



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

## **WORKSHOP REPORT**

### **PROPOSED AIR DISTRICT REGULATIONS 12, RULE 15: PETROLEUM REFINING EMISSIONS TRACKING AND REGULATION 12, RULE 16: PETROLEUM REFINING EMISSIONS ANALYSIS, THRESHOLDS AND MITIGATION**

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## Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>I. INTRODUCTION .....</b>	<b>5</b>
<b>II. BACKGROUND INFORMATION.....</b>	<b>5</b>
A. Bay Area Petroleum Refineries.....	5
B. Regulation of Air Pollutants from Petroleum Refineries .....	9
<b>III. NEED FOR REGULATORY ACTION .....</b>	<b>14</b>
<b>IV. PROPOSED RULES.....</b>	<b>16</b>
A. Regulation 12, Rule 15 - Administrative Procedures.....	16
B. Regulation 12, Rule 15 - Pollutant Coverage.....	17
C. Regulation 12, Rule 15 - Source Coverage .....	17
D. Regulation 12, Rule 15 - Emissions Inventory Development .....	18
E. Regulation 12, Rule 15 - Emissions Inventories and Crude Slate Report.....	19
J. Regulation 12, Rule 16 - Administrative Procedures.....	21
K. Regulation 12, Rule 16 – Emission Trigger Levels .....	22
L. Regulation 12, Rule 16 - Pollutant and Source Coverage.....	22
M. Regulation 12, Rule 16 – Emission Reduction Plan (ERP) .....	23
N. Regulation 12, Rule 16 – Toxic Air Contaminant Trigger Levels and HRAs ....	23
O. Regulation 12, Rule 16 – Crude Oil Throughput.....	24
P. Regulation 12, Rule 16 - Limited Exemptions .....	24
<b>V. COST RECOVERY .....</b>	<b>25</b>
<b>VI. RULE DEVELOPMENT / PUBLIC CONSULTATION PROCESS .....</b>	<b>25</b>
APPENDIX A	
<b>Proposed Rules</b>	
APPENDIX B	
<b>Emissions Inventory Guidance</b>	
APPENDIX C	
<b>Air Monitoring Guidance</b>	

## **EXECUTIVE SUMMARY**

Changes in crude oil stock being processed in Bay Area refineries, or other factors, could cause air emissions to increase. As a result, the Bay Area Air Quality Management District (“Air District”) is proposing two regulations: the Petroleum Refining Emissions Tracking Rule (herein “Tracking Rule”) to gather emissions inventory and crude slate information and to increase air monitoring activities at refinery fence lines and in nearby communities; and, the Petroleum Refining Emissions Analysis, Thresholds and Mitigation Rule (herein “Mitigation Rule”) to establish emissions thresholds that require refineries to perform causal analysis for emissions increases above trigger levels and develop mitigation plans for criteria pollutants and toxic air contaminants (TACs) to impose all cost effective measures for reducing emissions increases not caused by increases in crude oil throughput.

The proposed Tracking Rule would put in place requirements to enhance the tracking of refinery emissions and crude composition over time. Tracking this information would allow the Air District to use emissions inventory data, crude oil information and air monitoring data to identify any potential relationship between emissions and crude oil quality. In addition, the rule would also require updated Health Risk Assessments (HRAs) be performed utilizing the latest methodology and health effects data to provide additional information regarding health risk from air emissions at refineries.

The proposed Mitigation Rule would use emissions information gathered by the Tracking Rule to establish “trigger level” emissions thresholds and would require refineries to address increases in emissions above the “trigger level” due to, among other causes, changes in crude oil composition. The causal analysis required when emissions thresholds are exceeded would explain why the emissions increase occurred. Enforceable “emission reduction plans” would commit the refineries to planned reductions. If planned reductions are not sufficient to bring emissions back below trigger level thresholds within two years of submission of an emission reduction plan, an audit would be required to identify all feasible measures for emission reductions.

The Air District would also use information gathered to require emission reductions either through investigation and applicable enforcement action or further rulemaking. This investigatory process has been successfully applied by the Air District in the past as evidenced by the overall emissions reductions achieved over time throughout the Bay Area and at the refineries in particular. These rules would require Bay Area refineries to comply with the following requirements:

### **Proposed Regulation 12, Rule 15**

- Report on-going annual emissions inventories of criteria pollutants, Toxic Air Contaminants (TACs) and Greenhouse Gases (GHG) based on upgraded methods, including emissions from refinery cargo carriers
- Establish a Petroleum Refinery Emissions Profile (PREP), and require that on-going emissions inventories include comparisons with the PREP
- Report on-going crude oil characteristics with annual emissions inventories (e.g.,

sulfur and nitrogen content, API gravity, Total Acid Number)

- Update refinery-wide HRAs based on upgraded TAC emissions inventories and revised California EPA Office of Environmental Health Hazard Assessment (OEHHA) HRA guidelines
- Enhance fence line air monitoring systems and establish community air quality monitoring systems

Proposed Regulation 12, Rule 16

- Require a causal analysis if criteria pollutant, TAC and/or GHG emissions increases not exempt from this rule are above trigger level thresholds.
- Require the submission of an emission reduction plan for criteria pollutants and TACs to reduce emissions when trigger levels are exceeded.
- Require the submission of an emissions audit requiring implementation of all feasible measures if planned emission reductions will not fully mitigate emission increases within two years after the submission of an emission reduction plan.
- Require updates to emission reduction plans if expected emissions reductions are not achieved in practice.

## **I. INTRODUCTION**

This report was prepared to provide information relevant to the development of new rules by the Bay Area Air Quality Management District (“Air District”) that would apply to petroleum refineries located in the San Francisco Bay Area. The titles of these new proposed rules are *Regulation 12, Rule 15: Petroleum Refining Emissions Tracking* and *Regulation 12, Rule 16: Petroleum Refining Emissions Analysis, Thresholds and Mitigation*. The development of these rules was included as Action Item 4 in the Air District’s *Work Plan for Action Items Related to Accidental Releases from Industrial Facilities*, which was approved by the Air District’s Board of Directors on October 17, 2012. The Air District seeks additional input in the development of these new proposed rules from the public and other interested stakeholders, and will hold a second series of public workshops and additional meetings for this purpose. Public workshops were held on a previous draft of this rule in Martinez on April 22, 2014, Richmond on April 24, 2014 and the Air District offices on April 26, 2014. This second series of workshops will present revised draft rules as well as guidance documents for air monitoring and developing emissions inventories.

## **II. BACKGROUND INFORMATION**

### **A. Bay Area Petroleum Refineries**

Currently five petroleum refineries are located in the Bay Area within the jurisdiction of the Air District:

1. Chevron Products Company (Richmond),
2. Phillips 66 Company – San Francisco Refinery (Rodeo),
3. Shell Martinez Refinery (Martinez),
4. Tesoro Refining and Marketing Company (Martinez), and
5. Valero Refining Company – California (Benicia).

#### **1. Petroleum Crude Oil**

Petroleum refineries convert crude oil into a wide variety of refined products, including gasoline, aviation fuel, diesel and other fuel oils, lubricating oils, and feed stocks for the petrochemical industry. Crude oil consists of a complex mixture of hydrocarbon compounds with smaller amounts of impurities including sulfur, nitrogen, oxygen and metals (e.g., iron, copper, nickel, and vanadium). Crude oil that originates from different geographical locations may vary significantly with respect to its composition, and is most often determined by the oils’ density (light to heavy) and sulfur content (sweet to sour).

##### **a) API Gravity**

The industry standard measure for crude oil density is American Petroleum Institute (API) gravity, which is expressed in units of degrees, and which is inversely related to

density (i.e., a lower API gravity indicates higher density; a higher API gravity indicates lower density). Put another way, API gravity is an indirect measure of the amount of gasoline and distillate (diesel, jet fuel and home heating oil are collectively referred to as distillates). Lower API gravity crudes contain less gasoline and distillate and larger amounts of heavy tar-like components that require more processing to produce heavy molecules into gasoline and distillate. As a result, “light crude” is more desirable since it takes less processing to extract more marketable products from it (e.g., gasoline, fuel oils, and aviation fuel). “Light crude” generally refers to crude oil with API gravity of 38 degrees or more; “medium crude” has API gravity between 22 and 38 degrees; and “heavy crude” has API gravity of 22 degrees or less.

b) Sulfur Content (“Sweet” and “Sour” Crude)

“Sweet crude” is commonly defined as crude oil with a sulfur content of less than 0.5 percent, while “sour crude” has a sulfur content of greater than 0.5 percent. “Sweet crude” is more desirable since sulfur must be removed from the crude to produce more valuable refined products such as gasoline, diesel and aviation fuels. Sour crudes tend to be more corrosive than sweet crudes, resulting in more inspection and maintenance of equipment when more sour crudes are processed.

c) Trends and Impacts of Varying Crude Composition

“Light, Sweet Crude” is the most sought-after type of crude oil as it contains a disproportionately large amount of the hydrocarbon fractions that are used in more valuable refined products, is usually less corrosive and doesn’t require as much processing to remove sulfur. API gravity has steadily decreased and sulfur content has steadily increased in the United States over the last several decades. The trend towards lower API gravity/high sulfur crudes is largely due to the refiners’ preference for light sweet crude – this has led to the depletion of those reserves and reduced the market share of the light sweet crude that remains. These trends are expected to continue; some have estimated that worldwide production of heavy sour crudes will increase by about one-third by the year 2020.

## 2. Petroleum Refining Processes

Petroleum refineries are complex facilities that convert crude oil into a wide variety of refined products, including gasoline, aviation fuel, diesel fuel and other fuel oils, lubricating oils, and feed stocks for the petrochemical industry. Refineries consist of the following general processes and associated operations.

a) Separation Processes

Crude oil consists of a complex mixture of hydrocarbon compounds with small amounts of impurities including sulfur, nitrogen, and metals. The first phase in petroleum refining is the separation of crude oil into its major constituents using distillation and “light ends”

recovery (i.e., gas processing) that split crude oil constituents into component parts known as “boiling-point fractions”.

b) Conversion Processes

To meet the demands for high-octane gasoline, jet fuel, and diesel fuel, components such as residual oils, fuel oils, and light ends are converted to gasoline and other light fractions by various processes. These processes, cracking, coking, and visbreaking, are used to break large petroleum molecules into smaller ones. Polymerization and alkylation processes are used to combine small petroleum molecules into larger ones. Isomerization and reforming processes are applied to rearrange the structure of petroleum molecules to produce higher-value molecules of a similar size.

c) Treating Processes

Petroleum treating processes stabilize and upgrade petroleum products by separating them from less desirable products, and by removing other elements. Treating processes, employed primarily for the separation of petroleum products, include such processes as deasphalting. Elements such as sulfur, nitrogen, and oxygen are removed by hydrodesulfurization, hydrotreating, chemical sweetening, and acid gas removal.

d) Feedstock and Product Handling

Refinery feedstock and product handling operations consist of unloading, storage, blending, and loading activities.

e) Auxiliary Facilities

A wide assortment of processes and equipment not directly involved in the refining of crude oil are used in functions vital to the operation of the refinery. Examples are boilers, waste water treatment facilities, hydrogen plants, cooling towers, and sulfur recovery units. Products from auxiliary facilities (e.g. clean water, steam, and process heat) are required by most process units throughout the refinery.

e) Cargo Carriers

While some crude oil is transported to refineries by pipeline, ships and trains can be used to move large quantities of crude oil to refineries. Since these shipping techniques are vital to the operation of the refinery and can have additional emissions associated with them, they can be considered part of the refining process.

f) Expected Variations in Emissions

Emissions from petroleum refineries are expected to vary from year to year for a number of reasons. Fluctuations in crude oil input and semi-processed crude oil, also

known as “intermediates”, can require additional processing, resulting in the potential for increased emissions. Expected degradation of process units, such as decreasing efficiency of catalytic cracking units, as well as changes in processing environment, such as fuel gas composition, can also result in increased emissions. There is concern that changes in crude oil composition may also result in increases in emissions.

When addressing the causes of emissions increases, it is important to differentiate those associated with increases in crude oil throughput. Refineries must be able to address increases in demand for marketable products that result in additional refining of crude oil to ensure an adequate supply of gasoline, diesel, jet fuel and other marketable products for California. The intent of the proposed Mitigation Rule is not to require mitigation for emissions increases within permitted limits due solely to increases in throughput at the crude oil unit. This will help to ensure that the adequate supply of marketable products is not adversely affected by the requirements of the proposed rules.

There is concern that processing of these heavier and/or more sour crudes oils may result in increased emissions from refineries. It is anticipated that refineries will both update and/or modify their equipment to meet more strict regulatory fuel requirements and potentially to process heavier and or more sour crude oil. The proposed rules provide a means to determine overall changes in refinery emissions as processes and equipment change and to mitigate emissions not associated with crude oil increases. Thresholds established in the Mitigation Rule are designed to allow emissions variations from year to year caused by wear and tear as well as expected decreases in refinery processes.

### 3. Air Pollutants Emitted from Petroleum Refineries

Air pollutants are categorized based on their properties, and the programs in which they are regulated, as follows: (1) Criteria pollutants, (2) toxic air contaminants (which in federal programs are referred to as hazardous air pollutants), and (3) greenhouse gases. Additional categories of air contaminants include odorous compounds and visible emissions, although these are most often also components of one or more of the three primary categories of regulated air pollutants previously listed.

