BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

# INTERIM STAFF REPORT

## PROPOSED

## AIR DISTRICT REGULATION 12, RULE 15: PETROLEUM REFINING EMISSIONS TRACKING; AND REGULATION 12, RULE 16: PETROLEUM REFINING EMISSIONS LIMITS AND RISK THRESHOLDS

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## EXECUTIVE SUMMARY

Bay Area refineries are among the largest sources of air pollutants—criteria, toxic, and climate—in the region. Refineries process crude oil into various products, such as gasoline, diesel fuel, jet fuel, heating oil, and asphalt. Changes in the crude oil stock being processed in Bay Area refineries, along with other factors, can cause an increase in the air emissions of these pollutants. As a result, the Bay Area Air Quality Management District ("Air District") is developing two new draft rules:

- *Regulation 12, Rule 15: Petroleum Refining Emissions Tracking* ("Tracking Rule"); and
- *Regulation 12, Rule 16: Petroleum Refining Emissions Limits and Risks Thresholds* ("Emission Limits Rule").

The Tracking Rule would:

1. Enhance emissions inventory information;
2. Require updated health risk assessments (HRAs);
3. Require the collection of crude slate information;
4. Increase air monitoring activities at refinery fence lines and in nearby communities; and
5. Require the collection of energy efficiency information.

The Emission Limits Rule would:

1. Set a maximum allowable limit on emissions of sulfur dioxide ($SO_2$) and particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$);
2. Require demonstration of compliance with National Ambient Air Quality Standards (NAAQS) for $SO_2$ and $PM_{2.5}$; and
3. Ensure that the toxic risks posed by refineries to residents in nearby communities do not exceed acceptable levels.

The draft Tracking Rule would establish requirements to enhance the tracking of refinery emissions and crude oil composition over time, as well as increase air monitoring activities at refinery fence lines and in the nearby community. Tracking this information would enable the Air District to use emissions inventory data, crude oil information, and air monitoring data to identify any potential relationship between crude oil quality and emissions of air pollutants. In addition, the draft Tracking Rule would require updated HRAs be performed using the latest assessment methodology and health effects data to provide additional information regarding health impacts from the emissions of toxic air pollutants at refineries. The collection of energy efficiency information would allow comparisons on a refinery-by-refinery basis and aid in the potential identification of possible increases in efficiency of equipment and processes. Identified equipment and processes could then be targeted for further regulatory action to reduce emissions.

The draft Emission Limits Rule would utilize the AB 2588 Air Toxic "Hot Spots" Program to establish lower toxic risk levels for refineries. The rule would establish maximum refinery-wide emissions limits for $SO_2$ and $PM_{2.5}$ at each Bay Area refinery and specific

support facilities based on the potential to emit levels for all sources. The rule also would require refinery operators to develop an emission reduction plan for Air District review and approval that would detail the measures that would be implemented and a schedule of implementation to comply with the NAAQS for $SO_2$ and $PM_{2.5}$ if the refinery operators could not demonstrate compliance with these standards.

# 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 draft rules are *Regulation 12, Rule 15: Petroleum Refining Emissions Tracking* (Rule 12-15); and *Regulation 12, Rule 16: Petroleum Refining Emissions Limits and Risk Thresholds* (Rule 12-16). 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.

In the development of these draft proposals, the Air District held several workshops to discuss the draft rules and gather stakeholder input. An initial series of public workshops were held on an earlier draft of Rule 12-15 in Martinez on April 22, 2014; Richmond on April 24, 2014; and at the Air District offices on April 26, 2014. The Air District held a second series of workshops in Benicia on March 16, 2015; Richmond on March 17, 2015; Martinez on March 18, 2015; and at the Air District offices on March 20, 2015. At these workshops, staff presented and discussed a revised draft of Rule 12-15, the new draft Rule 12-16, as well as guidance documents for air monitoring and developing emissions inventories. (Also see Section VI, Rule Development and Public Consultation Process, below.) The Air District is currently seeking additional input in the development of these new drafts of the proposed rules from the public and other interested stakeholders.

# II. BACKGROUND INFORMATION

## A. Bay Area Petroleum Refineries

Currently, the five petroleum refineries located in the Bay Area within the jurisdiction of the Air District that would be affected by the two draft rules are:

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)
5. Valero Refining Company—California (Benicia)

The draft rules would also address five refinery-related facilities:

- Two sulfuric acid plants
- Two hydrogen plants
- One coke calcining plant (a refinery by-product)

## 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, a variety of toxic compounds, organic acids, and metals (e.g., iron, copper, nickel, and vanadium). Crude oil is most often characterized by the oil's density (light to heavy) and sulfur content (sweet to sour). A more detailed explanation of these terms and others used to describe crude oil follows below.

