANE

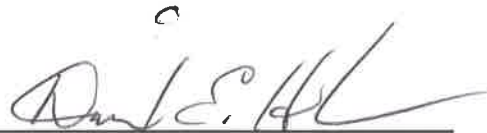
NOES: DAVIS, HUDSON, SPERING

ABSENT: CANEPA, HAGGERTY, PEPPER



Eric Mar
Chairperson of the Board of Directors

ATTEST:



David E. Hudson
Secretary of the Board of Directors

ATTACHMENT A

[PROPOSED RULE]

New Regulation 12, Rule 15: Petroleum Refining Emissions Tracking

**REGULATION 12
MISCELLANEOUS STANDARDS OF PERFORMANCE
RULE 15
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**REGULATION 12
MISCELLANEOUS STANDARDS OF PERFORMANCE
RULE 15
PETROLEUM REFINING EMISSIONS TRACKING**

(Adopted [DATE])

12-15-100 GENERAL

12-15-101 Description: The purpose of this rule is to track air emissions and crude oil composition characteristics from Petroleum Refineries and Support Facilities over time and to establish air monitoring systems to provide air quality data along refinery boundaries.

12-15-200 DEFINITIONS

12-15-201 Accidental Air Release: An unanticipated emission of a criteria pollutant, toxic air contaminant, and/or greenhouse gas into the atmosphere required to be reported in a Risk Management Plan (RMP) under 40 CFR §68.168.

12-15-202 Ambient Air: The portion of the atmosphere external to buildings to which the general public has access.

12-15-203 Annual Emissions Inventory: An emissions inventory at a Petroleum Refinery covering a calendar year period.

12-15-204 Criteria Pollutant: An air pollutant for which an ambient air quality standard has been established, or that is an atmospheric precursor to such an air pollutant. For the purposes of this rule, criteria pollutants are carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter with an aerodynamic diameter of 10 micrometers or less (PM₁₀), particulate matter with an aerodynamic diameter of 2.5 micrometers or less (PM_{2.5}), precursor organic compounds (POC), and sulfur dioxide (SO₂).

12-15-205 Crude Oil: Petroleum, as it occurs after being extracted from geologic formations by an oil well, and after extraneous substances may have been removed, and which may be subsequently processed at a Petroleum Refinery.

12-15-206 Emissions Inventory: A comprehensive accounting of the types and quantities of criteria pollutants, toxic air contaminants, and greenhouse gases that are released into the atmosphere based on state-of-the-art measurement technologies and estimation methodologies. For the purposes of this rule, emissions inventory data shall be collected or calculated for: (1) all continuous, intermittent, predictable, and accidental air releases resulting from Petroleum Refinery processes at stationary sources at a Petroleum Refinery, and (2) air releases from cargo carriers (e.g., ships and trains), excluding motor vehicles, during loading or unloading operations at a Petroleum Refinery.

12-15-207 Fence-line Monitoring System: Equipment that measures and records air pollutant concentrations at or near the property boundary of a facility, and which may be useful for detecting and/or estimating the quantity of fugitive emissions, gas leaks, and other air emissions from the facility.

12-15-208 Greenhouse Gases (GHGs): The air pollutant that is defined in 40 CFR § 86.1818-12(a), which is a single air pollutant made up of a combination of the following six constituents: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. For the purposes of this rule, GHG emissions should be calculated in manner consistent with California Air Resources Board requirements as contained in §95113 of the Mandatory Greenhouse Gas Emissions Reporting Rule.

12-15-209 Monthly Crude Slate Report: Summaries of the volume and certain properties of crude oil or crude oil blends at the first stage of processing at a Petroleum Refinery (typically at a crude distillation unit), and of the volume and certain properties of non-crude oil feedstock or feedstock blends which have been imported from outside a Petroleum Refinery, at the point it is first introduced into any refinery processing equipment other than storage, product blending, loading or unloading. The crude oil summary shall consist of the total volume of crude oil /

crude oil blends processed in the calendar month, and single average value for each of the properties of the total volume of crude oil / crude oil blends processed for the calendar month, as listed in Section 12-15-408, Table 1. The non-crude oil feedstock summary shall consist of the total volume of non-crude oil feedstock / non-crude oil feedstock blends processed in the calendar month, and single average value for each of the properties of the total volume of non-crude oil feedstock / non-crude oil feedstock blends processed for the calendar month, as listed in Section 12-15-408, Table 1. Supporting information for each crude oil and each non-crude oil feedstock shall be available for audit upon request in order to verify the summary data required in Section 12-15-408, Table 1.

- 12-15-210 Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties that processes crude oil to produce more usable products such as gasoline, diesel fuel, aviation fuel, lubricating oils, asphalt or petrochemical feedstocks. Petroleum Refinery processes include separation processes (e.g., atmospheric or vacuum distillation, and light ends recovery), petroleum conversion processes (e.g., cracking, reforming, alkylation, polymerization, isomerization, coking, and visbreaking), petroleum treating processes (e.g., hydrodesulfurization, hydrotreating, chemical sweetening, acid gas removal, and deasphalting), feedstock and product handling (e.g., storage, crude oil blending, non-crude oil feedstock blending, product blending, loading, and unloading), and auxiliary facilities (e.g., boilers, waste water treatment, hydrogen production, sulfur recovery plant, cooling towers, blowdown systems, compressor engines, and power plants).
- 12-15-211 Source:** As defined in BAAQMD Regulation 2, Rule 1, Section 221.
- 12-15-212 Support Facility:** For purposes of this rule, a hydrogen plant, sulfuric acid plant or electrical generation plant that is not owned or operated by a Petroleum Refinery, and that provides more than 50% of its production output to a Petroleum Refinery.
- 12-15-213 Toxic Air Contaminant (TAC):** An air pollutant that may cause or contribute to an increase in mortality or in serious illness or that may pose a present or potential hazard to human health. For the purposes of this rule, TACs consist of the substances listed in the most recent health risk assessment guidelines adopted by OEHHA.