Criteria pollutants are emissions for which Ambient Air Quality Standards (AAQS) have been set, or that are atmospheric precursors to such air pollutants (i.e., air emissions that then participate in chemical reactions to form a criteria pollutant). The AAQS are air concentration-based standards that are set to protect public health and welfare. The U.S. EPA sets AAQS on a national basis (National Ambient Air Quality Standards, or NAAQS), and the California Air Resources Board (CARB) sets AAQS for use in the State of California (California Ambient Air Quality Standards, or CAAQS). Although there is some variation in the specific pollutants for which NAAQS and CAAQS have been set, the term “criteria pollutants” generally refers to the following: (1) Carbon monoxide (CO), (2) nitrogen dioxide (NO<sub>2</sub>) and oxides of nitrogen (NO<sub>x</sub>), (3) particulate matter (PM) in two size ranges -- diameter of 10 micrometers or less (PM<sub>10</sub>), and

diameter of 2.5 micrometers or less ( $PM_{2.5}$ ), (4) precursor organic compounds (POC), and (5) sulfur dioxide ( $SO_2$ ). Each of these criteria pollutants are emitted by petroleum refineries.

Toxic air contaminants (TACs) are emissions for which AAQS have generally not been established, but that nonetheless may result in human health risks. TACs are generally emitted in much lower quantities than criteria pollutants, and may vary markedly in their relative toxicity (e.g., some TACs are millions of times more toxic than other TACs). The State list of TACs currently includes approximately 190 separate chemical compounds, and groups of compounds. TACs emitted from petroleum refineries include volatile organic TACs (e.g., acetaldehyde, benzene, 1,3-butadiene, formaldehyde and xylenes), semi-volatile and non-volatile organic TACs (e.g., benzo(a)pyrene, chlorinated dioxin/furans, cresols, and naphthalene), metallic TACs (e.g., compounds containing arsenic, cadmium, chromium, mercury, and nickel), and other inorganic TACs (e.g., chlorine, hydrogen sulfide, and hydrogen chloride).

Greenhouse gases (GHGs) are emissions that contribute to climate change. Carbon dioxide ( $CO_2$ ), methane ( $CH_4$ ), nitrous oxide ( $N_2O$ ), and three groups of fluorinated compounds (i.e., hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ( $SF_6$ )) are the major anthropogenic GHGs, and are regulated under the Kyoto Protocol international treaty, the federal Clean Air Act, and the California Global Warming Solutions Act. GHGs emitted from petroleum refineries include  $CO_2$ ,  $CH_4$  and  $N_2O$ .

## B. Regulation of Air Pollutants from Petroleum Refineries

### 1. Criteria Pollutants

Bay Area refineries are subject to various air quality regulations that have been adopted by the Air District, CARB and U.S. EPA. These rules contain standards that are expressed in a variety of forms to ensure that emissions are effectively controlled including:

- Requiring the use of specific emission control strategies or equipment (e.g., the use of floating roof tanks for VOC emissions);
- Requiring that emissions generated by a source be controlled by at least a specified percentage (e.g., 95% control of VOC emissions from pressure relief devices);
- Requiring that emissions from a source not exceed specific concentration levels (e.g., 100 parts per million (ppm) by volume of VOC for equipment leaks, unless those leaks are repaired within a specific timeframe; 250 ppm by volume  $SO_2$  in exhaust gases from sulfur recovery units; 1000 ppm by volume  $SO_2$  in exhaust gases from catalytic cracking units);
- Requiring that emissions not exceed certain quantities for a given amount of material processed or fuel used at a source (e.g., 0.033 pounds  $NO_x$  per million BTU of heat input, on a refinery-wide basis, for boilers, process heaters, and

- steam generators);
- Requiring that emissions be controlled sufficiently to not result in off property air concentrations above specified levels (e.g., 0.03 ppm by volume of hydrogen sulfide ( $H_2S$ ) in the ambient air);
- Requiring that emissions from a source not exceed specified opacity levels based on visible emissions observations (e.g., no more than 3 minutes in any hour in which emissions are as dark or darker than No. 1 on the Ringelmann chart); and
- Requiring that emissions be minimized by the use of all feasible prevention measures (e.g., flaring prohibited unless it is in accordance with an approved Flare Minimization Plan).

Air quality rules generally do not expressly limit mass emissions (e.g., pounds per year of any particular regulated air pollutant) from affected equipment unless that equipment was constructed or modified after March 7, 1979 and subject to the Air District's New Source Review (NSR) rule. All Bay Area refineries have "grandfathered" emission sources that were not subject to NSR but are generally regulated by equipment specific Air District regulations. As a result, none of these facilities have overall mass emission limits that apply to the entire refinery as they are defined in these proposed rules. Nonetheless, mass emissions of regulated air pollutants from Bay Area refineries are closely monitored at the source level, and these mass emissions have generally been substantially reduced over the past several decades.

Air pollutant emissions from Bay Area petroleum refineries have been regulated for over 50 years, with most of the rules and regulations being adopted following enactment of the 1970 Clean Air Act amendments. The Air District has the primary responsibility to regulate "stationary sources" of air pollution in the Bay Area, and the Air District has adopted many rules and regulations that apply to petroleum refineries.

The Air District is considering revisions to several rules and the development of new rules that may impact refinery operations. Potential revisions to existing rules that may impact refinery operations in addition to proposed 12-15 and 12-16 include:

- Regulation 1: General Provisions & Definitions;
- Regulation 6, Rule 1, Particulate Matter General Requirements;
- Regulation 8, Rule 18: Equipment Leaks;
- Regulation 8, Rule 44: Marine Vessel Loading Terminals;
- Regulation 9, Rule 9: Nitrogen Oxides and Carbon Monoxide from Stationary Gas Turbines; and
- Regulation 12, Rule 12: Flares at Petroleum Refineries.

New rules that are being considered that may impact refinery operations in addition to these proposed 12-15 and 15-16 are:

- Regulation 6, Rule 5: Direct and Indirect Particulate Emissions from Refinery Fluidized Catalytic Cracking Units (FCCUs);
- Regulation 9, Rule 14: Petroleum Coke Calcining Operations;
- Risk from Stationary Back-up Diesel Generators;

- Cooling Towers;
- Refinery SO<sub>2</sub> Emissions;
- Refinery Emissions Best Practices Backstop Rule; and
- GHGs in Permitting.

In addition, the Clean Air Plan is currently being developed that will investigate and evaluate further study measures, such as SO<sub>2</sub> emissions from Refinery Processes, that could result in revised and new rules that could affect refineries.

## 2. Toxic Air Contaminants

The Air District uses three approaches to reduce TAC emissions and to reduce the health impacts resulting from TAC emissions: 1) Specific rules and regulations; 2) Preconstruction review; and, 3) the Air Toxics Hot Spots Program.

### *Rules and Regulations*

Many of the TACs emitted by petroleum refineries are also criteria pollutants. For example, benzene and formaldehyde are precursor organic compounds, while arsenic and cadmium can be found in particulate matter. Thus, many regulations that reduce criteria pollutant emissions from refineries will also have a co-benefit of reducing toxic air contaminant emissions. In addition, the Air District implements EPA, CARB, and Air District rules that specifically target toxic air contaminant emissions from sources at petroleum refineries (e.g. EPA's National Emission Standards for Hazardous Air Pollutants (NESHAPS), CARB's Reducing Toxic Air Pollutants in California Communities Act (AB1807), as well as those listed below).

### *Preconstruction Review*

The Air District's Regulation 2, Rule 5 is a preconstruction review requirement for new and modified sources of TACs implemented through the Air District's permitting process. This rule includes health impact thresholds, which require the use of the best available control technology for TAC emissions (TBACT) for new or modified equipment, and health risk limits cannot be exceeded for any proposed project.

### *Air Toxics Hot Spots Program*

The Air Toxic Hot Spots program, or AB2588 Program, is a statewide program implemented by each individual air district pursuant to the Air Toxic Hot Spots Act of 1987 (Health and Safety Code Section 44300 et. seq.). The Air District uses standardized procedures to identify health impacts resulting from industrial and commercial facilities and encourage risk reductions at these facilities. Health impacts are expressed in terms of cancer risk and non-cancer hazard index.

Under this program, the Air District uses a prioritization process to identify facilities that warrant further review. This prioritization process uses toxic emissions data, health effects values for TACs, and Air District approved calculation procedures to determine a cancer risk prioritization score and a non-cancer prioritization score for each site. The District updates the prioritization scores annually based on the most recent toxic emissions inventory data for the facility. Facilities that have a cancer risk prioritization

score greater than 10 or a non-cancer prioritization greater than 1 must undergo further review. If emission inventory refinements and other screening procedures indicate that prioritizations scores remain above the thresholds, the Air District will require that the facility perform a comprehensive site-wide HRA.

An Air Toxic Hot Spots Act HRA estimates the health impacts from a site due to stationary source emissions. Hot Spots Act HRAs must be conducted in accordance with statewide HRA Guidelines adopted by OEHHA that include health effects values for each TAC and establish the procedures to follow for modeling TAC transport, calculating public exposure, and estimating the resulting health impacts. OEHHA periodically reviews and updates these HRA Guidelines through a scientific review panel and public comment process. The current HRA Guidelines were approved in 2003, but OEHHA proposed major revisions to these HRA Guidelines in June 2014. These proposed HRA Guidelines are expected to be adopted in 2015.

In 1990, the Air District Board of Directors adopted the current risk management thresholds pursuant to the Air Toxic "Hot Spots" Act of 1987. These risk management thresholds, which are summarized below, set health impact levels that require sites to take further action, such as conducting periodic public notifications about the site's health impacts and implementing mandatory risk reduction measures.

#### **Summary of Bay Area Air Toxics Hot Spots Program Risk Management Thresholds**

	Site Wide Cancer Risk	Site Wide Non-Cancer Hazard Index
Public Notification	greater than 10 in a million	greater than 1
Mandatory Risk Reduction	greater than 100 in a million	greater than 10

### **3. Greenhouse Gases**

More recently, CARB has adopted rules to reduce emissions of GHGs from mobile and stationary sources in California. Refineries are subject to CARB's Cap-and-Trade Rule (California Cap on Greenhouse Gas Emissions and Market-based Compliance Mechanisms). The Cap-and-Trade Rule will reduce GHG emissions collectively from all subject sources using a market-based approach, although there is no requirement that any specific source reduce its emissions.

The Air District's recently adopted Ten Point Climate Action Work Program calls for enhanced GHG emissions inventory and forecasting and the implementation of GHG emissions monitoring; both of which will impact the five Bay Area refineries.

### **4. Accidental Release Regulation**

Petroleum refineries are also subject to regulatory programs that are intended to prevent accidental releases of substances. The primary programs of this type are

based on requirements in the 1990 Clean Air Act amendments as follows: (1) the Process Safety Management (PSM) program, which focuses on protecting workers, and which is administered by the U.S. Occupational Safety & Health Administration (OSHA), and (2) the Accidental Release Prevention program (commonly referred to as the Risk Management Program, or RMP), which focuses on protecting the public and the environment, and which is administered by U.S. EPA. Bay Area refineries are subject to Cal/OSHA's PSM program, which is very similar to the federal OSHA program, but with certain more stringent State provisions. Bay Area refineries are subject to the California Accidental Release Prevention (CalARP) Program, which is very similar to U.S. EPA's RMP program, but with certain more stringent State provisions. In addition, Contra Costa County and the City of Richmond have both adopted an Industrial Safety Ordinance (ISO). These ISO's are very similar to CalARP requirements, but with certain more stringent local provisions. Accidental release prevention programs in California are implemented and enforced by local Administering Agencies, which in the case of the Bay Area refineries are Solano County (for the Valero Refining Company) and Contra Costa County (for the four other Bay Area refineries).

A partial list of the air pollution rules and regulations that the Air District implements and enforces at Bay Area refineries follows:

- Air District Regulation 1: General Provisions and Definitions
- Air District Regulation 2, Rule 1: Permits, General Requirements
- Air District Regulation 2, Rule 2: New Source Review
- Air District Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants
- Air District Regulation 2, Rule 6: Major Facility Review (Title V)
- Air District Regulation 6, Rule 1: Particulate Matter, General Requirements
- Air District Regulation 8, Rule 5: Storage of Organic Liquids
- Air District Regulation 8, Rule 6: Terminals and Bulk Plants
- Air District Regulation 8, Rule 8: Wastewater (Oil-Water) Separators
- Air District Regulation 8, Rule 9: Vacuum Producing Systems
- Air District Regulation 8, Rule 10: Process Vessel Depressurization
- Air District Regulation 8, Rule 18: Equipment Leaks
- Air District Regulation 8, Rule 28: Episodic Releases from Pressure Relief Devices at Petroleum Refineries and Chemical Plants
- Air District Regulation 8, Rule 44: Marine Vessel Loading Terminals
- Air District Regulation 9, Rule 1: Sulfur Dioxide
- Air District Regulation 9, Rule 2: Hydrogen Sulfide
- Air District Regulation 9, Rule 8: Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines
- Air District Regulation 9, Rule 9: Nitrogen Oxides and Carbon Monoxide from Stationary Gas Turbines
- Air District Regulation 9, Rule 10: Nitrogen Oxides and Carbon Monoxide from Boilers, Steam Generators and Process Heaters in Petroleum Refineries
- Air District Regulation 12, Rule 11: Flare Monitoring at Petroleum Refineries
- Air District Regulation 12, Rule 12: Flares at Petroleum Refineries

- 40 CFR Part 63, Subpart CC: Petroleum Refineries (NESHAP)
- 40 CFR Part 63, Subpart UUU: Petroleum Refineries: Catalytic Cracking, Catalytic Reforming, and Sulfur Plant Units (NESHAP)
- 40 CFR Part 61, Subpart FF: Benzene Waste Operations (NESHAP)
- 40 CFR Part 60, Subpart J: Standards of Performance for Petroleum Refineries (NSPS)
- State Airborne Toxic Control Measure for Stationary Compression Ignition (Diesel) Engines (ATCM)

### **III. NEED FOR REGULATORY ACTION**

In recent years, refineries have become subject to increasingly stringent regulatory standards for refined products. Both the U.S. EPA and CARB have adopted regulations that require refineries to significantly reduce the sulfur content of gasoline and diesel fuel. These agencies have also adopted other types of “reformulated fuel” standards.