### *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). 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 distillate). Crude oils with a lower API gravity contain less gasoline and distillate and larger amounts of heavy oil and tar-like components that require more processing to convert into gasoline and distillate. As a result, "light crude" with a higher API gravity is more desirable because it requires 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 because sulfur must be removed from the crude oil to produce more valuable refined products such as gasoline, diesel and aviation fuels.

### *c. Nitrogen Content*

Nitrogen in the heavy gas oil component of crude oil is a contaminant that often requires additional processing. Nitrogen can poison catalysts used in hydrotreating and cracking; therefore, nitrogen removal often results in better gasoline and distillate product yields.

### *d. Vapor Pressure*

Vapor pressure is a measure of crude oil volatility. High vapor pressure crude oil contains more Volatile Organic Carbon (VOC) compounds that are precursors for ozone formation. High vapor pressure crude oil could result in more emissions from crude oil storage and associated piping systems.

*e. Total Reduced Sulfur (Hydrogen Sulfide and Mercaptans) Content*

Total reduced sulfur (hydrogen sulfide and mercaptan content) is a measure of the highly odorous volatile components in crude oil.

*f. BTEX (Benzene, Toluene, Ethylbenzene, Xylene) Content*

BTEX content is a measure of the benzene, toluene, ethylbenzene, and xylene content in crude oil.

*g. Total Acid Number*

Total Acid Number is a measure of the quantity of organic acids in the crude oil.

*h. Metals (Nickel, Vanadium, and Iron) Content*

The metals content of crude oil indicates both the solids contamination of crude oil and the potential for organic metals compounds in the heavy gas oil component of crude oil. Solids contamination of crude can lead to air emissions when these metals settle in the heavy fuel oil or in the petroleum coke produced by the refinery. Air emissions of these metals can occur when the fuel oil or petroleum coke is burned. The organic metals in heavy gas oils are also a concern when the organic metals deposit on the coke formed in the fluid catalytic cracking (FCC) unit. This coke is burned in the FCC regenerator and these metals deposit on the catalyst. A portion of this catalyst is emitted from the FCC as particulates containing these metal compounds.

## 2. Petroleum Refining Processes

Refineries comprise the general processes and associated operations discussed below.

*a. Separation Processes*

Crude oil consists of a complex mixture of hydrocarbon compounds with small amounts of impurities such as 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 splits 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, such as cracking, coking, and visbreaking (a form of thermal cracking that breaks the viscosity), 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 using the same atoms.

*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 processes such 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 processing of crude oil are used in functions vital to the operation of the refinery. Examples include 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 a refinery.

*f. Cargo Carriers*

While some crude oil is transported to refineries by pipeline, ships and trains also can be used to move large quantities of crude oil to refineries. Understanding these emissions provides a more complete picture of the environmental impact of the refinery operations.

*g. Possible Changes in Emissions Due to Changes in Crude Oil*

In the past several years, new sources of crude oil—from shale and from tar sands—have been developed in North America. The crude oil derived from shale, now accessible because of technological improvements in hydraulic fracturing (“fracking”), tends to be light and sweet. However, it also has higher VOC and $H_2S$ content than some other crude oils. Crude oil from tar sands, currently under development in the Canadian province of Alberta, tends to be heavy and sour.

In order to maximize production, refineries are designed to process crude oils with a certain range in compositions. For example, a refinery that is designed to process more sour crude must have the capacity to remove large amounts of sulfur from the crude oil, while a refinery designed to process sweet crude does not require as much sulfur processing capacity. Bay Area refineries traditionally process heavier and more sour

crude oils and would need to make changes to their facilities in order to accommodate different sources of crude oil with different compositions and maintain current production levels.

It is anticipated that refineries will update and/or modify their equipment to meet more strict regulatory fuel requirements and potentially to process crude oil from different sources. The proposed rules provide a means to determine overall changes in refinery emissions as both processes and equipment change, and to ensure that any changes in emissions do not pose a threat to the health of nearby communities.

### 3. Air Pollutants Emitted from Petroleum Refineries

Air pollutants are categorized and regulated based on their properties and there are three primary categories of regulated air pollutants: (1) criteria pollutants; (2) toxic pollutants (toxic air contaminants, which in federal programs are referred to as "hazardous air pollutants"); and (3) climate pollutants (e.g., greenhouse gases). Additional categories of air pollutants 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 listed above.

Criteria pollutants are emissions for which Ambient Air Quality Standards (AAQS) have been established, or they are atmospheric precursors to such air pollutants (i.e., air pollutants that then participate in photochemical reactions to form a criteria pollutant, such as ozone). The AAQS are air concentration–based standards that are established to protect public health and welfare. The U.S. Environmental Protection Agency (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:

- Carbon monoxide (CO);
- Nitrogen dioxide ($NO_2$) and oxides of nitrogen ($NO_X$);
- Particulate matter (PM) in two size ranges—diameter of 10 micrometers or less ($PM_{10}$), and diameter of 2.5 micrometers or less ($PM_{2.5}$);
- Precursor organic compounds (POCs) for the formation of ozone and $PM_{2.5}$; and
- Sulfur dioxide ($SO_2$).