12-15-400 ADMINISTRATIVE REQUIREMENTS

- 12-15-401 Annual Emissions Inventory:** A Petroleum Refinery or Support Facility owner/operator shall obtain and maintain APCO approval of an Annual Emissions Inventory. Timely submittal as described in the next sentence shall constitute compliance with this requirement unless and until there is a determination of disapproval by the APCO pursuant to Section 12-15-402. On or before June 30, 2017, and every subsequent June 30, a Petroleum Refinery or Support Facility owner/operator shall submit to the APCO an Annual Emissions Inventory covering the previous calendar year period in an APCO-approved format. This report shall include, at a minimum, the following:
- 401.1** Identification of the calendar year that the Annual Emissions Inventory covers.
 - 401.2** A summary of the total quantity of each criteria pollutant, TAC, and GHG that was emitted from the Petroleum Refinery or Support Facility during the Annual Emission Inventory period, including a table for each source and each pollutant listing whether the pollutant was (a) continuously monitored, (b) monitored by direct measurement, (c) not monitored and estimated by some other method, or (d) not monitored and estimated to be zero.
 - 401.3** A detailed listing of the annual emissions of each criteria pollutant, TAC, and GHG emitted from each source at the Petroleum Refinery or Support Facility, and a complete description of the methodology used for monitoring and determining these emissions, any changes made, and including documentation of the basis for any assumptions used. Any methodologies that are unchanged from a previously submitted Annual Emissions Inventory under this section may instead be noted as such. Emissions resulting from accidental releases and flaring events addressed in Regulation 12, Rules 11 and 12 shall be identified, included and quantified as such, along with the date(s) and time(s) that the release occurred.
 - 401.4** Beginning with the Annual Emissions Inventory for the calendar year 2017 (due on or

before June 30, 2018), and for every subsequent calendar year Annual Emissions Inventory, a table that shows, on a Petroleum Refinery-wide or Support Facility-wide basis for each applicable air pollutant, the change in emissions that occurred between the current and most recent previous Annual Emissions Inventory. Emission changes do not need to be shown for any newly-listed air pollutants in the current Annual Emissions Inventory.

12-15-402 Review and Approval of Annual Emissions Inventory: The procedure for determining whether an Annual Emissions Inventory meets the requirements of this rule is as follows:

402.1 Preliminary Review: Within 45 days of receipt of the report, the APCO will complete a preliminary review of the report to identify any deficiencies that need to be corrected. If the APCO determines that the submitted report is deficient, the APCO will notify the owner/operator in writing. The notification will specify the basis for this determination and the required corrective action.

402.2 Corrective Action: Upon receipt of such notification, the owner/operator shall correct the identified deficiencies and resubmit the report within 45 days. If the APCO determines that the owner/operator failed to correct any deficiency identified in the notification, the APCO will disapprove the report, or the APCO may make the necessary corrections to the emissions inventory report with a designation that the report includes Air District revisions.

402.3 APCO Action: Within 45 days of the completion of preliminary review, or of resubmittal of a corrected report the APCO will approve the report if the APCO determines that the report meets the requirements of this rule, and shall provide written notification to the owner/operator. This period may be extended if necessary as determined by the APCO. If the APCO determines that the report does not meet the requirements of this rule, the APCO will notify the owner/operator in writing. The notification will specify the basis for this determination. Upon receipt of such notification, the owner/operator shall correct the identified deficiencies and resubmit the report within 45 days. If the APCO determines that the owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the owner/operator has failed to meet the requirements of this rule, and will disapprove the report, or the APCO may make the necessary corrections and approve the report with a designation that the report was approved with Air District revisions.

402.4 Public Inspection: Within 15 days of the approval or disapproval of a report under Section 12-15-402.3, the APCO shall post the approved or disapproved report on the Air District's website. The Air District shall consider any written comments submitted by the public or regulated community regarding this report and will make any corrections needed to ensure accuracy and completeness of the report. The public versions of these reports will not include detailed calculation methodologies for individual sources, but a short methodological description will be provided. In addition, the public versions of these reports will provide aggregated, rather than source specific emissions information for GHG.

12-15-403 Air Monitoring Plans: A Petroleum Refinery owner/operator, but not a Support Facility owner/operator, shall obtain and maintain APCO approval of a plan for establishing and operating a fence-line monitoring system. Timely submittal as described in the next sentence shall constitute compliance with this requirement unless and until there is a determination of disapproval by the APCO pursuant to Section 404. On or before [one year after adoption], the owner/operator shall submit to the APCO a plan for establishing and operating a fence-line monitoring system to aid in determining specified pollutants that cross the refinery fence-line(s) in real-time. The plan shall include detailed information describing the equipment to be used to monitor, record, and report air pollutant levels, the siting, operation, and maintenance of this equipment, and procedures for implementing data quality assurance and quality control. Within one year of approval by the District Board of Directors of updated air monitoring guidelines published by the APCO under Section 12-15-406, the refinery owner/operator shall submit to the APCO an updated air monitoring plan.

12-15-404 Review and Approval of Air Monitoring Plans: The procedure for determining whether an

- air monitoring plan submitted under Section 12-15-403 meets the applicable requirements of this rule is as follows:
- 404.1 Preliminary Review:** Within 45 days of receipt of the air monitoring plan, the APCO will complete a preliminary review of the plan to identify any deficiencies that need to be corrected. If the APCO determines that the submitted plan is deficient, the APCO will notify the owner/operator in writing. The notification will specify the basis for this determination and the required corrective action.
 - 404.2 Corrective Action:** Upon receipt of such notification, the owner/operator shall correct the plan and resubmit the proposed plan within 45 days. If the APCO determines that the owner/operator failed to correct any deficiency identified in the notification, the APCO will disapprove the plan.
 - 404.3 Public Comment:** The plan, including any revisions made to correct deficiencies, will be made available for public review within 45 days (with the exception of information designated confidential). The APCO will consider any written comments received during this period prior to approving or disapproving the final plan.
 - 404.4 Final Action:** Within 45 days of the close of the public comment period under Section 12-15-404.3, the APCO will approve the air monitoring plan if the APCO determines that the plan meets the requirements of Section 12-15-403, and shall provide written notification to the owner/operator. This period may be extended if necessary as determined by the APCO. If the APCO determines that the plan does not meet the requirements of Section 12-15-403, the APCO will notify the owner/operator in writing. The notification will specify the basis for this determination. Upon receipt of such notification, the owner/operator shall correct the identified deficiencies and resubmit the air monitoring plan within 45 days. If the APCO determines that the owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the owner/operator has failed to meet the requirements of Sections 12-15-403 and will disapprove the plan.
 - 404.5 Public Inspection:** Within 15 days of the approval or disapproval of an air monitoring plan under Section 12-15-404.4, the APCO shall post the plan on the Air District's website, and shall notify any member of the public who submitted comments under Section 12-15-404.3, or who otherwise has requested such notification of this action in writing. In making information available for public inspection, the confidentiality of trade secrets, as designated by the owner/operator, shall be handled in accordance with Section 6254.7 of the Government Code.
- 12-15-405 Emissions Inventory Guidelines:** The APCO shall publish, and periodically update, emissions inventory guidelines describing best practices to be used when producing emissions inventories required under this rule. Emission factors and estimation methodologies included in these guidelines may include, but are not limited to, continuous monitoring to measure emissions, applying the results of emissions source tests to known activity levels, combining published emission factors with known activity levels, material balances, or empirical formulae. The District will use these guidelines as criteria for review of Petroleum Refinery and Support Facility emissions inventory submittals.
- 12-15-406 Air Monitoring Guidelines:** The APCO shall publish air monitoring guidelines for Petroleum Refineries that describe the factors that the District will apply in reviewing fence-line monitoring systems required under this rule. These guidelines may include, but are not limited to, specifications for pollutant coverage, siting, instrumentation, operation, maintenance, quality assurance, quality control, and data reporting. The guidelines shall be reviewed by the APCO within five years of initial issuance in consideration of advances in air monitoring technology, updated information regarding the health effects of air pollutants, and review of data collected by existing fence-line air monitoring systems established under this rule.
- 12-15-407 Designation of Confidential Information:** When submitting any documents or records required by this rule, the Petroleum Refinery or Support Facility owner/operator shall designate as confidential any information claimed to be exempt from public disclosure under the California Public Records Act, Government Code Section 6250 et seq. If a document is submitted that contains information designated confidential in accordance with this section, the owner/operator shall provide a justification for this designation and shall submit a separate