Refiners therefore confront two opposite forces – a crude supply that is increasingly heavy and more sulfur rich (more sour), and mandates that require low sulfur reformulated fuels. In order to address these issues, refiners have responded in a variety of ways. One of the primary changes being made at virtually all refineries is to increase the amount of hydrotreating that occurs. Hydrotreating is the principle method for removing sulfur from crude oil, and it involves a chemical process in which hydrogen reacts with the sulfur to create hydrogen sulfide that can easily be removed from the oil. Other changes have included an increased reliance on processes that convert heavy oil into light products (e.g. coking). Increases in the corrosiveness of crude oil have been mitigated by the addition of compounds to neutralize the acid, or by upgrading piping and unit materials to stainless steel. In some cases, heavy, sour crude oil from the producing region is pre-processed to make it lighter and to reduce sulfur content before it is sent to the refinery (e.g., extra heavy oils, like those from the Orinoco region in Venezuela or the Alberta tar sands in Canada, are typically upgraded in a process that is both capital- and energy-intensive, but that yields a lighter, sweeter “syncrude”).

The Congressional Research Service’s report for Congress entitled “The U.S. Oil Refining Industry: Background in Changing Markets and Fuel Policies” (Nov. 22, 2010) summarizes the trend in crude oil composition, and the refiners responses, as follows:

“Over the last 25 years, the API gravity of imported crude oils has been decreasing while average sulfur content has been increasing. API gravity, a measure developed by the American Petroleum Institute, expresses the “lightness” or “heaviness” of crude oils on an inverted scale. With a diminishing supply of light sweet (low sulfur) crude oil, U.S. refiners have had to invest in multi-million dollar processing-upgrades to convert lower-priced heavier crude oils to high-value products such as gasoline, diesel, and jet fuel.” (Page 13).

There is concern that the processing of these heavier and/or sour crude oils may result

in increased emissions from refineries. It is anticipated that refineries will both update and/or modify their equipment to meet stricter regulatory fuel requirements and potentially process heavier and/or more sour crude oil. The proposed rules provide a means to determine overall changes in refinery emissions as processes and equipment change and to mitigate emissions increases not associated with crude oil throughput increases. The establishing of thresholds requiring mitigation in the Mitigation Rule is designed to allow for emissions variations from year to year due to expected efficiency decreases in equipment or processes.

In addition, the Air District collects emissions inventory information on a source by source basis, which can make understanding overall facility emissions difficult. Providing overall refinery emissions information that includes deliveries from cargo carriers (e.g. ships and trains) as well as other processes under common control of the refineries would provide the public and the Air District with a more direct method of tracking overall emissions at each refinery over time, and determining any relationship between overall emissions and crude oil composition.

The proposed rules are intended to address increases in air emissions from Bay Area petroleum refineries that might occur over time. These increased emissions include those that may be associated with the use of heavier and/or more sour crude slates. The proposed rules will help identify and mitigate increased emissions while allowing for increased crude oil throughput as well as allow for year to year decreases in efficiencies resulting from normal “wear and tear”, such as fouling at heat exchangers or decreased catalyst activity. The proposed regulatory approach involves the following basic elements and requires refineries to:

#### Regulation 12, Rule 15

- A. Report on-going annual emissions inventories of all regulated air pollutants based on upgraded emission calculation methods, including emissions from cargo carriers,
- B. Develop a Petroleum Refinery Emissions Profile (PREP) based on three years of emissions inventory and require that on-going inventories include comparisons with the PREP,
- C. Report on-going crude oil characteristics with annual emissions inventories,
- D. Require an update of refinery Health Risk Assessments (HRAs) based on the most recent Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) guidelines, and
- E. Establish fence-line and community air monitoring systems.

#### Regulation 12, Rule 16

- F. Establish emissions thresholds to identify significant emissions increases
- G. Require a causal analysis if criteria pollutant, TAC and/or GHG emissions increases not due solely to crude oil throughput are above trigger level thresholds.

- H. Require the submission of an emission reduction plan for criteria pollutants and TACs to reduce emissions when trigger levels are exceeded.
- I. Require the submission of an emissions audit requiring implementation of all feasible measures if planned emission reductions will not fully mitigate emission increases within two years of submission of an emission reduction plan.
- J. Require updates to emission reduction plans if expected emissions reductions are not achieved in practice.

## **IV. PROPOSED RULES**

The proposed Tracking and Mitigation rules are included in Appendix A of this report. Guidance documents that cover emissions inventory methodologies and development of air monitoring plans required by the Tracking Rule are included in Appendix B and Appendix C, respectively. Explanations of the various provisions of these proposed rules are provided below.

### **A. Regulation 12, Rule 15 - Administrative Procedures**

As explained in Sections A through I of this report, the proposed Tracking Rule would require refinery owner/operators to submit to the Air District various reports and plans, subject to review by members of the public and other interested stakeholders. Comments received would be considered by Air District staff prior to taking final action to approve, revise, or disapprove the reports and plans. Commenters would be notified of the Air District's final actions, and approved reports and plans would be posted on the Air District's website.

The administrative procedures by which the Air District would review and take final action to approve or disapprove the various types of required reports and plans are specified in Sections 12-15-404, 406, and 408 of the proposed rule.

It should be noted that California law specifies that "trade secrets" are not public records. While air pollutant emissions data and air monitoring data may not be considered trade secrets, many other types of information may be (e.g., production data used to calculate emissions data). The definition of "trade secrets" provided in Section 6254.7 of the California Government Code follows:

"Trade secrets," as used in this section, may include, but are not limited to, any formula, plan, pattern, process, tool, mechanism, compound, procedure, production data, or compilation of information which is not patented, which is known only to certain individuals within a commercial concern who are using it to fabricate, produce, or compound an article of trade or a service having commercial value and which gives its user an opportunity to obtain a business advantage over competitors who do not know or use it.

Section 12-15-411 of the proposed rule specifies that a refinery owner/operator may designate as confidential any information required to be submitted under the rule that is

claimed to be exempt from public disclosure under the California Government Code. The owner/operator is required to provide a justification for this designation, and must submit a separate public copy of the document with the information that is designated “confidential” redacted.

## **B. Regulation 12, Rule 15 - Pollutant Coverage**

The proposed Tracking Rule would cover the three primary categories of regulated air pollutants: (1) Criteria pollutants, (2) Toxic Air Contaminants (TACs), and Greenhouse Gases (GHGs). These terms are defined in Sections 12-15-204, 220, and 209 of the proposed rule.

The definition of TAC provided in Section 12-15-220 of the proposed rule refers to the State TAC list and includes those State TACs that have a basis for the evaluation of health effects under guideline procedures adopted by OEHHA for the Air Toxics Hot Spots Program.

Unlike criteria pollutants and TACs, GHGs are not directly associated with localized or regional health risks, which is the primary issue that the new rule is intended to address. GHGs are included in the proposed rule to address climate change issues (which have a link to increasing air concentrations of ozone, a criteria pollutant that forms on hot summer days), and because measures to reduce GHG emissions typically result in co-benefits in terms of reducing criteria pollutant and TAC emissions.

Odorous and visible emissions are not specifically proposed to be covered by the new rule, although most of these pollutants are also included in one of the categories of regulated air pollutants that would be covered (e.g., hydrogen sulfide, which is the primary odorous compound emitted from refineries, is a covered TAC; visible emissions are typically fine particulate matter (PM<sub>2.5</sub>), a covered criteria pollutant).

## **C. Regulation 12, Rule 15 - Source Coverage**

The proposed Tracking Rule would apply to all air emissions from “stationary sources” at petroleum refineries. Stationary sources, as opposed to mobile sources such as trucks and other vehicles, are the sources over which the Air District has regulatory jurisdiction. However, there are instances where mobile sources become stationary sources, such as when ships and trains are unloading or loading products produced at the refinery, and thus are included in the requirements of the rule. This concept is addressed in the definition of “emissions inventory” in Section 12-15-207. Several other definitions in the proposed rule are intended to clarify source coverage. This includes the definition of “petroleum refinery” in Section 12-15-212, the definition of “source” in Section 12-15-219 (which is the same definition used in the Air District’s permit rule), and the definition of “emissions inventory” in Section 12-15-207.

The proposed Tracking Rule would apply to petroleum refinery operations whether or not these operations are owned or operated by different entities. For example, some

Bay Area refineries include co-located hydrogen plants that are owned or operated by separate companies, but that provide hydrogen for refinery operations. Similar arrangements also exist for refinery terminal operations, and auxiliary facilities (e.g., cogeneration plants). The definition of “refinery owner/operator” provided in Section 12-15-216 of the proposed rule indicates that the refinery owner/operator is responsible for the submittal of required reports and plans that cover the entire refinery, including those that may be separately owned or operated. This is the same approach that is used in the implementation of Air District *Regulation 12, Rule 12: Flares at Petroleum Refineries* (e.g., for the submittal of Flare Minimization Plans).

As described earlier, there is concern that processing heavier and/or more sour crude oil may result in increased emissions. As a result, the proposed Tracking Rule requires that each refinery report its “crude slate” as defined in Section 12-15-206 containing information regarding sulfur and nitrogen content, API gravity and total acid number as described in Section 12-15-401.7. By gathering this information about crude oil fed into the refinery processes, the Air District intends to determine the relationship between the crude slate and emissions. Reporting the composition of the crude oil that is processed by the refinery along with total emissions from the refinery processes will assist in the development of any relationships that may exist between crude oil composition and overall facility emissions.

#### **D. Regulation 12, Rule 15 - Emissions Inventory Development**

Emissions inventories are used in a variety of air quality programs, and methodologies for establishing these inventories are provided in various publications. Depending on the specific type of source, and the specific type of air pollutant emitted, “state-of-the-art” emissions inventory techniques may involve continuous emission monitors, source-specific emission tests, general emission factors (i.e., representative values that relate the quantity of a pollutant emitted with an activity associated with the release of that pollutant), material balances, or empirical formulae. The term “emissions inventory” is defined in Section 12-15-207 of the proposed rule.

Due to the diversity of emissions inventory methodologies that exist, and the need to update these methodologies on an on-going basis due to improvements in scientific understanding and available data, Air District staff believes the Tracking Rule should not include detailed emissions inventory methodologies. As reflected in Section 12-15-409 of the proposed rule, the Air District staff would publish, and periodically update, emissions inventory guidelines for petroleum refineries that specify the methodology to be used for emissions inventories required under the rule. Section 12-15-601 indicates that emissions inventories submitted under the rule must be prepared following the Air District-published guidelines.

The initial refinery emissions inventory guideline document has been developed concurrently with the development of the proposed new rule. That document refers to other inventory methodology publications, including the refinery emissions protocol issued for the purpose of improving emissions inventories as collected through the U.S.

EPA's 2011 Information Collection Request (ICR) for the petroleum refining industry (*Emission Estimation Protocol for Petroleum Refineries*).

The Air District has used staff-published guideline documents in combination with other rules that have requirements based on detailed technical information that needs to be updated on an on-going basis. This includes the Air District's BACT/TBACT Workbook and Permit Handbook (both used in Air District Rules 2-2 and 2-5), and Health Risk Screening Guidelines (used in Air District Rules 2-1 and 2-5).

#### **E. Regulation 12, Rule 15 - Emissions Inventories and Crude Slate Report**

The establishment of annual emissions inventories will provide the basis in the new rule for determining emissions variations that occur from each refinery year to year and will be used to develop a Petroleum Refinery Emissions Profile (PREP). In addition, each refinery would be required to provide information on the crude oil composition, or "crude slate", as described above. The Air District would use this crude oil composition information to examine potential relationships between emissions and input to the refinery. Each refinery would be required to prepare and submit an annual refinery emissions inventory and crude slate report to the Air District as specified in Section 12-15-401 of the proposed rule. The public is provided an opportunity to provide input regarding emissions inventory and crude slate reports as described in Section 12-15-404.