Each of these criteria pollutants is emitted by petroleum refineries.

Toxic pollutants also known as toxic air contaminants (TACs), are emissions for which AAQS generally have not been established, but that nonetheless may result in human health risks. TACs generally are emitted in much lower quantities than criteria pollutants, and may vary markedly in their relative toxicity (e.g., some TACs cause health impacts at lower concentrations 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 inorganic TACs (e.g., chlorine, hydrogen sulfide, and hydrogen chloride).

Climate pollutants (greenhouse gases or 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 (hydrofluorocarbons, or HFCs; perfluorocarbons, or PFCs; and sulfur hexafluoride, or $SF_6$) are the major anthropogenic GHGs, and are regulated under the federal Clean Air Act and the California Global Warming Solutions Act (AB32). The climate pollutants 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 the U.S. EPA. These regulations contain standards that ensure emissions are effectively controlled, including:

- Requiring the use of specific emission control strategies or equipment (e.g., the use of floating roofs on 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; 1,000 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 so that concentrations beyond the facility's property are below 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 Smoke 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 is 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 or operational conditions contained in Air District permits. As a result, none of the Bay Area refineries 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 tracked at the source level, and these mass emissions generally have been substantially reduced over the past several decades.

Air pollutant emissions from Bay Area petroleum refineries have been regulated for more than 50 years, with most of the rules and regulations 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 affect refinery operations. In addition to proposed Rules 12-15 and 12-16, potential revisions to the following existing rules may affect refinery operations:

- Regulation 1: General Provisions & Definitions;
- Regulation 2, Rule 1: Permits, General Requirements;
- Regulation 2, Rule 2: New Source Review, including GHG evaluation;
- Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants;
- Regulation 6, Rule 1: Particulate Matter General Requirements;
- Regulation 8, Rule 18: Equipment Leaks;
- Regulation 9, Rule 1: Sulfur Dioxide; and
- Regulation 9, Rule 9: Nitrogen Oxides and Carbon Monoxide from Stationary Gas Turbines.
- Regulation 11, Rule 10: Cooling Towers;

New rules that are being considered that may affect refinery operations, in addition to those proposed in draft Rules 12-15 and 12-16, 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;
- Rule addressing risk from Stationary Back-up Diesel Generators;

In addition, the Air District currently is developing an update to its Clean Air Plan that will investigate and evaluate further measures that could result in revised and/or new rules affecting refineries.

## 2. Toxic Pollutants

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 AB 2588 Air Toxics "Hot Spots" Program.

### *a. Rules and Regulations*

Many of the TACs emitted by petroleum refineries are also criteria pollutants. For example, benzene and formaldehyde are precursor organic compounds to the formation of ozone, while arsenic and cadmium can be found in particulate matter emissions. 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, for example, the EPA's National Emission Standards for Hazardous Air Pollutants (NESHAPS) and CARB's Reducing Toxic Air Pollutants in California Communities Act (AB1807) Rules, as well as those listed below.

### *b. 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. Rule 2-5 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.

### *c. Air Toxics "Hot Spots" Program*

The Air Toxic "Hot Spots" program, or AB 2588 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 [H&SC] Section 44300 *et seq*.). The Air District uses standardized procedures to identify health impacts resulting from industrial and commercial facilities. Health impacts are expressed in terms of cancer risk and non-cancer (acute and chronic) 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 and non-cancer prioritization score for each site. The Air District updates the prioritization scores annually, based on the most recent toxic emissions inventory data for the facility. Currently, 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 prioritization scores remain above these thresholds, the Air District will require that the facility perform a comprehensive site-wide HRA.

An HRA conducted in accordance with AB 2588 estimates the health impacts from a site due to stationary source TAC emissions. The HRA must be conducted in accordance with statewide HRA guidelines developed by the Office of Environmental Health Hazard Assessment (OEHHA) in the Guidance Manual for Preparation of Health Risk Assessments. This manual includes health effects values for each TAC and establishes the procedures to follow for modeling TAC transport, calculating public exposure, and estimating the resulting health impacts. OEHHA periodically reviews and updates the Guidance Manual through a Scientific Review Panel and public comment process. The HRA guidelines were approved in 2003, but OEHHA proposed major revisions to these HRA guidelines in June 2014. The proposed revisions to the Guidance Manual were adopted March 6, 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; summarized in Table 1, 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. Draft Rule 12-16, would make these thresholds more stringent, with the expectation that these levels would then be applied for all regulated facilities throughout the Bay Area.