copy of the document with the information designated confidential redacted.

12-15-408 Availability of Monthly Crude Slate Reports: A Petroleum Refinery owner/operator, but not a Support Facility owner/operator, shall make available to the APCO, upon request, in an APCO-approved format, the following information:

- 408.1 Historical Monthly Crude Slate Reports: For each month of the years 2013, 2014, 2015 and 2016, summarized information as described in Table 1, to the extent this information is available. Detailed supporting data shall be made available upon APCO request for verification of the monthly summaries, effective [one year after adoption].
- 408.2 Ongoing Monthly Crude Slate Reports: Beginning with January 2017, summarized information as described in Table 1. Detailed supporting data shall be made available upon APCO request for verification of the monthly summaries, no later than 30 days after the end of each calendar month.

Table 1- Summarized Information Required in Monthly Crude Slate Report
<p>Processed Volume (thousand barrels)</p> <ul style="list-style-type: none"> a. Total volume of crude oils / crude oil blends fed to all crude units. b. Total volume of non-crude oil feedstocks / feedstock blends fed to all other process units.
<p>API gravity (degrees)</p> <ul style="list-style-type: none"> a. Average API gravity of total volume of crude oils / crude oil blends fed to all crude units. b. Average API gravity of total volume of non-crude oil feedstocks / feedstock blends fed to all other process units.
<p>Sulfur content (weight percent)</p> <ul style="list-style-type: none"> a. Average sulfur content of total volume of crude oils / crude oil blends fed to all crude units. b. Average sulfur content of total volume of non-crude oil feedstocks / feedstock blends fed to all other process units.
<p>Vapor pressure (psia)</p> <ul style="list-style-type: none"> a. Average vapor pressure of total volume of crude oils / crude oil blends fed to all crude units. b. Average vapor pressure of total volume of non-crude oil feedstocks / feedstock blends fed to all other process units.
<p>BTEX (benzene, toluene, ethylbenzene, and xylene content in volume percent)</p> <ul style="list-style-type: none"> a. Average BTEX of total volume of crude oils / crude oil blends fed to all crude units. b. Average BTEX of total volume of non-crude oil feedstocks / feedstock blends fed to all other process units.
<p>Metals (iron, nickel and vanadium content in ppmw)</p> <ul style="list-style-type: none"> a. Average metals content of total volume of crude oils / crude oil blends fed to all crude units. b. Average metals content of total volume of non-crude oil feedstocks / feedstock blends fed to all other process units.

12-15-500 MONITORING AND RECORDS

12-15-501 Fence-line Monitoring System: Within one year of the approval of an air monitoring plan under Section 12-15-404, the Petroleum Refinery owner/operator will ensure that a fence-line monitoring system is installed, and is operated in accordance with the approved air monitoring plan. Fence-line monitoring system data shall also be reported as specified in the approved plan.

12-15-502 Recordkeeping: The Petroleum Refinery or Support Facility owner/operator shall maintain records of all information required under this rule. Such records shall be maintained for a period of five years after the date of the records, and shall be made available to the APCO upon request.

ATTACHMENT B

AIR MONITORING GUIDELINES



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

Air Monitoring Guidelines for Petroleum Refineries

AIR DISTRICT REGULATION 12, RULE 15: PETROLEUM REFINING EMISSIONS TRACKING

Prepared by the staff of the
Bay Area Air Quality Management District

April 2016

Air Monitoring Guidelines for Petroleum Refineries

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Appendix 2: Expert Panel Report

Executive Summary

On August 6, 2012, a substantial fire occurred due to a hydrocarbon leak at a crude oil processing unit at the Chevron Refinery in Richmond, California. The fire resulted in a large plume of black smoke and visible emissions from a refinery flare. The August 6, 2012 incident prompted the Bay Area Air Quality Management District (Air District) staff and Board of Directors to identify a series of follow-up actions to enhance the Air District's ability to respond to similar incidents (Board of Directors, October 17, 2012). One of these actions was to convene a panel of air monitoring experts (Expert Panel) to recommend technologies, methodologies and tools to enhance air monitoring capabilities near refineries. In order for the Expert Panel to have a uniform starting point for their discussion, the Air District contracted with Desert Research Institute (DRI) to compile a report that provided background on current air monitoring capabilities near refineries and potential air monitoring technologies, methodologies and tools that could be used at refinery fence-lines and in the community to determine impacts from normal refinery operations and episodic incident-based releases. Another related follow-up action was the development of a new Air District Petroleum Refining Emissions Tracking rule, which would include a requirement that Bay Area refineries establish and operate fence-line air monitoring systems consistent with guidelines to be developed by the Air District.

The purpose of these *Air Monitoring Guidelines for Petroleum Refineries* (Guidelines) is to provide a framework on how these fence-line air monitoring systems should be developed and deployed and what metrics the Air District will use to evaluate the ability of those systems to meet the goals outlined below. The Guidelines provides refineries with information to be used to develop an air monitoring plan that the Air District will review, provide feedback and/or recommendations and approve once the monitoring plan meets the goals of the monitoring effort. More specifically, these Guidelines provide guidance for parties preparing air monitoring plans required by Regulation 12, Rule 15, and guidance to Air District staff that evaluates those plans.