#### **F. Regulation 12, Rule 15 - Establishing Petroleum Refinery Emissions Profiles**

Emissions can fluctuate from year to year due to market forces or other factors not necessarily related to normal refinery operation. Multiple annual emissions inventories are required to develop a more complete understanding of emissions and help determine which sources might require additional emissions reductions. Under the proposed Petroleum Refining Emissions Tracking rule, each refinery would be required to prepare and submit to the Air District a PREP, as specified in Section 12-15-402. The PREP would include a summary of the emission rate of each criteria pollutant, TAC and GHG that was emitted from each source and from the refinery overall.

Although refinery operations are more continuous and uniform than some other types of industries, year-to-year variations in emissions occur due to a variety of factors. Some of these factors include business cycles that affect the demand for products produced, and cyclical process unit maintenance turnarounds (which generally occur on different schedules at different refineries).

A variety of other factors may affect variations in year-to-year emissions from a refinery including the addition of emissions controls, equipment changes (e.g., replacements, modernizations, and expansions), accidents, compliance issues, changes in feed stocks used, and the mix of products produced due to business decisions. As a result of these fluctuations, refinery owners/operators may choose any consecutive 12-month period

over the last five years to define annual emissions in the PREP. The annual ongoing emissions inventories will be compared to the PREP to see variations of emissions from year to year and over time and will be compared to changes in crude oil composition to determine if crude composition changes have a major impact on emissions. The public would have an opportunity to provide input regarding emissions inventory and crude slate reports as described in Section 12-15-404.

#### **G. Regulation 12, Rule 15 - Revising Petroleum Refinery Profile Reports (PREPs)**

In addition to specifying the annual emission inventory for each refinery and identifying the changes in emissions that occurred relative to the PREP as described in Section 12-15-401.6, the On-going Emissions Inventory and Crude Slate Report would incorporate any improvements in emissions inventory methodologies used. Section 12-15-403 provides a way to incorporate these changes in emissions inventory methodologies into the PREP. Section 12-15-403 would also cover potential expansions of the emissions inventory over time to address additional compounds that may be added to the OEHHA health effects values list, and will ensure that a uniform basis exists for determining changes in emissions over time. Any revisions to the PREP are required to be submitted no later than the date the emissions inventory affected by the changes in methodology is required.

#### **H. Regulation 12, Rule 15 - Health Risk Assessments**

The Air District uses a variety of tools to determine where health hazards may be occurring in the Bay Area, to assess the relative magnitude of these health hazards compared to other locations, and to determine how to best focus Air District resources in order to reduce these health hazards. HRAs are one of the tools that can be used to assess the relative magnitude of health hazards. HRAs are designed to quantify the potential health impacts to an individual receptor or community that may be occurring due to specific sources or facilities or that may occur in the future due to proposed projects or proposed changes at a facility. For the purposes of this rule, an HRA is defined in Section 12-15-210.

An HRA consists of four basic steps: 1) hazard identification; 2) exposure assessment; 3) dose response assessment; and 4) risk characterization. The Air District conducts HRAs using standardized methodologies for each of these steps. As indicated in Sections 12-15-210 and 12-15-602 of the proposed rule, HRAs will be prepared in accordance with the most recent guidelines adopted by the Office of Environmental Health Hazard Assessment (OEHHA). The Air District follows these OEHHA HRA Guidelines when conducting HRAs under the Air Toxic Hot Spots Program.

HRAs were first required for Bay Area petroleum refineries in the early 1990s pursuant to the Air District's Air Toxic Hot Spots Program. However, the HRA Guidelines have undergone many changes since that time and additional major revisions to these HRA Guidelines are expected to be finalized soon.

As a result, staff believes that new facility-wide HRAs should be performed including improved emission inventories, updated health effects values, and the most recent HRA methodologies. The proposed rule requires that each refinery conduct an HRA utilizing the most recent OEHHA HRA Guidelines along with more refined emissions inventories. This requirement is outlined in Section 12-15-405. The public would have an opportunity to review and comment on the HRA Modeling Protocol and the HRA, as described in Section 12-15-406.

## **I. Regulation 12, Rule 15 - Air Monitoring**

The proposed Tracking Rule would require the refinery owner/operator to prepare and submit to the Air District an air monitoring plan for establishing and operating a fence-line monitoring system and a community air monitoring system (see Section 12-15-407). The terms “fence-line monitoring system” and “community air monitoring system” are defined in the proposed rule in Sections 12-15-208 and 203, respectively. The air monitoring plans would need to be prepared in accordance with air monitoring guidelines that are published by the Air District (see Sections 12-15-410 and 603).

The initial air monitoring guideline document was developed concurrently with the development of the proposed Tracking Rule. Much of the information gathering for the guideline document was completed under Action Item 3 of the Air District’s *Work Plan for Action Items Related to Accidental Releases from Industrial Facilities*. Under this Action Item, Air District staff retained a contractor to create a report that identifies equipment and methodological options for monitoring systems. A panel of monitoring experts gathered from academia, industry, the community, and other government agencies to discuss and weigh the various options and the expert panel provided input to guide the Air District in developing the air monitoring guidelines.

Under the proposed rule, within one year of Air District approval of a refinery’s air monitoring plan, the refinery owner/operator would be required to ensure that fence-line monitoring systems are operational. Within two years after Air District approval of the air monitoring plan, the community air monitoring systems would be required to be operational. Both systems would be installed, operated, and maintained, in accordance with the approved plan (see Sections 12-15-501 and 502 of the proposed rule).

The Air District would update the initial air monitoring guideline document within a five-year period of the publication of the initial guideline document. The guidelines would be updated in consideration of advances in monitoring technology, updated information regarding the health effects of air pollutants, and review of data collected by existing monitoring systems required under the rule. The refinery owner/operator would be required to implement any needed modifications to existing monitoring systems within one year of publication of the updated guidelines.

## **J. Regulation 12, Rule 16 - Administrative Procedures**

The proposed Mitigation Rule, described in Sections J through P of this report, uses

many of the plans and reports required by the Tracking Rule to identify, investigate and mitigate emissions increases. These emissions increases could result from a wide range of causes, such as changes in crude oil composition or losses in efficiency due to normal wear and tear, and are based on mass emissions from refineries taken as a whole. Like the Tracking Rule, the Mitigation Rule would require various reports and plans be submitted to the Air District and subjected to public review. Comments received from the public would be considered by Air District staff prior to taking final action. Commenters would be notified of final actions and approved reports and plans would be posted on the Air District's website.

The administrative procedures by which the Air District would review and take final action to approve or disapprove the various types of required reports and plans are specified in Sections 12-16-401, 402, and 403 of the proposed rule. The contents and requirements of the reports and plans are discussed in the following sections.

## **K. Regulation 12, Rule 16 – Emission Trigger Levels**

Sections 12-16-301.1 through Sections 12-16-301.3 would provide threshold trigger levels that will require a refinery owner/operator to submit an Emission Reduction Plan (ERP). The thresholds are defined in relation to the PREP required by the Tracking Rule.

The trigger levels for criteria pollutant levels described in Section 12-16-301.1 were designed to take into account fluctuations that occur in refineries on a year to year basis, such as the reduced efficiency of heat exchanges, which may be the result of process changes and degradation of processes described in Section F above. Emissions variations like these are considered to be in the “noise” of emissions inventories and the ability of the inventory calculations to provide accurate, repeatable results. By allowing these thresholds, staff believes ERPs will be able to better identify and address equipment that can produce effective and lasting emission reductions.

The threshold triggers for TACs described in Section 12-16-301.2 were developed to ensure that health impacts at the maximally exposed individual, as defined by the HRA required in the Tracking Rule, do not increase by more than 10 in one million for cancer risk or by more than 1 for chronic hazard index. Section 12-16-301.3 establishes a more stringent threshold of “any” increase in toxicity weighted emissions, if the HRA required by the Tracking Rule finds that a refinery has health impacts greater than the Air District’s Air Toxic Hot Spots (AB-2588) Mandatory Risk Reduction Thresholds.

## **L. Regulation 12, Rule 16 - Pollutant and Source Coverage**

Since the Mitigation Rule is designed to work in tandem with the Tracking Rule, pollutants and sources covered are the same. ERPs can propose reductions at any source that will bring overall refinery emissions below threshold triggers. This will allow flexibility to determine the most effective measures to reduce emissions. The feasibility of the reduction measures will be judged based on the cost effectiveness levels

contained in Table 3 in Section 12-16-401.3.3.

#### **M. Regulation 12, Rule 16 – Emission Reduction Plan (ERP)**

Section 401 of the proposed Mitigation Rule would require the refinery owner/operator to prepare and submit to the Air District an ERP that contains: 1) a causal analysis of why emissions increased above trigger thresholds (Section 12-16-401.1); 2) a legal commitment to measures that are planned to reduce emissions (Section 12-16-401.2); and, 3) potentially, an emission reduction audit requiring implementation of all feasible measures for further reductions (Section 12-16-401.3) if planned reductions would not result in emissions being reduced to below trigger thresholds within two years from submission of an ERP. An updated ERP would be required if the emissions are not reduced to below trigger levels as provided in the initial ERP (Section 12-16-402). While all sources will be covered by proposed Regulation 12, Rule 16, additional controls or limits on sources where all feasible measures are already in place are not required (Section 12-16-401.3).

#### **N. Regulation 12, Rule 16 – Toxic Air Contaminant Trigger Levels and HRAs**

As discussed in Section K above, specific trigger levels for each refinery would be set based on the HRAs developed in the Tracking Rule and are discussed in Section 12-16-404. These trigger levels would be set to ensure that risks don't increase above the health risk thresholds discussed in Section K, based on the latest information included in OEHHA guidelines. Staff believes that allowing the refinery owners/operators flexibility in reducing TACs to below trigger levels allows for the most effective targeting of reduction strategies.

Section 12-16-303 requires an updated HRA in addition to the Section 401.1 causal analysis, if the most recent HRA indicates that a refinery has a health impact above an AB-2588 Mandatory Risk Reduction Threshold and an inventory shows an increase in toxicity weighted emissions compared to the PREP baseline emissions. An updated HRA is not required if the inventory year showing the emissions increase is less than five years from the inventory year for the most recent District approved HRA for the site or if the site is currently implementing an approved risk reduction plan pursuant to Health & Safety Code § 44391. HRA updates are appropriate for sites that are subject to mandatory risk reduction measures under the State Hot Spots program to ensure that the risk reductions employed are effectively reducing health impacts and to verify that any subsequent increases in toxicity weighted emissions do not hinder these mandatory health impact reductions. These provisions also ensure that additional information regarding TACs and health risks is incorporated and reviewed by Air District staff and will provide additional assurance that refinery health impacts will not increase in the future. Section 303 is structured to allow the State risk reduction plans a reasonable period of time to work, but also provides a backstop in case risk is not reduced as expected.

## **O. Regulation 12, Rule 16 – Crude Oil Throughput**

As discussed later in this Section, the proposed rule would exempt emissions caused solely by increased throughput of crude oil at a crude oil unit. This allows refineries to respond to demand by either market forces or reduced production of other California refineries. Refineries must always maintain compliance with any limitations currently contained in Air District operating permits, but as a matter of practice rarely operate at this “maximum” rate. If the criteria set forth in Section 103 are met, increases in throughput consistent with compliance with Air District permit limits thus would not trigger the requirements of the Mitigation Rule.

Staff considered various ways to allow flexibility in production rate while still requiring all feasible mitigation of changes that affect emissions. Relating emissions to inputs is an extremely difficult task. Refineries vary output of products depending on market demands, which affects emissions. In addition, operation of various units and processes may vary, also affecting emissions. These changes in emissions can occur without varying crude oil throughput. Inputs besides crude oil, commonly called intermediates, also have an effect on emissions without necessarily being related to crude oil throughput. Attempting to attribute overall refinery emissions changes to these variations to all specific outputs and inputs would involve significant resources and would likely result in calculations with significant errors and uncertainties. As a result, necessary and permitted increases in overall throughput would be extremely difficult to relate to emissions and would likely be error-prone using this method.

Staff believe the methodology presented in Section 12-16-405 represents the clearest, most transparent and efficient way to provide required flexibility in crude oil throughput variability. This method will also allow for better enforceability and more consistent application of the requirements across refineries. The public, Air District staff and refinery owner/operators will be able to quickly determine whether emissions changes are tied solely to crude oil throughput at a crude oil unit. This method will also provide refineries a better means to manage overall refinery emissions by providing a consistent, quick and accurate way to determine how throughput changes are related to overall emissions.

## **P. Regulation 12, Rule 16 - Limited Exemptions**

There are four exemptions in the rule. The first exemption, contained in Section 12-16-102, applies to small refineries whose processing capacity of total crude oil is 5,000 barrels per day or less. This exemption is intended to limit the requirements of the rule to the five Bay Area refineries identified in Section II A of this report and not include operations solely involving asphalt or oil recycling.

A second exemption applies to criteria pollutants and GHG emission increases resulting solely from additional crude oil throughput. This allows the refineries flexibility in production that may result from increases in demand or the reduction of output from other California refineries. The Tracking and Mitigation rules are intended to address

increases in emissions caused by changes in crude oil composition or changes in refinery equipment or processes.