**Table 1**
**Summary of Current Bay Area Air Toxics "Hot Spots" Program Risk Management Thresholds**

| | **Site Wide Cancer Risk** | **Site Wide Non-Cancer Hazard Index** |
|---|---|---|
| Public Notification | 10 in a million | 1.0 |
| Mandatory Risk Reduction | 100 in a million | 10 |

3. Climate Pollutants

More recently, CARB has adopted rules to reduce emissions of GHGs from mobile and stationary sources in California. All refineries in California are subject to CARB's Cap on Greenhouse Gas Emissions and Market-based Compliance Mechanisms ("Cap-and-Trade Rule"). 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 Cap and Trade system will reduce emissions from subject sources to 1990 levels by 2020, a roughly 15 percent reduction. The Air District's recently adopted Ten Point Climate Action Work Program calls for enhanced GHG emissions inventory and forecasting, the implementation of GHG emissions monitoring and additional rule development specifically addressing GHG emissions; all of which will affect the five Bay Area refineries.

## 4. Accidental Release Regulation

In addition to Air District regulations, petroleum refineries are also subject to regulatory programs that are intended to prevent accidental releases of regulated substances. 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 Chevron Products Company, Phillips 66 Company, Shell Martinez Refinery, and Tesoro Refining and Marketing Company).

The primary regulatory programs of this type are based on requirements in the amendments to the1990 Clean Air Act 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 focusing on worker safety, 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 to limit exposure of the public, 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 ISOs are very similar to CalARP requirements, but with certain more stringent local provisions.

## 5. Air District Rules Affecting Refineries

The following is a partial list of the air pollution rules and regulations that the Air District implements and enforces at Bay Area refineries:

- Regulation 1: General Provisions and Definitions
- Regulation 2, Rule 1: Permits, General Requirements
- Regulation 2, Rule 2: New Source Review
- Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants
- Regulation 2, Rule 6: Major Facility Review (Title V)
- Regulation 6, Rule 1: Particulate Matter, General Requirements
- Regulation 8, Rule 1: Organic Compounds, General Provisions
- Regulation 8, Rule 2: Organic Compounds, Miscellaneous Operations
- Regulation 8, Rule 5: Storage of Organic Liquids
- Regulation 8, Rule 6: Terminals and Bulk Plants
- Regulation 8, Rule 8: Wastewater (Oil-Water) Separators
- Regulation 8, Rule 9: Vacuum Producing Systems
- Regulation 8, Rule 10: Process Vessel Depressurization
- Regulation 8, Rule 18: Equipment Leaks
- Regulation 8, Rule 28: Episodic Releases from Pressure Relief Devices at Petroleum Refineries and Chemical Plants

- Regulation 8, Rule 44: Marine Vessel Loading Terminals
- Regulation 9, Rule 1: Sulfur Dioxide
- Regulation 9, Rule 2: Hydrogen Sulfide
- Regulation 9, Rule 8: Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines
- Regulation 9, Rule 9: Nitrogen Oxides and Carbon Monoxide from Stationary Gas Turbines
- Regulation 9, Rule 10: Nitrogen Oxides and Carbon Monoxide from Boilers, Steam Generators and Process Heaters in Petroleum Refineries
- Regulation 11, Rule 10: Cooling Towers
- Regulation 12, Rule 11: Flare Monitoring at Petroleum Refineries
- Regulation 12, Rule 12: Flares at Petroleum Refineries
- 40 CFR Part 60, Subpart J: Standards of Performance for Petroleum Refineries (NSPS)
- 40 CFR Part 61, Subpart FF: Benzene Waste Operations (NESHAP)
- 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)
- State Airborne Toxic Control Measure for Stationary Compression Ignition (Diesel) Engines (ATCM)

## III. NEED FOR REGULATORY ACTION

Refineries are among the largest single sources of criteria pollutants and climate pollutants in the Bay Area. Further, the five Bay Area refineries rank among the top ten facilities in the Bay Area for risk-weighted emissions of toxic air contaminants (TAC), based on an evaluation of emissions from stationary sources in 2012 and using risk factors for cancer and chronic hazard index. Bay Area refineries are also some of the largest individual sources of $NO_X$ and $SO_2$ in the region. While historically, refinery emissions have tended to decrease overall over time; there are occasions when some emissions have increased despite the regulatory environment in which they operate. Some of the factors that can result in increased refinery emissions include higher production rates to meet increased demand or to compensate for loss of production in other regions, upset conditions and accidents, and changes in crude oil or product slates.

As new sources of North American crude oil become available, the refining of these different crude oils may also lead to increased emissions. As mentioned above, heavy, sour crude from Canadian tar sands may increase GHG emissions due to the need for more intensive processing. The high sulfur content of crude oil from tar sands may also lead to higher $SO_2$ emissions and may potentially contain more toxic metals. Crude oil from shale has characteristics that may lead also to increases in other emissions. The crude from shale is lighter and, therefore, more easily converted to products, which may mitigate GHG emissions. However, this crude has higher VOC and $H_2S$ content, which may lead to increased emissions of these pollutants from storage and loading

operations and from equipment leaks. Because of these changes in the sources of crude oil, it is prudent for the Air District to improve our understanding of emissions from the refineries and set standards to ensure that public health is protected.