Note on Community Monitoring:

Although DRI and the expert panel considered and made recommendations on air monitoring in the communities around Bay Area refineries, and although draft Regulation 12, Rule 15 initially included community monitoring requirements, the Air District has decided to implement community monitoring through a different mechanism. Therefore, this version of the Air Monitoring Guidelines for Petroleum Refineries includes only fence-line monitoring guidelines.

Background

On August 6, 2012, a substantial fire occurred due to a hydrocarbon leak at a crude oil processing unit at the Chevron Refinery in Richmond, California. The fire resulted in a large plume of black smoke and visible emissions from a refinery flare. The Contra Costa County Health Department issued a community warning and ordered a shelter-in-place for approximately five hours in Richmond and San Pablo. Thousands of residents sought medical treatment, with most suffering respiratory and/or eye discomfort.

The August 6, 2012 incident prompted the Bay Area Air Quality Management District (Air District) staff and Board of Directors to identify a series of follow-up actions to enhance the Air District's ability to respond to similar incidents (Board of Directors, October 17, 2012). One of these actions was to convene a panel of air monitoring experts (Expert Panel) to recommend technologies, methodologies and tools to enhance air monitoring capabilities near refineries. Another related follow-up action was to expedite the development of a new Air District Petroleum Refining Emissions Tracking rule, and to include a requirement that Bay Area refineries establish and operate fence-line air monitoring systems consistent with guidelines to be developed by the Air District. This guidance document is intended to provide a framework on how these air monitoring systems would be developed and deployed and what metrics the Air District will use to evaluate the ability of those systems to meet the goals outlined below.

As part of the effort to develop this guidance, the Air District contracted with Desert Research Institute (DRI) to compile a report that provides background on current air monitoring capabilities near refineries and potential air monitoring technologies, methodologies and tools to:

- Provide air quality information for communities near refineries;
- Gather data to evaluate health impacts associated with air quality near refineries;
- Track air quality changes and trends over time near refineries.

The DRI report reviewed and evaluated measurement approaches and methods for assessing the impacts of refinery emissions on ambient concentrations of criteria and air toxics pollutants in nearby communities and is included in Appendix A. Available data for refinery emissions along with ambient air concentrations were reviewed and compared to established levels for acute and chronic health effects to identify the species that should be considered for air monitoring. Various monitoring options were associated with the following monitoring objectives: short-term characterization of emission fluxes; long-term continuous fence-line monitoring of refinery emission releases to the community; community-scale monitoring with varying time scales to evaluate potential chronic or acute health impacts; and episodic monitoring during catastrophic events. With these objectives in mind, air quality data from existing Air District criteria and air toxics pollutant monitoring programs, and air monitoring (both regulatory and voluntary) by the refineries were then used to identify existing gaps in information or useful supplemental data. Published results from relevant applications of the monitoring approaches were reviewed and the specifications for selectivity, sensitivity, precision, accuracy and costs of commercially-available continuous or semi-continuous monitors, and time-integrated sampling and analysis

methods were compared for each target pollutant to determine the positive and negative attributes of each monitoring approach and method. Potential augmentations to existing monitoring in the Bay Area were suggested with scalable options. It was the intent of the Air District to utilize the DRI report to provide the Expert Panel with a starting point for further discussion.

The Expert Panel was convened on July 11, 2013 and included monitoring experts from around the nation representing academia, community advocates, industry, and government. The final report of the Expert Panel, including a list of participants is provided in Appendix B. The Expert Panel reviewed the DRI report, received a presentation by one of its authors, Mr. David Campbell, and then addressed questions developed by the Air District to further explore potential air monitoring methodologies and instrumentation that could be developed to provide the public, refineries, and regulators information about exposures to the public near refineries. The Expert Panel addressed the following questions:

- What should the size and spatial orientation of a network of monitors be around refineries?
- What network components should be considered (compounds measured, technology and instrumentation used, methodologies applied, air quality assessment tools utilized, etc.)?
- How should the data be provided to the public?
- What should be considered when developing measurement quality objectives, such as:
 - What type of instrument siting criteria should be used?
 - What should the time resolution of the equipment be?
 - How often should the instrumentation be calibrated?
 - What should the accuracy/precision/completeness requirements of the data be?
 - What other quality control/quality assurance requirements should be put in place?
- What technologies, methodologies and tools could be employed to augment any fixed network to better quantify pollutant variations over space and time, especially during short duration incidents?
- What emerging technologies might be utilized in the future to further enhance community air monitoring capabilities?

The Expert Panel believed that open path monitoring capable of measuring representative compounds at near-ambient background levels of detection likely to be emitted by refineries should be employed at, or near, refinery fence-lines. Measurements of these compounds should be collected at a time resolution of five minutes. Data should be displayed to the public real-time, with appropriate QA/QC parameters defined and context provided so that the public can more easily understand when concentration from refineries reach levels of concern.

The Air District has developed this Guidelines Document for monitoring near refineries based on the DRI report and the input provided by the Expert Panel. This Guidelines Document can be used by the refineries to develop Air Monitoring Plans as described in Air District Regulation 12, Rule 15. The guidance is intended to identify what should be included in the Air Monitoring Plan

and what must be provided to the Air District in order to deviate from specific recommendations and satisfy flexible conditions of the guidelines. The Air District recognizes that, in certain circumstances, flexibility must be provided in order to allow for operational or technical limitations of instrumentation or sampling methodologies and has identified where that flexibility may be used as long as acceptable rationale is provided that outlines the operational or technical limitations.

In addition, the Air District will use this Guidelines Document as a basis to evaluate whether Air Monitoring Plans and the monitoring systems contained therein adequately address the monitoring goals of measuring compounds of interest near refineries and reporting them to the public. The Air District encourages the inclusion of the community and other interested parties in the development of Air Monitoring Plans to help ensure that the community's concerns and desires are adequately addressed.

Revisions and updates to this guidance will be required as new instrumentation, methodologies and monitoring strategies are developed. Staff will bring any substantial changes to the Board of Directors for their consideration of approval.

Note on Community Monitoring:

Although DRI and the expert panel considered and made recommendations on air monitoring in the communities around Bay Area refineries, and although draft Regulation 12, Rule 15 initially included community monitoring requirements, the Air District has decided to implement community monitoring through a different mechanism. Therefore, this version of the Air Monitoring Guidelines for Petroleum Refineries includes only fence-line monitoring guidelines.