A third exemption deals with GHG emissions. GHG emissions increases are required to be addressed in the causal analysis described in Section 12-16-401.1, but are not required to be addressed in the emissions reductions measures discussed in Section 12-16-401.2. This exemption avoids confusion and conflict with CARB's Cap-and-Trade rule. However, since the proposed Tracking and Mitigation rules require the collection of information relevant to GHGs, the Air District is positioned to take action at a later date based on sound emissions data if appropriate.

The fourth exemption deals with emissions from flares in Section 12-16-105. Staff believe that emissions from flares are covered under Regulation 12, Rule 11 and Regulation 12, Rule 12. As a result, the information is already collected and available and need not be addressed further in this rule making.

## **V. COST RECOVERY**

The Air District has the authority to assess fees to regulated entities for the purpose of recovering the reasonable costs of implementing and enforcing applicable regulatory requirements. On March 7, 2012, the Air District's Board of Directors adopted a Cost Recovery Policy that specifies that newly adopted regulatory measures should include fees that are designed to recover increased regulatory program activity costs associated with the measure (unless the Board of Directors determines that a portion of those costs should be covered by tax revenue).

In accordance with the adopted Cost Recovery Policy, Air District staff will develop fee estimates after the draft Tracking and Mitigation rules have been revised in response to comments. Changes to fee schedules will require amendments to Regulation 3: Fees.

## **VI. RULE DEVELOPMENT / PUBLIC CONSULTATION PROCESS**

Air District staff develops proposed rules to address emissions from refineries and other types of "stationary sources" of air pollution. The rule development process includes consideration of input received from interested stakeholders. Proposed rules are considered for adoption by the Air District's Board of Directors after a public hearing is held. Before these proposed rules may be adopted (or amended), the Board of Directors must consider certain factors (e.g., socioeconomic and environmental impacts), and make a number of findings (e.g., authority, necessity, clarity, and consistency), based upon relevant information presented at the public hearing. Staff expects that the new Petroleum Refining Emissions Tracking and Refinery Emissions Analysis, Thresholds and Mitigation rules will be considered for adoption in the second quarter of 2015.

Since July, 2012, Air District staff has engaged in an extensive and comprehensive rule development process involving a wide range of stakeholders that has resulted in these

regulatory proposals, Emissions Inventory Guidelines, Air Monitoring Guidelines and workshop report.

On July 11, 2012, staff provided a memo to the Executive Officer /Air Pollution Control Officer (EO/APCO) outlining options that could be used to enhance emissions inventories and gather information about the possible relationship between crude oil composition and emissions from the five Bay Area refineries. Regulatory concept papers were produced to further investigate the rule development possibilities. In October of 2012, a Work Plan for Action Items Related to Accidental Releases from Industrial Facilities was adopted by the Board of Directors that included development of a Petroleum Refinery Emissions Tracking Rule. In March of 2013 a workshop report and initial proposed rule were issued and the rule development process began. The following meetings and efforts to work with the public and affected industry then took place:

- Apr. 2013: Public workshops held (Martinez, Richmond, District office – webcast)
- May 2013: Stationary Source Committee briefing
- Jul. 2013: Desert Research Institute (DRI) report on air monitoring finalized documenting air monitoring options and methodologies that might be utilized to measure air quality impacts in communities near refineries
- Jul. 2013: Panel of national air monitoring experts convened that expanded on the air monitoring options and methodological information contained in the DRI report – webcast
- Sep. 2013: Draft refinery emissions inventory guidelines issued
- Sep. 2013: Stakeholder Technical Work Group meeting
- Jan. 2014: Revised draft rule and preliminary responses to comments issued
- Jan. 2014: Stakeholder Technical Work Group meeting
- Feb. 2014: Stationary Source Committee briefing
- May 2013 – Apr. 2014: Additional meetings with stakeholders held
- Apr. 2014: Stationary Source Committee briefing
- June 2014: Report on the panel of experts meeting convened in 2013 finalized and posted on Air District website
- June 2014: Next draft of rule developed and posted on the Air District website
- Aug. 2014 Air monitoring guidance draft released and comments accepted
- Aug 2014 – Oct. 2014: Continue meeting with stakeholders
- Nov. 2014 – Dec. 2014: Regulation 12, Rule 16: Petroleum Refining Emissions Analysis, Thresholds and Mitigation rule was developed as directed by the Board
- Jan. 2015: Comment period opened
- March 2015: Public workshops expected (Martinez, Richmond, Benicia, District Office – webcast)
- June 2015: Comments responded to and staff report released



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

## **WORKSHOP REPORT**

**PROPOSED  
AIR DISTRICT REGULATIONS 12, RULE 15:  
PETROLEUM REFINING EMISSIONS  
TRACKING AND REGULATION 12, RULE 16:  
PETROLEUM REFINING EMISSIONS  
ANALYSIS, THRESHOLDS AND MITIGATION**

**APPENDIX A**

**PROPOSED RULES**

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

**INDEX**

**12-15-100 GENERAL**

12-15-101 Description

**12-15-200 DEFINITIONS**

12-15-201 Accidental Air Release  
12-15-202 Ambient Air  
12-15-203 Community Air Monitoring System  
12-15-204 Criteria Pollutant  
12-15-205 Crude Oil  
12-15-206 Crude Slate  
12-15-207 Emissions Inventory  
12-15-208 Fence-line Monitoring System  
12-15-209 Greenhouse Gases (GHGs)  
12-15-210 Health Risk Assessment (HRA)  
12-15-211 Health Risk Assessment Modeling Protocol  
12-15-212 Petroleum Refinery  
12-15-213 Petroleum Refinery Emissions Profile (PREP)  
12-15-214 Petroleum Refinery Emissions Profile Period  
12-15-215 On-going Petroleum Refinery Emissions Inventory  
12-15-216 Petroleum Refinery Owner/Operator  
12-15-217 Receptor Location  
12-15-218 Sensitive Receptor  
12-15-219 Source  
12-15-220 Toxic Air Contaminant (TAC)

**12-15-400 ADMINISTRATIVE REQUIREMENTS**

12-15-401 On-going Petroleum Refinery Emissions Inventory and Crude Slate Reports  
12-15-402 Petroleum Refinery Emissions Profile Report  
12-15-403 Revision of Petroleum Refinery Emissions Profile Report  
12-15-404 Review and Approval of On-going Petroleum Refinery Emissions Inventory and Crude Slate Reports and Petroleum Refinery Emissions Profile Reports  
12-15-405 Submittal of Health Risk Assessment Modeling Protocol and Health Risk Assessment  
12-15-406 Review and Approval of Health Risk Assessment Modeling Protocols and Health Risk Assessments  
12-15-407 Air Monitoring Plans  
12-15-408 Review and Approval of Air Monitoring Plans  
12-15-409 Emissions Inventory Guidelines  
12-15-410 Air Monitoring Guidelines  
12-15-411 Designation of Confidential Information

**12-15-500 MONITORING AND RECORDS**

12-15-501 Community Air Monitoring System

12-15-502 Fence-line Monitoring System  
12-15-503 Recordkeeping

**12-15-600 MANUAL OF PROCEDURES**

12-15-601 Emissions Inventory Procedures  
12-15-602 Health Risk Assessment Procedures  
12-12-603 Air Monitoring Procedures

**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 over time, to complete health risk assessments for petroleum refineries, and to establish monitoring systems to provide detailed air quality data along refinery boundaries and in nearby communities.

**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 Community Air Monitoring System:** Equipment that measures and records air pollutant concentrations in the ambient air at or near sensitive receptor locations near a facility, and which may be useful for estimating associated pollutant exposures and health risks, and in determining trends in air pollutant levels over time.
- 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<sub>x</sub>), particulate matter with an aerodynamic diameter of 10 micrometers or less (PM<sub>10</sub>), particulate matter with an aerodynamic diameter of 2.5 micrometers or less (PM<sub>2.5</sub>), precursor organic compounds (POC), and sulfur dioxide (SO<sub>2</sub>).
- 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 Crude Slate:** A record of the characteristics and quantities of crude oil and/or crude oil blends to be processed by a crude distillation unit at a petroleum refinery.
- 12-15-207 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) all air releases from cargo carriers (e.g., ships and trains), excluding motor vehicles, that load or unload materials at a petroleum refinery including emissions from such carriers while operating within the District or within California Coastal Waters as specified in Regulation 2-2-610 (adopted Dec. 19, 2012).
- 12-15-208 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.
- 12-15-209 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. GHG emissions shall be expressed as CO<sub>2</sub> equivalent emissions (CO<sub>2</sub>e) according to the methodology set forth in 40 CFR § 52.21(b)(49)(ii).

- 12-15-210 Health Risk Assessment (HRA):** A detailed and comprehensive analysis to evaluate and predict the dispersion of hazardous substances in the environment and the potential for exposure of the human population and to assess and quantify both the individual and populationwide health risks associated with those levels of exposure. HRAs required by this rule shall be prepared in accordance with Section 12-15-602.
- 12-15-211 Health Risk Assessment Modeling Protocol:** A detailed plan identifying the steps that will be taken during the air dispersion modeling and health risk assessment process. This plan shall be prepared in accordance with the modeling protocol guidance presented in OEHHA's Air Toxic Hot Spots Risk Assessment Guidelines: Technical Support Document for Exposure Assessment and Stochastic Analysis and shall identify the specific basis or references for all input data (such as emissions data, stack parameters, building dimensions, terrain data, meteorological data, health effects values, etc.) and the proposed models, methods, procedures, and assumptions that will be used for each step of the HRA process.
- 12-15-212 Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties, and under common control, and 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, 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).
- 12-15-213 Petroleum Refinery Emissions Profile (PREP):** An emissions inventory for the Petroleum Refinery Emissions Profile (PREP) period that is used as a reference with which to compare emissions inventories for later periods of time (on-going emissions inventories) in order to determine changes in emissions that have occurred from a petroleum refinery. A PREP shall be the average emission rate, expressed in units of tons or pounds per year, based on actual emissions that occurred during the PREP period, except that a PREP shall not include emissions that exceeded regulatory or permitted limits, or emissions from accidental air releases.
- 12-15-214 Petroleum Refinery Emissions Profile Period:** A period of 12 consecutive months, from January 2010 through December 2015, which is selected by a refinery owner/operator for establishing a PREP for a particular criteria pollutant, toxic air contaminant, or greenhouse gas. A different consecutive 12-month period may be used for each criteria pollutant, toxic air contaminant, or greenhouse gas.
- 12-15-215 On-going Petroleum Refinery Emissions Inventory:** An emissions inventory at a petroleum refinery covering a calendar year period. For the purposes of this rule, on-going emissions inventories are required to be compiled for the calendar year 2016, and for each subsequent calendar year.
- 12-15-216 Petroleum Refinery Owner/Operator:** Any person who owns, operates, or exercises operational control over the majority of operations at a petroleum refinery. The refinery owner/operator is responsible for compliance with this rule for the entirety of the petroleum refinery, including any refinery processes or auxiliary facilities that may be separately owned or operated. Any person who owns, operates, or exercises operational control over a portion of a petroleum refinery that is less than a majority of the total refinery operations must provide the Owner/Operator with information sufficient to allow the owner/operator to comply with this rule, and must make that information available to the APCO upon request.
- 12-15-217 Receptor Location:** A location outside the property boundary of the facility being evaluated where a member of the public may reasonably be expected to be exposed to air pollutants for the particular acute or chronic health risks being evaluated.
- 12-15-218 Sensitive Receptor:** A receptor location where an individual that may have increased vulnerability to exposure to air pollutants may be present. For the purposes of this rule, sensitive receptors are residences (where an individual may live for 6 months or more out of a year), schools (including colleges and universities), daycares, hospitals, and senior-care

facilities.

- 12-15-219** **Source:** Any article, machine, equipment, operation, contrivance or related groupings of such which may produce and/or emit air pollutants.
- 12-15-220** **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** **On-going Petroleum Refinery Emissions Inventory and Crude Slate Reports:** A refinery owner/operator shall obtain and maintain APCO approval of an On-going Petroleum Refinery Emissions Inventory and Crude Slate Report. 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 12-15-404. On or before September 1, 2017, and every subsequent September 1, a refinery owner/operator shall submit to the APCO an On-going Petroleum Refinery Emission Inventory and Crude Slate Report 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 On-going Petroleum Refinery Emission Inventory and Crude Slate Report covers.
  - 401.2** A summary of the total quantity of each criteria pollutant, TAC, and GHG that was emitted from the petroleum refinery during the on-going petroleum refinery emissions inventory period.
  - 401.3** A detailed listing of the annual emissions of each criteria pollutant, TAC, and GHG emitted from each source at the petroleum refinery, and a complete description of the methodology used for determining these emissions including documentation of the basis for any assumptions used, except that methodologies that are unchanged from a previously submitted On-going Petroleum Refinery Emissions Inventory and Crude Slate Report 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** As an alternative to 401.3 for GHG, annual emissions for GHG may be reported based on the most recent California Air Resources Board (CARB) Regulation for the Mandatory Reporting of Greenhouse Gas Emissions methodology. If emissions increase by more than 10,000 metric tons from the PREP or from the previous year's On-going Petroleum Refinery Emissions Inventory and Crude Slate Report, the owner/operator must submit with that year's Emissions Inventory and Crude Slate Report an analysis of the cause of the GHG emissions increase, including the individual sources involved, and the actions taken to meet the emissions reductions requirements of the CARB regulation. The analysis shall also include documentation for any assumptions used.
  - 401.5** A plot plan that clearly identifies the location of each source identified in Section 12-15-401.3 at the petroleum refinery.
  - 401.6** Beginning with the On-going Petroleum Refinery Emission Inventory and Crude Slate Report for the calendar year 2016 (due on or before September 1, 2017), and for every subsequent calendar year On-going Petroleum Refinery Emission Inventory and Crude Slate Report, a table that shows, on a refinery-wide basis for each applicable air pollutant, the change in emissions that occurred between the PREP established under Sections 12-15-402 or 403 and the calendar year period for which the On-going Petroleum Refinery Emission Inventory and Crude Slate Report was prepared under this section. Emission changes do not need to be shown for any newly listed TACs that have been included in an On-going Petroleum Refinery Emission Inventory and Crude Slate Report but that have not been included in a PREP due to insufficient information.