Understanding overall facility emissions is difficult. Improving reporting of overall refinery emissions information including 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 have several primary goals:

1. Accurately and fully characterize emissions of air pollutants (criteria, toxic, and climate) from all refinery-related emissions sources in an on-going basis to determine if additional rule development is required to further reduce emissions;
2. Determine the level of toxic exposure and health risk refineries pose to the residents of nearby communities;
3. Determine how efficiently refineries operate;
4. Track crude slate changes to ensure that the impacts of these changes on emissions are reviewed.
5. Ensure refinery toxic emissions do not pose an unacceptable health risk to the residents of nearby communities; and
6. Ensure refineries comply with the ambient air quality standards for $SO_2$ and $PM_{2.5}$.

The proposed regulatory approach involves the following basic elements and requires refineries to:

<u>Regulation 12, Rule 15</u>

A. Report on-going annual emissions inventories of 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 monthly characteristics with annual emissions inventories;

D. Require an update of refinery Health Risk Assessments (HRAs) based on the most recent OEHHA guidelines;

E. <u>NEW</u>: Report Energy Audit results so that the Air District can determine which refineries have opportunities for reducing GHG emissions through economically and technically feasible improvements in energy efficiency; and

F. Establish fence-line and community air monitoring systems.

Regulation 12, Rule 16

A. NEW: Establish maximum emissions limits for $SO_2$ and $PM_{2.5}$ from all permitted sources (including grandfathered sources) at each Bay Area refinery and specific support facilities;

B. NEW: Require refinery operators to demonstrate that their facilities will not cause an exceedance of the NAAQS for $SO_2$ or $PM_{2.5}$ when operating at their maximum allowed emission rate.

C. NEW: Require the submission, approval, and implementation of a Risk Reduction Audit and Plan (under AB 2588 Toxic "Hot Spots" Program) to reduce the refinery risk if an Air District-approved HRA indicates that the refinery risk to the surrounding community exceeds the action levels.

## IV. PROPOSED RULES

The draft language of the proposed Tracking and Emission Limits 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. Significant Changes to the Draft Rules

The Air District staff has made several changes to the draft rules based on input from stakeholders and internal staff deliberations subsequent to the March workshops. The most significant revisions to the draft rules are summarized below.

#### 1. Summary of Revisions to Draft Regulation 12, Rule 15

Air District staff has made several significant changes to the draft version of Rule 12-15 in response to comments received from stakeholders during and following the March 2015 workshops and internal staff deliberations. These revisions address:

*a. Crude Slate Reporting Requirements Changes:*
   i. Additional crude oil composition characteristics requirements, and
   ii. Addition of historic monthly information on the crude slate covering years 2012 through 2015;

*b. Energy Audit Reporting Requirements:*
The inclusion of Energy Efficiency reporting requirements for 2012 and 2014.

#### 2. Summary of Revisions to Regulation 12, Rule 16

Air District staff has also made several changes to draft Rule 12-16. These revisions are summarized as follows:

*a. Inclusion of AB 2588 Risk Reduction Requirements:*
Reduce the maximum risk levels for cancer and chronic and acute Hazard

Indices from 100 per million to 25 per million for cancer and from 10 to 2.5 for the hazard index. If a refinery's HRA indicates an exceedance of these lowered levels, the refinery operator would be required to develop a risk reduction audit and plan for Air District review and approval that would detail measures the refinery operators would implement to reduce the refinery risk below the maximum risk levels as required by the AB 2588 Air Toxic "Hot Spots" Program. This approach is based upon the well-established AB 2588 Risk Reduction Audit and Plan program (H&SC Sections 44390 *et seq*.). This change would replace the requirement for threshold trigger levels for toxic pollutants and would ensure toxic emissions from refineries do not pose an unacceptable health risk to residents of nearby communities.