Section 1: Basic Requirements for an Approvable Air Monitoring Plan

This Section describes the criteria for an approvable Air Monitoring Plan. Plans that meet these criteria will be considered by the Air District and approved if all criteria in this Section are met. However, as part of the approval process, the Air District will consider comments received during the public comment period.

This Guidelines Document provides additional information in later sections that demonstrates pathways to alternatives and outlines processes and considerations for meeting the requirements of developing an Air Monitoring Plan. Where air monitoring requirements described in this Section are not met, subsequent sections outline what a refinery owner/operator should provide as a rationale for why the Air Monitoring Plan should be approved. Such rationale will be evaluated on a case-by-case basis.

1.1 Fence-line Monitoring

Refinery operators must measure **benzene, toluene, ethyl benzene, and xylenes (BTEX)** and **hydrogen sulfide (H₂S)** concentrations at refinery fence-lines with open path technology capable

of measuring in the parts per billion range regardless of path length. Open path measurement of **sulfur dioxide (SO₂)**, **alkanes or other organic compound indicators, 1, 3-butadiene**, and **ammonia** concentrations are to be considered in the Air Monitoring Plan. Refinery operators must provide a rationale in the Air Monitoring Plan for not measuring all of the above compounds that addresses: why these compounds are not contained in the compositional matrix of emissions; are not at expected concentrations measured by available equipment; and/or address the technical or other considerations that make specific measurements inappropriate or unavailable.

Fence-line measurements must be continuously measured with a time resolution of five minutes. If this is not the case, refinery operators must provide a rationale in the Air Monitoring Plan for lesser time resolutions based on equipment or other operational limitations. These measurements must be provided to the public on a real-time basis, with appropriate Quality Assurance/Quality Control (QA/QC) measures taken to provide assurance of data accuracy. A Quality Assurance Project Plan (QAPP) that follows EPA guidelines must be developed that outlines the QA/QC parameters. Instrumentation must meet a minimum of 75 percent completeness on an hourly basis, 90 percent of the time based on annual quarters. Atmospheric conditions beyond the control of the refinery that affects accurate measurements, such as dense fog, shall not be counted against data completeness requirements as long as appropriate meteorological measurements document time periods when these conditions exist.

Measurements must cover populated areas within one mile of the refinery fence-line likely to be affected when the annual mean wind direction lies in an arc within 22.5 degrees of a direct line from source to receptors 10 percent of the time, or greater, based on the most representative meteorological measurements for sources likely to emit the compounds listed above at the refinery. If this is not the case and an alternative method, such as dispersion modeling is used to determine fence-line locations, refinery operators must provide a rationale for utilizing any alternative in the Air Monitoring Plan that addresses why receptors would not be affected by emissions from the sources within the refinery.

Refineries that already have open path monitoring capabilities in place need only provide verification those current systems adequately address population requirements.

1.2 Display of Monitoring Information

The data must be displayed to the public as defined above and available to the Air District in an approved format. The refinery operator must include in the Air Monitoring Plan how the data will be displayed and the steps taken to provide context of the measurements to the public, including how background concentrations and/or contributions from non-refinery sources affect measured concentrations. The Air Monitoring Plan must also outline a methodology for the public to provide comments and feedback for improvement of the website. It is hoped that this will be a mechanism to help improve the general understanding by the public of the air quality information presented but does not require refineries to address all comments received.

Comments regarding the website made by the public must be made available to the Air District upon request.

Section 2: Air Monitoring Guidelines Document and Development of Air Monitoring Plans

The Air District is providing this Guidelines Document to enable Air District staff, the community, industry and other interested parties to determine if Air Monitoring Plans submitted by Bay Area refineries adequately collect the data needed to determine air pollutant exposures associated with living or working near Bay Area refineries. Information gathered by the equipment and methodologies outlined in the Air Monitoring Plan will be used to evaluate the need for additional actions to reduce emissions and exposures.

This Guidance Document and the below sections outline where documentation and rationales for decision making must be included in the Air Monitoring Plan. The Air District understands that there is a need for flexibility when designing air monitoring networks. Air Monitoring Plans should document the considerations that were taken, the process involved with determining the proposed course of action and the potential affects the different choices may have on the data produced to support the decisions made.

The Expert Panel was clear that not all measurements need to necessarily utilize high cost instrumentation, provide real-time results or be located on a permanent basis as long as technologies met monitoring goals, long term measurements or demonstrated strong agreement with Health Risk Assessment (HRA) modeling. The Expert Panel stressed the need to leverage all monitoring activities available, be they regulatory or informational. Examples of this type of monitoring strategy are also provided in the DRI report. If alternatives monitoring strategies, such as those outlined in the DRI report or discussed by the Expert Panel, are proposed to replace measurement and/or equipment required in Section 1 for consideration, an acceptable rationale for this substitution must be supplied and approvable in the Air Monitoring Plan.

It is important to note that the Expert Panel generally agreed that information collected outside of refinery fence-lines could not be effectively utilized to take direct enforcement action but could be an effective tool to potentially identify areas where actions could be taken to reduce emissions. However, the Air District believes that there is the potential for fence-line measurements to be used in the Ground Level Monitoring (GLM) regulatory network if data collected correlates well with the current in-place network. In addition, this Guidelines Document is not intended to provide a representation of exposures within refinery property.

The following sections and appendices are intended to provide guidance on specific considerations that should be investigated and thoroughly addressed in the Air Monitoring Plan. It is required that a Quality Assurance Project Plan (QAPP) that follows EPA guidelines be provided with the Air Monitoring Plan that outlines the specific goals of the monitoring networks and instrumentation, the data quality that is required and how that relates to when data generated

by the instrumentation is accepted, and how the data will be reviewed and managed by the refineries.

2.1 Data Display and Dissemination

The Expert Panel discussed how measurement results should be displayed to the public. The Air Monitoring Plan must address the measurements of compounds as well as the display and dissemination of this information. This Guidelines Document provides information on this subject in *Section 4: Data Display/Reporting*. Providing context for the measurements is an important consideration when displaying the information. The Air Monitoring Plan submitted by the refinery operators must describe how the refinery will provide the air monitoring data in a way that the public can readily access and understand. This would require involving interested parties in the design of data dissemination. The Air Monitoring Plan must also provide a means for the public to provide input toward improving the way data are displayed in order to aid in understanding. It is hoped that this will be a mechanism to help improve the general understanding by the public of the air quality information presented, but does not require refineries to address all comments received. It should also be noted that there is potential for the current GLM network to be incorporated into this display of data in the future.