- 401.7** Quarterly summaries of the total volume (million barrels) and average sulfur content (percentage by weight), nitrogen content (percentage by weight), API gravity (degrees), and total acid number (milligrams of potassium hydroxide per gram) of the petroleum refinery's crude slate for the calendar year period covered by the On-going Petroleum Refinery Emission Inventory and Crude Slate Report.
- 12-15-402 Petroleum Refinery Emissions Profile Report:** A refinery owner/operator shall obtain and maintain APCO approval of a PREP report. 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 12-15-404. On or before July 1, 2016, a refinery owner/operator shall submit to the APCO a PREP report in an APCO-approved format. This report shall include, at a minimum, the following:
- 402.1** Identification of the PREP period for each air pollutant included in the PREP.
  - 402.2** A summary of the emission rate of each criteria pollutant, TAC, and GHG that was emitted from the petroleum refinery during the PREP period, expressed in units of tons or pounds per year, excluding any emissions that do not meet the definition of PREP in Section 12-15-213.
  - 402.3** A detailed listing of the emission rate of each criteria pollutant, TAC, and GHG that was emitted from each source at the petroleum refinery during the PREP period, expressed in units of tons or pounds per year, and a complete description of the methodology used for determining these emissions including documentation of the basis for any assumptions used and the exclusion of any emissions that do not meet the definition of PREP in Section 12-15-213.
  - 402.4** A plot plan that clearly identifies the location of each source identified in Section 12-15-402.3 at the petroleum refinery.
- 12-15-403 Revision of Petroleum Refinery Emissions Profile Report:** Any improvements in emissions inventory methodologies that are used to expand or refine On-going Petroleum Refinery Emission Inventory and Crude Slate Reports submitted under Section 12-15-401 shall also be used to expand or refine future submissions of the PREP as provided below, to the extent that such improved methodologies are also applicable to the sources included in the PREP. In such instances, a revised PREP report shall be submitted to the APCO no later than by the date the applicable On-going Petroleum Refinery Emission Inventory and Crude Slate Report is due. The revised PREP report shall, at a minimum, identify the date of the revision, contain the information described in Sections 12-15-402.1 to 402.4, and clearly identify, describe, and justify the changes in the PREP that have been made. Revised PREP reports should be expanded to include emissions of newly listed TACs that have been included in an On-going Petroleum Refinery Emission Inventory and Crude Slate Report required by Reg. 12-15-401.6, unless insufficient information exists to make such revisions.
- 12-15-404 Review and Approval of On-going Petroleum Refinery Emissions Inventory and Crude Slate Reports and Petroleum Refinery Emissions Profile Reports:** The procedure for determining whether an On-going Petroleum Refinery Emission Inventory and Crude Slate Report submitted under Section 12-15-401, or a PREP report submitted under Section 12-15-402 or 403, meet the applicable requirements of this rule is as follows:
- 404.1 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 refinery 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 refinery owner/operator shall correct the identified deficiencies and resubmit the report within 45 days. If the APCO determines that the refinery 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.
  - 404.3 Public Comment:** The report, including any revisions made to correct deficiencies will be made available for public review for 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 report.
- 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 report if the APCO determines that the report meets the requirements of Sections 12-15-401, 402, or 403, and Section 12-15-601, and shall provide written notification to the refinery 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 Sections 12-15-401, 402, 403, and Section 12-15-601, the APCO will notify the refinery owner/operator in writing. The notification will specify the basis for this determination. Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the report within 45 days. If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the refinery owner/operator has failed to meet the requirements of Sections 12-15-401, 402, or 403, and Section 12-15-601, 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.
- 404.5 Public Inspection:** Within 15 days of the approval or disapproval of a report under Section 12-15-404.4, the APCO shall post the approved or disapproved report on the District's website, and shall notify any member of the public who submitted comments under Section 12-15-404.3, or who otherwise requested such notification of this action in writing. In making information available for public inspection, the confidentiality of trade secrets, as designated by the refinery owner/operator, shall be handled in accordance with Section 6254.7 of the Government Code.
- 12-15-405 Submittal of Health Risk Assessment Modeling Protocol and Health Risk Assessment:** A refinery owner/operator shall obtain and maintain APCO approval of a HRA Modeling Protocol and HRA and, if required pursuant to 12-16-303, an Updated HRA Modeling Protocol and HRA. Timely submittal of a protocol and assessment as described in this section shall constitute compliance with this requirement unless and until the APCO makes a disapproval determination pursuant to Section 12-15-406.4 or 406.8.
- 405.1 Timely Submittal of HRA Modeling Protocol:** Timely submittal of an HRA Modeling Protocol means that the refinery owner/operator shall submit to the APCO an HRA Modeling Protocol for the petroleum refinery no later than September 1, 2016 or within 60 days of the date that CARB releases the Hotspots Analysis Reporting Program (HARP) for use after incorporation of OEHHA's revised HRA Guidelines, whichever date is later. This protocol shall be based on emissions inventory data collected for the calendar year prior to the year in which CARB releases HARP.
- 405.2 Timely Submittal of HRA:** Timely submittal of an HRA means that the refinery owner/operator shall submit to the APCO an HRA that is completed in accordance with the final APCO-approved HRA Modeling Protocol by no later than 90 days after receipt of APCO approval of the HRA Modeling Protocol.
- 405.3 Timely Submittal of Modeling Protocol for Updated HRA:** Timely submittal of an Modeling Protocol for an Updated HRA required pursuant to 12-16-303 means that the refinery owner/operator shall submit to the APCO an HRA Modeling Protocol for the petroleum refinery no later than 60 days after APCO approval of an On-Going Inventory Report that, pursuant to 12-16-303, triggers the requirement to obtain and maintain approval of an Updated HRA.
- 405.4 Timely Submittal of an Updated HRA:** Timely submittal of an Updated HRA required pursuant to 12-16-303 means that the refinery owner/operator shall submit to the APCO an HRA that is completed in accordance with the final APCO-approved HRA Modeling Protocol by no later than 90 days after receipt of APCO approval of the HRA Modeling Protocol.
- 12-15-406 Review and Approval of Health Risk Assessment Modeling Protocols and Health Risk Assessments:** The procedure for determining whether a Health Risk Assessment (HRA) Modeling Protocol and Health Risk Assessment submitted under Section 12-15-405 meet the applicable requirements of this rule is as follows:
- 406.1 Preliminary Protocol Review:** Within 90 days of receipt of an HRA Modeling

Protocol, the APCO will complete a preliminary review of the protocol to identify any deficiencies that need to be corrected. If the APCO determines that the submitted protocol is deficient, the APCO will notify the refinery owner/operator in writing. The notification will specify the basis for this determination and the required corrective action.

- 406.2 Protocol Corrective Action:** Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the HRA Modeling Protocol within 45 days. If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will disapprove the HRA Modeling Protocol.
- 406.3 Public Comment on HRA Modeling Protocol:** The HRA Modeling Protocol, including any revisions made to correct deficiencies, will be made available for public review for 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 HRA Modeling Protocol.
- 406.4 Final Action on Modeling Protocol:** Within 45 days of the close of the public comment period under Section 12-15-406.3, the APCO will approve the HRA Modeling Protocol if the APCO determines that the HRA Modeling Protocol meets the requirements of Section 12-15-405, and shall provide written notification to the refinery owner/operator. This period may be extended if necessary as determined by the APCO. If the APCO determines that the HRA does not meet the requirement of Sections 12-15-405, the APCO will notify the refinery owner/operator in writing. The notification will specify the basis for this determination. Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the HRA Modeling Protocol within 45 days. If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the refinery owner/operator has failed to meet the requirement of Sections 12-15-405, and will disapprove the HRA Modeling Protocol.
- 406.5 Preliminary HRA Review:** The APCO will complete a preliminary review of the HRA to verify that it was conducted in accordance with the APCO-approved Modeling Program and to identify any deficiencies that need to be corrected. If the APCO determines that the submitted HRA is deficient, the APCO will notify the refinery owner/operator in writing. The notification will specify the basis for this determination and the required corrective action.
- 406.6 HRA Corrective Action:** Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the HRA within 45 days. If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will disapprove the HRA.
- 406.7 Public Comment on HRA:** The HRA, including any revisions made to correct deficiencies, will be made available for public review for 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 HRA.
- 406.8 Final Action:** Within 45 days of the close of the public comment period under Section 12-15-406.7 the APCO will approve the HRA if the APCO determines that the HRA meets the requirements of Section 12-15-405, and shall provide written notification to the refinery owner/operator. This period may be extended if necessary as determined by the APCO. If the APCO determines that the HRA does not meet the requirement of Sections 12-15-405, the APCO will notify the refinery owner/operator in writing. The notification will specify the basis for this determination. Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the HRA within 45 days. If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the refinery owner/operator has failed to meet the requirement of Sections 12-15-405, and will disapprove the HRA.
- 406.9 Public Inspection:** Within 15 days of the approval or disapproval of an HRA under

Section 12-15-406.8, the APCO shall post the approved or disapproved HRA on the District's website, and shall notify any member of the public who submitted comments under Section 12-15-406.3, or who otherwise requested such notification of this action in writing. In making information available for public inspection, the confidentiality of trade secrets, as designated by the refinery owner/operator, shall be handled in accordance with Section 6254.7 of the Government Code.

- 12-15-407 Air Monitoring Plans:** A refinery owner/operator shall obtain and maintain APCO approval of a plan for establishing and operating a fence-line monitoring system and community air 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 408. On or before December 31, 2015, the refinery owner/operator shall submit to the APCO a plan for establishing and operating a fence-line monitoring system and a community air monitoring system. 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 12-15-410, the refinery/operator shall submit to the APCO an updated air monitoring plan. The siting of community air monitors shall be addressed in an Air Monitoring Plan Siting Addendum that may be submitted subsequent to the required time for submittal of the Air Monitoring Plan, provided the community air monitoring system is installed and operated in a timely manner as provided in 12-15-501.
- 12-15-408 Review and Approval of Air Monitoring Plans:** The procedure for determining whether an air monitoring plan submitted under Section 12-15-407 meets the applicable requirements of this rule is as follows:
- 408.1 **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 refinery owner/operator in writing. The notification will specify the basis for this determination and the required corrective action.
- 408.2 **Corrective Action:** Upon receipt of such notification, the refinery owner/operator shall correct the plan and resubmit the proposed plan within 45 days. If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will disapprove the plan.
- 408.3 **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.
- 408.4 **Final Action:** Within 45 days of the close of the public comment period under Section 12-15-408.3, the APCO will approve the air monitoring plan if the APCO determines that the plan meets the requirements of Section 12-15-407 and Section 12-15-603, and shall provide written notification to the refinery 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 12-15-407 and Section 12-15-603, the APCO will notify the refinery owner/operator in writing. The notification will specify the basis for this determination. Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the air monitoring plan within 45 days. If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the refinery owner/operator has failed to meet the requirements of Sections 12-15-407 and Section 12-15-603 and will disapprove the plan.
- 408.5 **Public Inspection:** Within 15 days of the approval or disapproval of an air monitoring plan under Section 12-15-408.4, the APCO shall post the plan on the District's website, and shall notify any member of the public who submitted comments under Section 12-15-408.3, 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 refinery owner/operator, shall be handled in accordance with Section 6254.7 of the Government Code.
- 408.6 Siting of Community Monitors:** If the APCO determines that sites proposed for community monitors in the Air Monitoring Plan Siting Addendum are inappropriate, the APCO shall notify the refinery owner/operator of any deficiencies. Within 30 days of receiving this notice, the refinery owner/operator shall correct siting deficiencies and resubmit the Siting Addendum. If the proposed sites continue to be inappropriate, the APCO shall disapprove the Air Monitoring Plan.
- 408.7 Separate Approvals for Fence-Line and Community Monitoring Possible:** The APCO may approve both the fence-line monitoring and community air monitoring system elements of the Air Monitoring Plan, or may approve only the element that is determined to be adequate while disapproving the remainder. A refinery owner/operator shall implement the approved elements of an Air Monitoring Plan.
- 12-15-409 Emissions Inventory Guidelines:** The APCO shall publish, and periodically update, emissions inventory guidelines for petroleum refineries that describe the emission factors/estimation methodologies that the District will apply for each source category when reviewing emissions inventories required under this rule. Methods 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.
- 12-15-410 Air Monitoring Guidelines:** The APCO shall publish air monitoring guidelines for petroleum refineries that describe the factors that the District will apply in reviewing community air monitoring systems and 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 and community air monitoring systems established under this rule.
- 12-15-411 Designation of Confidential Information:** When submitting an On-going Petroleum Refinery Emission Inventory and Crude Slate Report, PREP report, air monitoring plan, or other documents or records required by this rule, the refinery 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.