*b. Ensure NAAQS Compliance for $SO_2$ and $PM_{2.5}$ via Implementation of an Emissions Reduction Plan:*

Refineries would be required to develop and implement an emissions reduction plan that would ensure compliance with the NAAQS for $SO_2$ and $PM_{2.5}$ unless they could demonstrate compliance by way either of two methods: modeling at their Potential to Emit (PTE) or monitoring.

i. Modeling Demonstration:

a) The first step under this approach would utilize a specified computer model to estimate the ground-level concentrations of $SO_2$ and $PM_{2.5}$ at the full potential to emit (PTE) of all sources. The model would account for local conditions and use local meteorological data. The model is specifically designed to be very conservative, in that it tends to over-predict the actual ground-level concentrations.

b) If the model indicates compliance at full PTE cannot be achieved, the refinery operator can opt to voluntarily reduce the allowable emissions to a level at which the model indicates that the NAAQS is not exceeded even under worst-case meteorological and topographical conditions. The Air District expects that these NAAQS demonstration exercises will take place while the refineries are reducing emissions in response to planned revisions to current regulations and adoption of new regulations that will significantly reduce the refineries emissions. With the approval of Air District technical staff, the refinery operators will be able to include the expected benefits of these rules in their modeling assumptions.

ii. Air Monitoring: If the refinery operator still cannot or chooses not to demonstrate compliance through modeling, air monitoring equipment can be installed near expected locations of maximum impact for a period of time sufficient to account for variations in meteorology.

If none of the above options results in a demonstration of compliance with the NAAQS, then refinery operators would be required to submit an Emissions Reduction Plan to the Air District that details how the refinery would demonstrate compliance with the NAAQS for $SO_2$ and/or $PM_{2.5}$.

c. *Alteration of the Emission Reduction Plan Requirement:*
The requirement for an Emission Reduction Plan would be triggered when the refineries could not demonstrate compliance with the NAAQS for $SO_2$ or $PM_{2.5}$.

d. *Maximum Emissions Limits for $SO_2$ and $PM_{2.5}$:*
Establish maximum emission limits for $SO_2$ and $PM_{2.5}$ for all permitted sources (including "grandfathered" sources) at each Bay Area refinery based on the PTE of those sources. These limits would be used to establish a cumulative maximum emissions limit for all refinery operations. This limit would be permanent. Any change in permitted emissions levels within the refinery would be required to be under the cumulative limit. This change would replace the requirement for threshold trigger levels for criteria pollutants proposed in the previous version of the rule.

## B. Regulation 12, Rule 15 – Administrative Procedures

As explained in subsections A through K of Section IV, Proposed Rules, of this report, the draft Tracking Rule would require refinery owners/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 before taking final action to approve, require revisions, 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 draft Rule 12-15.

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.

## C. Regulation 12, Rule 15 – Pollutant Coverage

The draft Tracking Rule would cover the three primary categories of regulated air pollutants: (1) criteria pollutants, (2) toxic pollutants, i.e., toxic air contaminants (TACs), and (3) climate pollutants, e.g., greenhouse gases. These terms are defined in Sections 12-15-204, 221, and 209 of the proposed rule.

The definition of TAC provided in Section 12-15-221 of the proposed rule refers to the California State TAC list and includes those state-identified TACs that have a basis for the evaluation of health effects under guideline procedures adopted by OEHHA for the Air Toxics "Hot Spots" Program.

The Air District realizes the importance of reducing climate pollutants and staff has developed the *Regional Climate Protection Strategy*, *10-Point Climate Action Work Program* and created a new department, the Climate Protection Section, to investigate and implement ways to reduce climate pollutants. Rule 12-15 requires that emissions inventories for climate pollutants be developed and submitted to the Air District to begin to address climate change issues. Air District staff will assess emissions of climate pollutants and the refineries' abilities to make feasible improvements in their operations to reduce climate pollutants. We expect the refineries to make these changes in response to the economic incentives created by the AB32 Cap and Trade system. Air District staff may propose climate-specific rulemaking if these improvements are not made.

Staff believes that that odorous and visible emissions will be decreased as a result of actions required by both Rule 12-15 and 12-16 as 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 [$PM_{2.5}$], a covered criteria pollutant).

## D. Regulation 12, Rule 15 – Source Coverage

The proposed Tracking Rule would apply to 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 in which the Air District desires to understand emissions from these mobile sources, such as when ships and trains are unloading or loading products at the refinery, and thus emissions from these operations 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 12-15-214, the definition of "source" in Section 12-15-220 (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 12-15-217 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 crude oil from new sources may result in increased emissions. As a result, the draft Tracking Rule would require that each refinery report its "crude slate" as defined in Section 12-15-206. The report would contain information regarding sulfur and nitrogen content, API gravity, total acid number, and other properties 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.

## E. 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.

Because of 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 guidelines in combination with other rules that have requirements based on detailed technical information that needs to be updated on an on-going basis. These include 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).

## F. Regulation 12, Rule 15 – Emissions Inventories and Crude Slate Report

### 1. Emissions Inventories Report

The establishment of annual emissions inventories would provide the basis in the new rule for determining emissions variations that occur at each refinery from 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 would be given an opportunity to provide input regarding emissions inventory reports, as described in Section 12-15-404.