Section 3: Considerations for Fence-line Monitoring

As stated above, the main goals of fence-line monitoring are to:

- Provide continuous air quality concentration information on a short enough time scale to address changes in fence-line concentrations of compounds associated with refinery operations;
- Provide data of sufficient accuracy to identify when concentrations of compounds associated with refinery operations are elevated as compared to other monitoring locations throughout the Bay Area;
- Provide context to the data so that the community can determine differences in air quality between their location and other locations in the Bay Area;
- Potentially aid in identifying corrective actions that will lower emissions.

It is expected that the fence-line monitoring will be permanently installed and continually operated.

As pointed out in the DRI report, multiple technologies need to be employed to ensure adequate compound identification at appropriate levels of detection and accuracy. The Expert Panel also agreed that each refinery should identify compounds of interest and define correlations and relationships of compounds prior to choosing measurement technologies and that potential interference(s) should be identified to ensure representative results. Air Monitoring Plans must include which organic and other refinery generated compounds likely to impact the health and wellbeing of people are likely to cross fence-lines and whether or not the proposed equipment is capable of measuring those compounds. If a refinery wishes to utilize a technology other than open path, the rationale for the choice must be outlined in the Air Monitoring Plan. The rationale

must include how the proposed technology will be representative of the varying concentrations along the applicable refinery fence-line and how the time resolution goal of five minutes will be met. In addition, it should include how the proposed technology will meet data completeness and quality objectives and how the proposed technology's advantages/disadvantages compared to open path technologies.

Technologies proposed in the Air Monitoring Plan must be able to measure, at a minimum, benzene, toluene, ethyl benzene, and xylenes (BTEX) and hydrogen sulfide (H₂S) and potentially sulfur dioxide (SO₂), alkanes or other organic compound indicators, 1, 3 butadiene and ammonia. Exclusion of any of these compounds by fence-line monitoring must be thoroughly explained in the Air Monitoring Plan.

3.1 Open Path Monitoring

The Expert Panel agreed with the DRI report that open path monitors best addressed the goal of monitoring potential impacts from refineries and also believed that shorter time scale resolution was very desirable. Open path equipment should provide appropriately accurate data on an hourly basis, at a minimum, and the Expert Panel believed that five-minute data resolution was reasonable. The rationale for the technology chosen and the associated time resolution should be included in the Air Monitoring Plan.

Investigation prior to fence-line installation should address areas more likely to emit compounds of interest and identify the appropriate open path distance necessary to accurately and precisely capture those emissions. The results of the investigation must be provided in the Air Monitoring Plan, providing support for the technologies chosen. In addition, the elevation of likely emissions as well as topographical changes should also be incorporated into the evaluation to ensure maximum coverage.

Meteorological measurements should also be used and addressed in the Air Monitoring Plan to ensure proper location of fence-line systems, looking at long term measurements such as annual average wind rose, but also taking into account more seasonal and recurring short term meteorological events. It was also suggested, and is likely in the best interest of the facilities, to locate additional fence-line monitoring in a predominately upwind location to measure contributions from upwind sources that could impact downwind refinery fence-line measurements. The following guidance and metrics will be used by the Air District to evaluate the expected performance of the fence-line monitoring portion of the Air Monitoring Plan.

Refineries that already have open path monitoring capabilities in place need only provide verification those current systems adequately address population requirements.

The EPA has recently proposed a rule requiring monitoring for benzene at refinery fence-lines. The Air District believes that the best methodology for this is the use of open path technologies,

and will work to ensure that monitoring systems proposed as part of the Air Monitoring Plan meet all applicable EPA requirements for monitoring of benzene.

A summary of fence-line monitoring considerations appears in Table 1.

Table 1. – Fence-Line Monitoring Considerations

Evaluate	Information Needed	Additional Considerations
Compounds likely to be emitted	Compound relations and correlations within the facility	Likely interferences
Precision, accuracy and minimum levels of detection of equipment	Information that is represented of compounds of interest at concentrations likely to cause concern	Maximum path length allowed to provide precision and accuracy
Time resolution of data produced	Resolution will be adequate to appropriately capture short duration events	Data management
Identify likely emission sources and compounds likely to be emitted from those sources	Compounds potentially unique to emission sources to ensure appropriate technology will be representative	Potential to utilize multiple technologies to capture relevant information
Topography of measurement area and elevation of equipment	Measurements will likely capture emissions from sources of concern	Power and security
Meteorology	Annual average and likely to occur wind patterns	Variations of wind from location to location

3.2 Appropriate Sampling Locations

Air Monitoring Plans must include locations of equipment, elevations of equipment and expected path length and the rationale behind these choices. Potential disruption of airflow and the potential effect on measured concentrations cause by obstacles must also be addressed. Any interferences cause by meteorological or process issues associated with the chosen location must be addressed. For example, an explanation should be included if a chosen measurement area is likely to be affected by fog or process steam. In addition, the Air Monitoring Plan should include how the open path monitoring will effectively provide relevant information for all nearby downwind communities during expected meteorological conditions.

3.3 Appropriate Sampling Methodologies

Air Monitoring Plans must address why a particular measurement method was chosen for a given location based on likely emissions from nearby contributing sources, desires to reach appropriate levels of detection and ability to measure compounds that have potentially unique relationships that apply to the particular facility. Factors that affect measurements, such as path length and potential interferences, should also be addressed. Issues that affect data completeness for the measurement technique proposed should be documented. If time periods when data cannot be collected due to these operational issues are to be excluded from data completeness calculations, methodologies for determining and documenting when the events occur must be addressed. Errors associated with the measurement technologies as well as accuracy, repeatability and precision should be documented and presented and ways to address these issues provided in the Air Monitoring Plan.

3.4 Quality Assurance/Quality Control (QA/QC)

Methodologies for ensuring appropriate levels of QA/QC must be provided in the Air Monitoring Plan to ensure data are of high enough quality and representative and defensible enough to meet the goals described in Section 3.3. The QA/QC plan should set data acceptance levels as well as appropriate levels of data quality. In addition, the QA/QC plan should address data management issues and provide the levels of review that data will go through to determine validity. This should be outlined in a Quality Assurance Project Plan (QAPP) that follows EPA guidelines submitted in the Air Monitoring Plan. It is critical that this portion of the monitoring plan identify a clear and transparent manner when data does not meet quality requirements and should be removed from the data set, to ensure the community understands why data is removed.