## **12-15-500 MONITORING AND RECORDS**

- 12-15-501 Community Air Monitoring System:** Within two years of the approval of an air monitoring plan under Section 12-15-408.4, the refinery owner/operator will ensure that a community air monitoring system is installed, and is operated and maintained in accordance with the approved air monitoring plan. Community air monitoring system data shall also be reported as specified in the approved plan.
- 12-15-502 Fence-line Monitoring System:** Within one year of the approval of an air monitoring plan under Section 12-15-408.4, the 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.
- 12-15-503 Recordkeeping:** The refinery owner/operator shall maintain records of all monitoring information, source test results, material and fuel throughputs, and other information used to establish emissions inventories required under this rule. The refinery owner/operator shall also maintain records of the quantity and characteristics of crude oil, and other pre-processed feedstocks that are refined, blended or processed. Characteristics for crude oil shall include,

at a minimum, sulfur content, nitrogen content, API gravity and total acid number. Characteristics for pre-processed feedstocks shall include, at a minimum, sulfur content, nitrogen content, API gravity and all specification information required by the owner/operator and/or provided by the supplier of the pre-processed feedstocks. Such records shall be maintained for a period of five years after the submittal of a required On-going Petroleum Refinery Emission Inventory and Crude Slate Report or PREP report, and shall be made available to the APCO upon request.

## **12-15-600 MANUAL OF PROCEDURES**

- 12-15-601 Emissions Inventory Procedures:** Each emissions inventory required under this rule shall be prepared following the District's Emission Inventory Guidelines for Petroleum Refineries established under Section 12-15-409.
- 12-15-602 Health Risk Assessment Procedures:** Each health risk assessment required under this rule shall be prepared following the most recent guidelines adopted by the Office of Environmental Health Hazard Assessment (OEHHA) under Health and Safety Code Section 44360(b)(2) for use in the Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Health and Safety Code Section 44300 et seq.).
- 12-15-603 Air Monitoring Procedures:** Each air monitoring plan required under this rule shall be prepared following the District's Air Monitoring Guidelines for Petroleum Refineries established under Section 12-15-410.

**REGULATION 12**  
**MISCELLANEOUS STANDARDS OF PERFORMANCE**  
**RULE 16**  
**PETROLEUM REFINING EMISSIONS ANALYSIS, THRESHOLDS AND MITIGATION**  
**INDEX**

**12-16-100 GENERAL**

- 12-16-101 Description
- 12-16-102 Exemption, Small Refineries
- 12-16-103 Limited Exemption, Increases in Crude Oil Throughput
- 12-16-104 Limited Exemption, Greenhouse Gas Emissions
- 12-16-105 Limited Exemption, Emission from Flares

**12-16-200 DEFINITIONS**

- 12-16-201 AB-2588 Mandatory Risk Reduction Threshold
- 12-16-202 Accidental Air Release
- 12-16-203 Acute Hazard Index
- 12-16-204 Acute Hazard Quotient
- 12-16-205 Air Emission Reduction Measures
- 12-16-206 Cancer Risk
- 12-16-207 Chronic Hazard Index
- 12-16-208 Chronic Hazard Quotient
- 12-16-209 Cost-Effectiveness
- 12-16-210 Criteria Pollutant
- 12-16-211 Crude Oil
- 12-16-212 Emission Reduction Plan (ERP)
- 12-16-213 Emissions Inventory
- 12-16-214 Greenhouse Gases (GHGs)
- 12-16-215 Health Risk
- 12-16-216 On-going Petroleum Refinery Emissions Inventory
- 12-16-217 Petroleum Refinery
- 12-16-218 Petroleum Refinery Emissions Profile (PREP)
- 12-16-219 Petroleum Refinery Owner/Operator
- 12-16-220 Risk Reduction Measures
- 12-16-221 Source
- 12-16-222 Toxic Air Contaminant (TAC)
- 12-16-223 Toxicity-Weighted Emissions
- 12-16-224 Trigger Levels

**12-16-300 STANDARDS**

- 12-16-301 Emission Reduction Plan
- 12-16-302 Emission Reduction Plan Implementation
- 12-16-303 Health Risk Assessment Update

**12-16-400 ADMINISTRATIVE REQUIREMENTS**

- 12-16-401 Emission Reduction Plan
- 12-16-402 Updated Emission Reduction Plan
- 12-16-403 Review and Approval of Emission Reduction Plans
- 12-16-404 Refinery-Specific Toxic Air Contaminant Trigger Levels

12-16-405 Emission Increases Related to Increases in Crude Oil Throughput

**12-16-500 MONITORING AND RECORDS**

**12-16-600 MANUAL OF PROCEDURES**

12-16-601 Emissions Inventory Procedures

**REGULATION 12**  
**MISCELLANEOUS STANDARDS OF PERFORMANCE**  
**RULE 16**  
**PETROLEUM REFINING EMISSIONS ANALYSIS, THRESHOLDS AND MITIGATION**  
**(ADOPTED [DATE])**

**12-16-100 GENERAL**

- 12-16-101 Description:** The purpose of this rule is to identify the cause of, and to mitigate, any significant emissions increases from petroleum refineries.
- 12-16-102 Exemption, Small Refineries:** This rule shall not apply to any refinery that is limited to a total crude oil throughput or total crude oil processing capacity of 5,000 barrels per day or less by an Air District Permit to Operate.
- 12-16-103 Limited Exemption, Increases in Crude Oil Throughput:** This rule does not require mitigation of emission increases of criteria pollutants or greenhouse gases if such increases are caused solely by an increased volume of crude oil processed at the crude oil unit as allowed by an Air District Permit to Operate, relative to the crude oil unit throughput that was used to establish the PREP in Regulation 12, Rule 15, and those increases do not reflect an increase in the emission rate relative to the processing rate of crude oil. Therefore, the portion of the increase in emissions of a criteria pollutant or greenhouse gas above the Trigger Level that is attributable to an increase in crude oil throughput shall be addressed in the Causal Analysis in Section 12-16-401.1, but is exempt from the other requirements of Section 401 provided the refinery owner/operator satisfies the requirements of Section 12-16-405.
- 12-16-104 Limited Exemption, Greenhouse Gas Emissions:** Emission increases of greenhouse gases (GHG) that exceed the Trigger Levels in Section 12-16-301 shall be addressed in the Causal Analysis in Section 12-16-401.1, but are exempt from the other requirements of Section 401.
- 12-16-105 Limited Exemption, Emissions from Flares:** Emissions from flaring events addressed in Regulation 12, Rules 11 and 12 shall not be included in requirements for this rule.

**12-16-200 DEFINITIONS**

- 12-16-201 AB-2588 Mandatory Risk Reduction Threshold:** The significant risk level established by the Air District pursuant to Air Toxic “Hot Spots” Information and Assessment, Health and Safety Code Section 44391 et seq.
- 12-16-202 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.
- 12-16-203 Acute Hazard Index:** A measure of short-term non-cancer health risks, which is the sum of the individual acute hazard quotients for toxic air contaminants identified as affecting the same target organ or organ system.
- 12-16-204 Acute Hazard Quotient:** The ratio of the estimated short-term average concentration of a toxic air contaminant at a particular location to its acute reference exposure level (estimated for inhalation exposure).
- 12-16-205 Air Emission Reduction Measures:** Equipment or practices intended to reduce or eliminate air emissions, and that may include equipment upgrades or modernization, improved

emissions capture or control, process changes, operational changes, or feedstock modifications. When addressing Toxic Air Contaminants, air emission reduction measures shall include risk reduction measures.

- 12-16-206 Cancer Risk:** An estimate of the probability that an individual will develop cancer as a result of lifetime exposure to emitted carcinogens at a particular location, and considering, where appropriate, age sensitivity factors to account for inherent increased susceptibility to carcinogens during infancy and childhood.
- 12-16-207 Chronic Hazard Index:** A measure of long-term non-cancer health risks, which is the sum of the individual chronic hazard quotients for toxic air contaminants identified as affecting the same target organ or organ system.
- 12-16-208 Chronic Hazard Quotient:** The ratio of the estimated long-term average concentration of a toxic air contaminant at a particular location to its chronic reference exposure level (estimated for inhalation and non-inhalation exposures).
- 12-16-209 Cost-Effectiveness:** The ratio of the total annualized cost of an Air Emission Reduction Measure to the annual amount of emissions reduced from its implementation.
- 12-16-210 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<sub>x</sub>), particulate matter with an aerodynamic diameter of 10 micrometers or less (PM<sub>10</sub>), particulate matter with an aerodynamic diameter of 2.5 micrometers or less (PM<sub>2.5</sub>), precursor organic compounds (POC), and sulfur dioxide (SO<sub>2</sub>).
- 12-16-211 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.
- 12-16-212 Emission Reduction Plan (ERP):** A document intended to meet the requirements of Section 12-16-401 that identifies the sources, quantities, and causes of excess emissions and lists and details the measures that will be implemented to reduce emissions of pollutants that have exceeded Trigger Levels described in Section 12-16-301.
- 12-16-213 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) all air releases from cargo carriers (e.g., ships and trains), excluding motor vehicles, that load or unload materials at a petroleum refinery including emissions from such carriers while operating within the Air District or within California Coastal Waters as specified in Regulation 2-2-610 (adopted Dec. 19, 2012).
- 12-16-214 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. GHG emissions shall be expressed as CO<sub>2</sub> equivalent emissions (CO<sub>2</sub>e) according to the methodology in 40 CFR § 52.21(b)(49)(ii).
- 12-16-215 Health Risk:** The potential for adverse human health effects resulting from exposure to emissions of air contaminants and ranging from relatively mild temporary conditions, such as eye or throat irritation, shortness of breath, or headaches, to permanent and serious conditions, such as birth defects, cancer or damage to lungs, nerves, liver, heart, or other organs. Measures of health risk from exposure to toxic air contaminants include cancer risk, chronic hazard index, and acute hazard index.

- 12-16-216 On-Going Petroleum Refinery Emissions Inventory:** An emissions inventory at a petroleum refinery covering a calendar year period. For the purposes of this rule, On-Going Emissions Inventories are required to be compiled for the calendar year 2016, and for each subsequent calendar year. The On-Going Petroleum Refinery Emissions Inventory is described more fully in Regulation 12, Rule 15.
- 12-16-217 Petroleum Refinery:** An establishment that is located on one or more contiguous or adjacent properties, and under common control, and 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, 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).
- 12-16-218 Petroleum Refinery Emissions Profile (PREP):** An emissions inventory that is used as a reference with which to compare emissions inventories for later periods of time (On-Going Emissions Inventories) in order to determine changes in emissions that have occurred from a petroleum refinery. The PREP is described more fully in Regulation 12, Rule 15.
- 12-16-219 Petroleum Refinery Owner/Operator:** Any person who owns, operates, or exercises operational control over the majority of operations at a petroleum refinery. The refinery owner/operator is responsible for compliance with this rule for the entirety of the petroleum refinery, including any refinery processes or auxiliary facilities that may be separately owned or operated. Any person who owns, operates, or exercises operational control over a portion of a petroleum refinery that is less than a majority of the total refinery operations must provide the Owner/Operator with information sufficient to allow the owner/operator to comply with this rule, and must make that information available to the APCO upon request.
- 12-16-220 Risk Reduction Measures:** Changes to production processes, feedstocks, product formulations, emission point locations, emissions capture and dispersion mechanisms, and other practices that reduce Toxic Air Contaminant emissions or that reduce health risks at the facility being evaluated.
- 12-16-221 Source:** Any article, machine, equipment, operation, contrivance or related groupings of such that may produce and/or emit air pollutants.
- 12-16-222 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.
- 12-16-223 Toxicity-Weighted Emissions:** An emission calculation technique that uses the cancer potency (CP) weighting factors and chronic reference exposure level (CREL) weighting factors described in Regulation 2, Rule 5 to assess the relative carcinogenic-weighted quotient and non-carcinogenic-weighted quotient for each toxic air contaminant under evaluation. The toxicity-weighted emissions for a project or site are the sum of the individual quotients for each type of risk: the sum of all carcinogenic-weighted quotients and the sum of all non-carcinogenic-weighted quotients.
- 12-16-224 Trigger Level:** An air emissions increase threshold measured relative to the emissions in the PREP described in Regulation 12, Rule 15, Section 12-15-402 that, if exceeded, initiates requirements under this rule. Specific Trigger Levels are defined in Section 12-16-301.

## **12-16-300 STANDARDS**

**12-16-301 Emission Reduction Plan:** A refinery owner/operator shall obtain and maintain APCO approval of an Emission Reduction Plan (ERP) in accordance with Section 12-16-401 or 402 if any of the conditions described in Sections 12-16-301.1, 301.2 or 301.3 occur. Timely submittal of an ERP or Updated ERP as specified in Sections 12-16-401 or 402 and compliance with the procedures of Section 12-16-403 shall satisfy this requirement unless and until the APCO disapproves the ERP.