### 2. Crude Slate Report (Including Changes)

The previous draft of Rule 12-15 included total crude volume (millions of 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) in the crude slate report. This draft would address those parameters listed above:

- Total volume
- API gravity as it relates to higher crude density
- Sulfur content
- Nitrogen content
- Acid content

And the following additional parameters:

- Vapor pressure
- Total Reduced Sulfur (hydrogen sulfide [$H_2S$] and mercaptan content)
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) contents
- Selected metals (nickel, vanadium, and iron) content as an indicator of potential heavy metals that may be released when coke is burned in the fluid catalytic cracking unit

In addition, the refinery operators must collect monthly values of each of these parameters and report that information to the Air District on an annual basis.

## G. 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 operations. 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 draft Rule 12-15, each refinery would be required to prepare and submit to the Air District a Petroleum Refinery Emissions Profile (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 continuous and more 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 reports as described in Section 12-15-404.

## H. Regulation 12, Rule 15 – Revising Petroleum Refinery Emissions 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 would provide 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.

## I. 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 to a community that may be attributable to specific sources or facilities, or that may occur in the future as a result of 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 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 as a result of the Air District’s Air Toxic “Hot Spots” Program. However, the Guidance Manual for Preparation of Health Risk Assessments has undergone many changes since that time and additional major revisions to these HRA guidelines were adopted by the Director of OEHHA on March 6, 2015.

As a result, Air District 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 would require that each refinery conduct an HRA using the most recent OEHHA HRA guidelines along with more refined emissions inventories. This requirement is outlined in Section 12-15-602. 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.

## J. 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 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 was 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 review the initial air monitoring guideline document within a five-year period of the publication of the initial guideline document. The guidelines would be updated if necessary 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.

## K. *New Requirement:* Regulation 12, Rule 15 – Energy Audit

Although the GHG Cap-and-Trade program under AB 32 requires an overall GHG emission reduction in the state, it is possible that Bay Area refineries will partially meet their GHG reduction requirements by purchasing GHG allowances generated outside the Bay Area.

The Energy Audit element of Rule 12-15 (Section 12-15-412) would provide refinery data that Air District staff could use to determine whether less-than-optimum energy management is occurring at Bay Area refineries. If there are areas of energy management that can be significantly improved—and especially if the refineries opt to purchase GHG allowances rather than implement best practices in energy management—the Energy Audit would allow Air District staff to determine whether a targeted rule-making should be pursued to achieve actual GHG emission reductions at Bay Area refineries in order to ensure the achievement of GHG emissions reduction goals as well as the realization of associated co-benefits.

The draft rule would seek specific data from the biennial "Fuels Study" report dedicated to energy management that is developed for the refineries (most recently in 2014) by consulting firm Solomon Associates. One requirement would be for the refineries to submit the most recent energy management performance gap analysis that compares the refinery to a global sample set of about 300 refineries. Bay Area refineries participated in the Solomon Associates "Fuels Study," using 2012 refinery data that resulted in the report delivered in 2014, part of which addressed refinery energy management.

The draft rule also includes a requirement for the refinery operators to submit a follow-up energy gap analysis based on 2014 data that would be available in early 2016.

## L. Regulation 12, Rule 16 – Administrative Procedures

The proposed Emission Limits Rule uses the most up-to-date science to ensure that the emissions from the refineries do not pose an unacceptable risk to neighboring communities. Like the Tracking Rule, the Emission Limits 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 the Air District would use to review and take final action to approve or disapprove the various types of required reports and plans are specified in Sections 12-16-404, 406 and 408 of the proposed rule. The contents and requirements of the reports and plans are discussed in the following sections.

## M. *New Requirement:* Regulation 12, Rule 16 – Refinery Maximum Allowable Risk Levels

Draft Rule 12-16 has been modified to incorporate reduced AB 2588 Air Toxics "Hot Spots" Risk Management Thresholds. Table 1 lists the draft new risk thresholds for refinery risk management.

**Table 2**
**Summary of Draft New Bay Area Air Toxics "Hot Spots" Program Risk Management Thresholds for Petroleum Refineries**

| | Refinery-Wide Cancer Risk Levels | Refinery-Wide Non-Cancer, Acute and Chronic Hazard Indices |
|---|---|---|
| Public Notification | 10 in a million | 1.0 |
| Mandatory Risk Reduction | 25 in a million | 2.5 |
| Unacceptable Risk Level | 100 in a million | 10 |

If any of these thresholds were exceeded, action by the refinery operators would be required. Specifically, notification would be required to be sent to potentially exposed people, as determined by the HRA, if the public notification threshold were to be exceeded; or development, approval, and implementation of a risk reduction plan would be required if the mandatory risk level were to be exceeded. Exceeding the "unacceptable" risk level would require an accelerated schedule for the implementation of an Air District–approved risk reduction plan.

These requirements are discussed further in Section O of this report, below.