Section 4: Data Display/Reporting

The Expert Panel discussed the importance of providing relevant, useful and understandable monitoring information to the public. Monitoring that requires laboratory analysis, or involves time-integrated sampling methods and therefore would not be presented to the community real-time, would also need to be made available to the public, but would most likely require a different display format. It should be noted that use of integrated sampling methods and laboratory analysis would require an explanation in the Air Monitoring Plan of why these methods were chosen over open path technologies as stated in other sections of this Guidance Document. The Expert Panel stressed the need for QA/QC requirements to be stated clearly up front, so that if data removal were required due to failed QA/QC objectives, the rationale for the data removal would be done in a transparent way with proper notation.

Providing context to measurements that the public could readily understand was also stressed, with graphics to allow residents to determine when concentrations were within normal ambient ranges and what constituted concentrations that might indicate potential issues. This included providing information regarding the affects background concentrations as well as non-refinery sources may impact measurements. There was also a realization that more complex data should

also be provided, so that residents that had the understanding and ability could perform additional analysis. There was also general agreement by the Expert Panel that any data display should contain a means for residents to provide feedback so that improvements could be made to data display as well as monitoring activities over time.

Air Monitoring Plans must provide an explanation of how data will be provided to the public, how that data will be provided context, and how the public will be able to provide feedback to improve the process. Feedback regarding the website or other data presentation must be made available to the Air District upon request. It should also be noted that there is potential for the current GLM network to be incorporated into this display of data in the future.

4.1 Time Resolution and Data Availability

Air Monitoring Plans should provide information on how real-time data will be distributed to the community and how other data generated by this air monitoring will be made available. It is assumed that this will likely result in data being presented on a website on a real-time basis and many examples of these types of websites exist. Ideally, the websites for all refineries would be similar in nature, so that the public could compare the various data to each other, though this is not a requirement. In addition, the Air Monitoring Plan must contain alternatives for those members of the community who may wish to have access to data while not having computer access at home, such as ensuring that the website can be accessed at a public library. The data must also be made available to the Air District in an approved format.

As stated previously, continuous instrumentation should be capable of producing data on an hourly basis, at a minimum, with data resulting from fence-line instrument measurements available on a shorter time resolution, ideally at five minutes. Data completeness for displayed data (as defined by collected measurement data being successfully displayed) should be upwards of 95 percent, given the reliability of current telecommunications equipment. Members of the Expert Panel representing the community provided input that as long as QA/QC data removal requirements were provided up front and were reasonable, removal of questionable data was not usually an issue. As a result, Air Monitoring Plans must incorporate how data can be displayed real-time, while incorporating necessary QA/QC to ensure representative data. Air Monitoring Plans must also address timeframes that data will be provided and the rationale behind those decisions as well as minimum expected uptime for the website. While QA/QC and data completeness must be addressed in the QAPP, how these will be applied to real-time display must also be provided in the Air Monitoring Plan. It is understood that a balance between providing data as close to real time as possible and providing adequately QA/QC'd data must be struck. It is assumed that data will go through a rudimentary QA/QC screening prior to display, and a more thorough review in which data may need to be removed from display due to data quality issues. Clearly defining the QA/QC parameters that will result in data removal in the QAPP is critical in ensuring a transparent method to data removal.

The Air Monitoring Plans must also include how the refineries will provide context that the community can utilize to understand what the data mean. This must include a mechanism for feedback and improvement of the site and a means for residents to report experiences and provide information regarding potential impacts from the refinery that could be used to improve data display and the monitoring activities themselves.

Air Monitoring Plans should also include how residents can access historical data directly, as websites should not simply provide graphical information about current conditions. The Expert Panel suggested that data should be “layered” so that interested parties with expertise could access more complex and complete datasets and these considerations must be incorporated into the Air Monitoring Plan. It is recognized and expected that this will likely involve appropriate annotation of data to convey limitations and issues associated with these more complex datasets.

Section 5: Siting Considerations

Sampling should be spaced away from certain supporting structures and have an open, unobstructed fetch to the target area. At least 90 percent of the monitoring path for open path, remote sensing instruments, should be at least one meter vertically and/or horizontally away from any supporting structure, and away from dusty or dirty areas. Rationale for siting equipment should be included in the Air Monitoring Plan. Locations where power may not be adequate to ensure proper equipment operation or where substantial security measures must be taken may also be considered while evaluating appropriate sites.

5.1 Nearby Structures

Structures may be present that can significantly impact pollutant concentrations. These structures include sound walls or noise barriers, vegetation, and buildings. Physical barriers affect pollutant concentrations around the structure by blocking initial dispersion and increasing turbulence and initial mixing of the emitted pollutants. While these structures can trap pollutants upwind of the structure, these effects are very localized and likely do not contribute to representative peak exposures for the nearby population. In general, these structures should be avoided when establishing fence-line monitoring systems. Air Monitoring Plans must address how any effects caused by structures were identified and addressed.

5.2 Terrain

As described previously, local topography can greatly influence pollutant transport and dispersion. However, large-scale terrain features may also impact where peak concentrations can occur. Air Monitoring Plans must address how the effects of terrain were taken into consideration and addressed.

5.3 Meteorology

Evaluating historical meteorological data is useful in determining whether certain candidate locations may experience a higher proportion of direct impacts from emissions from a given source or process. Often, peak concentrations occur during stable, low wind speed conditions. Thus, historical wind directions should be a consideration in establishing any monitoring site, but should not be the only considerations. A rationale for how meteorological measurements were used to determine sampling locations should be included in the Air Monitoring Plan.

Section 6: Multi-pollutant Monitoring

Multi-pollutant monitoring is a means to broaden the understanding of air quality conditions and pollutant interactions, furthering capabilities to evaluate air quality models, develop emissions control strategies, and support research, including health studies. The DRI report and the Expert Panel recognized the need to employ a multi-pollutant monitoring strategy at refineries for these reasons and this Guidelines Document provides the following list of compounds for consideration as part of the Air Monitoring Plan. All compounds must be considered and evaluated with rationale for chosen measurements. As stated throughout this Guidelines Document, the Air District would consider adding or deleting compounds in the below list dependent on the rationale provided for inclusion and/or exclusion in the Air Monitoring Plan.