- 301.1** An On-Going Petroleum Refinery Emissions Inventory Report required by Regulation 12, Rule 15 establishes that emissions of a criteria pollutant has increased relative to the baseline emissions inventory for that pollutant established in the PREP by more than 7.0 percent or GHGs by more than 10,000 metric tons (CO<sub>2</sub> equivalent).
- 301.2** An On-Going Petroleum Refinery Emissions Inventory Report required by Regulation 12, Rule 15 establishes that emissions of TACs have increased relative to the baseline emissions inventory established in the PREP in excess of any of the Trigger Levels in Table 1.

<b>Table 1 – TAC Trigger Levels</b>	
Chronic Trigger Level	Any Chronic Trigger Level in Table 2-5-1 of Regulation 2, Rule 5, unless the refinery owner/operator demonstrates prior to the time an ERP is due that the total refinery-wide carcinogenic-weighted emission rate and the total refinery-wide non-carcinogenic-weighted emission rate, whichever are applicable, have not increased.
Carcinogenic Trigger Level	Any refinery-specific Carcinogenic Trigger Level established pursuant to Section 12-16-404.1.
Noncarcinogenic Trigger Level	Any refinery-specific Noncarcinogenic Trigger Level established pursuant to Section 12-16-404.2.

- 301.3** A Health Risk Assessment (HRA) required by Regulation 12, Rule 15 establishes that a refinery-wide health impact is greater than the Air District's current AB-2588 mandatory risk reduction threshold, and an On-going Petroleum Refinery Emissions Inventory Report required by Regulation 12, Rule 15 establishes that the refinery has any increase in toxicity-weighted emissions for that health impact type.

**12-16-302 Emission Reduction Plan Implementation:** A refinery owner/operator shall implement any and all Air Emission Reduction Measures identified in an approved ERP prepared pursuant to Sections 12-16-401 or 402 in accordance with the schedule provided in that ERP.

**12-16-303 Updated Health Risk Assessment:** A refinery owner/operator shall obtain and maintain approval of an Updated Health Risk Assessment if each of the conditions of Sections 303.1 through 303.4 are met.

- 303.1** An APCO-approved HRA indicates that the refinery has a refinery-wide health impact that is greater than the Air District's current AB-2588 mandatory risk reduction threshold; and
- 303.2** The APCO has approved an On-Going Emissions Inventory that shows an increase in refinery-wide toxicity-weighted emissions relative to the baseline emissions inventory established in the PREP; and
- 303.3** The refinery is not implementing an approved risk reduction and audit plan developed pursuant to California Health & Safety Code § 44391 that addresses the increase described in Section 303.2; and
- 303.4** The most recent APCO-approved refinery-wide HRA is based on an inventory year that is more than five years prior to the inventory year showing the increase described in Section 303.2.
- 303.5** If the conditions of Sections 303.1 through 303.3 are met but the most recent APCO-approved refinery-wide HRA is based on an inventory year that is less than five years

prior to the inventory year showing the increase described in Section 303.2, then the refinery owner/operator must comply with Section 12-16-301.3 by submitting a causal analysis pursuant to Section 12-16-401.1 addressing the increased described in Section 302.2.

- 303.6** An Updated Health Risk Assessment required pursuant to this Section shall be submitted in accordance with 12-15-405 and shall be reviewed by the APCO in accordance with 12-16-406.

## **12-16-400 ADMINISTRATIVE REQUIREMENTS**

**12-16-401 Emission Reduction Plan:** A refinery owner/operator shall submit the Emission Reduction Plan (ERP) required by Section 12-16-301 to the APCO within 60 days of APCO approval of an On-Going Refinery Emissions Inventory Report that establishes that a Trigger Level of Section 12-16-301 has been exceeded. The ERP shall include the elements described in Sections 12-16-401.1, 401.2, and 401.3. APCO disapproval of any of these elements or failure to implement an APCO-approved schedule described in Sections 12-16-401.2 or 401.3, shall constitute a violation of Section 12-16-301.

**401.1 Causal Analysis:** The ERP shall include a Causal Analysis that includes the following:

- 1.1 Identification of the source(s) of emissions that contributed to the refinery-wide emissions increase that exceeded a Trigger Level and a quantification of the contribution of each source to this increase.
- 1.2 An analysis that identifies the factor(s) that resulted in the emissions increase. The analysis shall address, in addition to other factors involved, the degree to which changes in crude oil characteristics at the refinery may have caused or contributed to the emissions increase.
- 1.3 If accidental air releases are identified as causing or contributing to an emissions increase at the refinery, identification of the accident's initiating event and any contributing factors, and a description of the investigation that led to these findings.
- 1.4 Any requests for exemption based on Section 12-16-103, including the demonstrations described in Section 12-16-405.

**401.2 Air Emission Reduction Measures:** The ERP shall identify any Air Emission Reduction Measures planned for implementation that will, within two (2) years of submission of a complete ERP, reduce emissions that have exceeded a Trigger Level. This part of the ERP shall include the following:

- 2.1 A quantification of the emission reductions expected from each Air Emission Reduction Measure.
- 2.2 A schedule for the permitting and implementation of each Air Emission Reduction Measure.

**401.3 Emission Reduction Audit:** If the planned Air Emission Reduction Measures in Section 401.2 are not projected to fully mitigate, within two years of submission of the complete ERP, each emissions increase that has exceeded a Trigger Level, then the ERP must include an Emission Reduction Audit. The Emission Reduction Audit shall include the following:

- 3.1 Identification of all technically feasible Air Emission Reduction Measures that would mitigate to any extent emissions that have exceeded a Trigger Level and a quantification of the emission reductions that would be achieved by each measure.
- 3.2 An estimate of the cost-effectiveness of each technically feasible Air Emission Reduction Measure and a description of the basis for the estimate.
- 3.3 A schedule for the permitting and implementation of technically feasible Air Emission Reduction Measures sufficient to fully mitigate emissions that have exceeded a Trigger Level. A refinery owner/operator is not required to implement Air Emission Reduction Measures that exceed maximum cost-effectiveness as described in Table 2.

**Table 2 – Maximum Cost-Effectiveness for Air Emission Reduction Measures**

Pollutant	Maximum Cost Effectiveness (\$/ton of emissions reduced)
NO <sub>x</sub>	\$35,000
SO <sub>2</sub>	\$35,000
PM <sub>10</sub>	\$15,000
PM <sub>2.5</sub>	\$50,000
CO	\$500
POC	\$35,000

Notes:

1. Maximum cost-effectiveness values are in 2015 dollars and shall be adjusted for inflation using the Bay Area Consumer Price Index in other years.
2. The PM<sub>2.5</sub> cost-effectiveness value shall be applied only to combustion emissions including process units that regenerate catalyst, such as Fluidized Catalytic Cracking Units and Catalytic Reformer Units. Non-combustion particulate emissions are subject to the PM<sub>10</sub> value.

**12-16-402 Updated Emission Reduction Plan:** If implementation of an APCO-approved Emission Reduction Plan (ERP) described in Section 12-16-401 fails to fully mitigate emissions that have exceeded Trigger Levels, a refinery owner/operator shall submit an Updated ERP to the APCO that satisfies the following requirements:

- 402.1** The Updated ERP shall be submitted to the APCO within 120 days of the final compliance date in the APCO-approved ERP.
- 402.2** The Updated ERP shall include an Emission Reduction Audit as described in Section 12-16-401.3.

**12-16-403 Review and Approval of Emission Reduction Plans:** The procedure for determining whether an ERP, or an Updated ERP, submitted under Sections 12-16-401 or 402 meets the applicable requirements of this rule is as follows:

**403.1 Completeness Review:** Within 20 business days of receipt of the ERP, the APCO will conduct a completeness review of the ERP. The APCO will notify the refinery owner/ operator in writing if the submitted ERP is lacking information necessary to make an approval determination. The refinery owner/operator shall submit a complete ERP within 45 days of receipt of this notification. If the APCO determines that the resubmitted ERP is still incomplete, the APCO may disapprove the ERP or may notify the refinery owner/operator that the ERP continues to lack necessary information and provide another opportunity to submit a complete ERP in 45 or fewer days.

**403.2 Public Comment:** The ERP, including any revisions made to correct deficiencies, will be made available to the public for 45 days (with exception of confidential information). The APCO will consider any written comments received during this period prior to approving or disapproving the final ERP.

**403.3 Final Action:**

- 4.1** The APCO will approve the ERP if the APCO determines that the ERP meets the requirements of Sections 12-16-401 and 402, and will provide written notification to the refinery owner/operator.
- 4.2** If the APCO determines that the ERP does not meet the requirements of Sections 12-16-401 and 402, the APCO will notify the refinery owner/operator in writing and will specify the basis for this determination. Upon receipt of such notification, the refinery owner/operator shall correct the identified deficiencies and resubmit the ERP within 45 days.
- 4.3** If the APCO determines that the refinery owner/operator failed to correct any deficiency identified in the notification, the APCO will determine that the refinery

owner/operator has failed to meet the requirements of Sections 12-16-401 and 402 and will disapprove the ERP.

- 403.4 Public Inspection:** Within 30 days of the approval of an ERP under Section 12-16-403.3, the APCO shall post the ERP on the Air District's website, and shall notify any member of the public, who submitted comments under Section 12-16-403.2, or who otherwise requested such notification of this action in writing. In making information available for public inspection, the confidentiality of trade secrets, as designated by the refinery owner/operator, shall be handled in accordance with Section 6254.7 of the Government Code.

- 12-16-404 Refinery-Specific Toxic Air Contaminant Trigger Levels:** Within 45 days of taking final action to approve a health risk assessment pursuant to Regulation 12-15-406.8, the APCO shall:

- 404.1** Identify one or more site-specific Carcinogenic Toxic Air Contaminant (TAC) Trigger Levels for each refinery. A Carcinogenic TAC Trigger Level shall be an increase in carcinogenic-weighted emissions for a source or group of sources that is projected to correspond to an increase in cancer risk at the maximally exposed individual of 10 in a million cancer risk;
- 404.2** Identify one or more site-specific Non-carcinogenic TAC Trigger Levels for each refinery. A Non-carcinogenic TAC Trigger Level shall be an increase in non-carcinogenic-weighted emissions for a source or group of sources that is projected to correspond to an increase in chronic hazard index at the maximally exposed individual of 1.0 hazard index.
- 404.3** The refinery-specific increases in toxicity-weighted emissions determined pursuant to Sections 404.1 and 404.2 shall be the TAC Trigger Levels for Section 301.2. The Air District may establish the Refinery-Specific TAC Trigger Levels for a source, a group of sources, or for the entire refinery based on the most relevant predictor of maximum health impacts for a given facility. The Air District's Carcinogenic and Non-carcinogenic TAC Trigger Levels shall be determined using the results of the APCO-approved health risk assessment that was prepared pursuant to Regulation 12, Rule 15.
- 404.4** If the District requires the preparation of an updated health risk assessment pursuant to Section 12-16-303, the District shall revise the Refinery-Specific TAC Trigger Levels, if necessary, after the District has approved the updated health risk assessment for the site.
- 404.5** Site-specific TAC Trigger Levels shall take effect upon publication on the District's website and written notification to the affected refinery.

- 12-16-405 Emission Increases Related to Increases in Crude Oil Throughput:** To qualify for the limited exemption in Section 12-16-103, the refinery owner/operator must do the following:

- 405.1 Submit a causal analysis in accordance with Section 12-16-401.1 to justify exemption of the emission increase by demonstrating that it was caused solely by a permitted increase in crude oil throughput at the crude oil unit as allowed by an Air District Permit to Operate; and
- 405.2 Include in the causal analysis a demonstration that the emission increase proposed to be exempted is the result of crude oil throughput above the crude oil unit throughput that was used to establish the PREP in Regulation 12, Rule 15, and does not represent an increase in the emission rate relative to the volume of processed crude oil by demonstrating that the following is true:

$$\frac{E_t}{C_t} \leq \frac{E_{BL}}{C_{BL}}$$

Where:

$E_i$  = total criteria pollutant or greenhouse gas emission increase above the baseline (tons).  
 $C_i$  = crude oil throughput increase above the baseline through the Crude Oil Unit associated with  $E_i$  (million barrels (million bbl)).  
 $E_{BL}$  = total criteria pollutant or greenhouse gas emissions during the baseline period (tons).  
 $C_{BL}$  = crude oil throughput through the Crude Oil Unit associated with  $E_{BL}$  (million bbl) during the baseline period.

## **12-16-500 MONITORING AND RECORDS**

### **12-16-600 MANUAL OF PROCEDURES**

**12-16-601 Emissions Inventory Procedures:** Each emissions inventory required under this rule shall be prepared following the District's Emission Inventory Guidelines for Petroleum Refineries established under Regulation 12, Rule 15, Section 12-15-412.



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## **WORKSHOP REPORT**

**PROPOSED  
AIR DISTRICT REGULATIONS 12, RULE 15:  
PETROLEUM REFINING EMISSIONS  
TRACKING AND REGULATION 12, RULE 16:  
PETROLEUM REFINING EMISSIONS  
ANALYSIS, THRESHOLDS AND MITIGATION**

### **APPENDIX B**

**Emissions Inventory Guidance**



BAY AREA  
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## WORKSHOP REPORT

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### APPENDIX C

**Air Monitoring Guidance**