## N. Regulation 12, Rule 16 – Pollutant and Source Coverage

Because the Emission Limits Rule is designed to work in tandem with the Tracking Rule, many of the pollutants and sources covered are the same. Emission Reduction Plans (ERPs), should they be required, can propose reductions at any source that will bring overall refinery emissions down to a level consistent with protection of the health of neighboring communities. This would allow flexibility to determine the most effective measures to reduce emissions. The feasibility of the reduction measures will be judged, in part, based on the cost effectiveness levels listed in Table 1 in Section 12-16-407.2.3.

## O. *Modified Requirement:* Regulation 12, Rule 16 – Risk Management Requirements and HRAs

Changes to the draft rule would ensure petroleum refinery emissions of toxic pollutants do not pose unacceptable health impacts to residents living in communities close to refineries. This would be accomplished through the codification of the AB 2588 "Hot

Spots" Program / SB 1731 Risk Reduction Audit and Plan requirements into draft Rule 12-16 (H&SC Section 44390 *et seq*.). This approach maximizes the utility of a well-established state health protection law, the purpose of which is to ensure that sources of toxic pollutants do not pose an unacceptable risk to the residents of the communities in which they are located. Utilizing the authority provided under this law, the Air District would set a significant risk level (action level) at cancer risk 25 in a million and acute and chronic hazard indices (HI) at 2.5.

The revisions to draft Rule 12-16 include:

- Under draft Rule 12-15, refinery operators must submit a new HRA (using the updated OEHHA protocols and health risk values) to the Air District as described in Section 12-15-405. Draft Rule 12-16 would allow the Air District to request new or updated HRAs if criteria and toxic emissions inventories indicate a need for an update.
- If the refinery-wide HRA results exceed the notification level (either cancer risk of 10 in a million or acute or chronic HI of 1.0), the refinery operators must notify potentially exposed people at or above those levels of the results of the HRA (H&SC Section 44362(b)).
- If the refinery-wide HRA results exceed the significance level (either the cancer risk level of 25 in a million or the acute or chronic HI of 2.5), the refinery operator must:
    - Notify potentially exposed people (based on the HRA who are at a risk level of 10 in a million or an HI of 1.0 or more) of the results of the HRA (H&SC Section 44362(b)); and
    - Conduct a toxic risk reduction audit and develop a plan that would reduce health risk below the significant level within three to five years (H&SC Sections 44391(a) & (b)). The plan would include information such as:
        - Facility information, such as equipment location and emission point elevation;
        - Toxic pollutant source information;
        - Toxic pollutant emissions inventory;
        - Evaluation of risk reductions measures to be implemented including a demonstration that the measure would reduce the refinery risk below the significant level, and be technical and economic feasibility; and
        - Schedule of implementation.
- The Air District would review and approve the plan in a transparent process (subject to laws regarding confidentiality of trade secret information) and the refineries would have up to five years to implement the plans.
- If, following implementation of the risk reduction plan, the residual refinery-wide health risk remains in excess of the significant level or if the risk level exceeds the significant level for other reasons (increased throughput or changing crude or product slates), additional risk reduction measures may be required to ensure the risk level decreases and remains below the significant level.

## P. Regulation 12, Rule 16 – Limited Exemptions

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

The second exemption deals with emissions from flares in Section 12-16-103. Air District staff believes that $SO_2$ and $PM_{2.5}$ emissions from flares are more appropriately addressed under Regulation 12, Rule 11, and Regulation 12, Rule 12.

# 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 is developing a new fee schedule to be included in Regulation 3, Fees, through a separate rule development process.

# VI. RULE DEVELOPMENT AND 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 on relevant information presented at the public hearing. The staff expects that the new Petroleum Refining Emissions Tracking and Petroleum Refining Emissions Limits and Risk Thresholds rules will be considered for adoption in the fourth 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.

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 interested public and affected industry then took place:

- Apr. 2013: Public workshops held (Martinez, Richmond, District office via 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 via 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.
- Jun. 2014: Next draft of rule developed and posted on the Air District website.
- Aug. 2014: Air monitoring guidance draft released and comments accepted.
- Aug.–Oct. 2014: Continued meetings with stakeholders.
- Nov.–Dec. 2014: Regulation 12, Rule 16: Petroleum Refining Emissions Limits and Risk Thresholds Rule development was initiated as directed by the Board.
- Jan. 2015: Comment period opened.
- Mar. 2015: Public workshops held (Martinez, Richmond, Benicia, Air District Office via webcast).
- Sep. 2015: Comments responded to and this interim staff report and revised draft rules released.

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

# INTERIM STAFF REPORT

## PROPOSED
## AIR DISTRICT REGULATION 12, RULE 15: PETROLEUM REFINING EMISSIONS TRACKING; AND REGULATION 12, RULE 16: PETROLEUM REFINING EMISSIONS LIMITS AND RISK THRESHOLDS

## APPENDIX A

## PROPOSED RULES