6.1 Hydrogen Sulfide (H₂S)*

H₂S is a colorless gas with a strong “rotten egg” odor and can be smelled at very low concentrations. It is poisonous, discolors paints and can tarnish metals. Although it is produced at sewage treatment plants and through anaerobic processes, it is also produced at oil refineries as a by-product of refining crude oil. As a result, measurement of this compound will help identify potential leaks at refineries.

6.2 Nitrogen Oxides (NO₂)*

Scientific evidence links NO₂ exposures with adverse respiratory effects, making it a compound that is routinely measured in ambient air monitoring networks. NO₂ measurements also typically include measurement of NO and NO_x. It is emitted during combustion and is therefore of interest near refineries, though there are many sources of nitrogen oxides. Measurement of these constituents will help determine if refineries add significant concentrations to nearby urban environments by comparing measurements with other Bay Area locations.

6.3 Particulate Matter (PM) and Constituents

Combustion sources emit significant amounts of PM. Motor vehicles may also contribute to elevated PM concentrations by re-suspending dust present on the road surface. There are regulations that address ambient concentrations of PM less than 10 µm in diameter (PM₁₀) and PM less than 2.5 µm in diameter (PM_{2.5}). While both of these PM size fractions are emitted during

combustion, the majority will generally be in the PM_{2.5} size fraction. Since combustion-emitted particles typically occur at less than 0.1 µm in diameter, these emissions tend to contribute little to ambient PM_{2.5} mass concentrations, but do contribute significantly to PM number concentrations, and may impact the chemical composition of the PM_{2.5} mass collected relative to urban background conditions. PM emitted through mechanical processes (brake wear, tire wear, re-suspended road dust) will tend to be in the PM₁₀ size fraction and can lead to elevated mass concentrations. As a result, PM_{2.5} mass measurements may be useful for estimating potential refinery contributions to nearby urban environments by comparing measurements with other Bay Area locations.

Most PM₁₀ and PM_{2.5} mass measurements use filter-based, gravimetric analyses over a 24-hour sample collection period. Diurnal variations in meteorology can have a tremendous impact on air quality that may not be identifiable in 24-hour average measurements. Thus, continuous PM measurements provide useful information for refinery emission measurement applications; however, care must be taken in choosing a sampling method. Optical PM mass samplers typically cannot detect particles less than approximately 0.2-0.5 µm in diameter. Therefore, these measurement devices may not capture a significant amount of the PM mass related to primary combustion emissions. In addition, some continuous PM samplers heat the inlet air prior to analysis. Since PM emissions can contain a significant amount of semi-volatile organic compounds, these samplers can underestimate the PM mass by volatilizing the organic PM prior to collection in the sampler.

6.4 Speciated Hydrocarbons*

Speciated hydrocarbons are pollutants that are made up of hydrogen and carbon and can be associated with adverse health effects. They are emitted by a large number of sources, but many hydrocarbons are associated with fuels and the production of fuels. As a result, measurement of these compounds is critical to determining the impacts refineries have on nearby communities. The following are potential compounds of interest and are separated out based on their measurement and/or analytical techniques. Measurement of hydrocarbons will help determine if refineries add significant concentrations to nearby urban environments and can indicate leaks and emissions from refinery sources by comparing measurements with other Bay Area locations.

6.4.1 Aldehydes*

Aldehydes emitted into ambient air include, but are not limited to, formaldehyde, acetaldehyde, and acrolein. A more detailed listing of aldehydes with potential health concerns is provided by OEHHA. Aldehydes are typically measured using cartridges containing dinitrophenyl hydrazine (DNPH). However, other methods, including evacuated canisters and cartridges containing other compounds, have been used to measure ambient concentrations of some of these compounds. Sample collection periods of 24 hours or more are typically required for assessing ambient aldehyde concentrations, although a few manufacturers advertise semi-continuous analyzers for select compounds.

6.4.2 Polycyclic Aromatic Hydrocarbons (PAH)*

Polycyclic Aromatic Hydrocarbons (PAHs) are hydrocarbons with multiple aromatic rings that have been associated with potential health effects. They are present in fossil fuels and can be formed as part of the combustion process, though there are many sources of PAHs. Sampling and analysis for PAHs requires very specific techniques and methodologies, though there are some non-specific, real-time instruments available. A more detailed listing of PAHs with potential health concerns is provided by OEHHA.

6.4.3 Volatile Organic Compounds (VOCs)*

These air pollutants are found in the gas phase in ambient air. Typical VOCs of concern include, but are not limited to, benzene, toluene, ethylbenzene, xylenes (BTEX), 1, 3 butadiene, acrolein, and styrene. A more detailed listing of potential VOCs of health concern is provided by the OEHHA. VOCs are typically measured by the collection of ambient air using evacuated canister sampling and subsequent analysis on a gas chromatograph (GC). For evacuated canister sampling, the sample collection time can vary from instantaneous grab sample to averaging times of more than 24 hours depending on the collection orifice used. As discussed for PM sampling, shorter averaging times can be important to discern the impacts of varying environmental conditions. Auto-GCs can be used to measure select VOC pollutant concentrations semi-continuously at a monitoring site. A number of manufacturers also advertise semi-continuous analyzers for one or more VOCs of interest using various GC technologies.

6.5 Sulfur Dioxide (SO₂)*

Heating and burning of fossil fuel releases the sulfur present in these materials and result in the formation of SO₂. SO₂ can have direct health impacts as well as cause damage to the environment and, as result, is routinely measured in ambient air monitoring networks. Like H₂S, SO₂ is produced at refineries, though there are other sources. As a result, measurement of this compound will help identify potential leaks and other issues at refineries.

6.6 Surrogate Measurements*

A number of surrogate measurements can also be considered to assist in interpreting emission impacts on air quality and to determine possible causes of adverse health effects. A common surrogate has been the use of CO to represent the impacts of other non-reactive gas emissions that are more difficult to measure from emission sources. While studies do show that CO and other non-reactive VOC concentrations tend to correlate in some near combustion source environments, the magnitude of VOC concentrations relative to CO concentrations may be difficult to discern because of varying impacts from control strategies and emission sources. Regulations that have led to reductions in CO emissions may not equally affect VOC emission rates. In addition, CO is emitted by fuel combustion, whereas VOCs are emitted from both combustion and evaporation processes.

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Other surrogate measurements focus on PM constituents that are primarily emitted from motor vehicles and other combustion processes and may pose a public health concern. These surrogate measurements were discussed in the above sections.

If surrogate measurements are proposed in the Air Monitoring Plan, the relationship to compounds of interest must be identified and confirmed for the application desired.

Appendix 1: DRI Report

Appendix 2: Expert Panel Report