BAY AREA AIR QUALITY MANAGEMENT DISTRICT

DRAFT Project Description for

Draft BAAQMD Regulation 12, Rule 16: Petroleum Refining Facility-Wide Emissions Limits
&
Draft BAAQMD Regulation 11, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities

Prepared by:

Staff of the Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, California 94105

Contact: Victor Douglas
415-749-4752

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

Petroleum refineries are significant sources of harmful pollutants on both the global (greenhouse gases) and local scale (toxic air contaminants and criteria pollutants). Many Bay Area residents have expressed concern about the impact of this pollution on the environment and public health. Though refinery emissions have declined over time, it is possible that as refinery operations change in the future, emissions of these pollutants could increase.

In response to these concerns, the Board of Directors of the Bay Area Air Quality Management District (Air District) has directed staff to bring forward two draft rules for their consideration, one that reflects policy recommended by some environmental advocacy organizations, and an approach recommended by Air District staff.

Communities for a Better Environment (CBE) and several associated organizations have recommended that the Air District adopt new Regulation 12, Rule 16: Petroleum Refining Facility-Wide Emissions Limits (Rule 12-16 or "Refining Caps Rule"). This rule would set numeric limits on specific refinery emissions. Rule 12-16 would apply only to the Bay Area's five petroleum refineries and three facilities associated with the refineries.

The staff of the Air District has developed a different approach that directly addresses concerns about health risks to the refinery communities. The staff recommendation is that the Air District adopt a new Regulation 11, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities (Rule 11-18 or "Toxic Risk Reduction Rule"). Rule 11-18 would apply to all facilities whose emissions of toxic air contaminants may result in a significant risk to nearby residents and workers – this would include petroleum refineries. The purpose of 11-18 is to set toxic air contaminant caps for those facilities causing the highest health impacts across the bay area and to require these facilities to reduce that health risk.

Because the Board of Directors of the Air District intends to consider these rules within the same timeframe, staff is preparing one Environmental Impact Report to cover both rules. The intent of the single EIR is to ensure that all of the potential environmental impacts for both rules are considered and comprehensively addressed. Although they are being considered at the same time and both would affect refineries, the two rules are functionally independent. Adoption of one does not depend on adoption of the other. The Board of Directors could adopt either rule, both rules or neither rule.

1.1.1 Draft Rule 12-16

Draft Rule 12-16 reflects a policy recommendation from CBE and their associated organizations. The rule, as proposed by CBE, would limit the emissions of climate pollutants and three criteria pollutants: greenhouse gases (GHGs), particulate matter (PM), oxides of nitrogen (NOx), and sulfur dioxide (SO_2) from petroleum refineries and three associated facilities. The draft rule would

establish facility-wide emissions limits for the covered pollutants at each of the affected facilities to ensure that each facility does not increase emissions due to changes in operation, crude or product slates, or increases in production. Each facility emissions limit would be set at the maximum-annual emissions reported for that facility in the period from 2011 through 2015[1] with an additional allowance or "threshold factor" of seven percent over the maximum annual emission rate for each pollutant.

1.1.2 Draft Rule 11-18

Draft Rule 11-18, as proposed by Air District staff, would ensure that emissions of toxic air contaminants (TACs) from existing facilities do not pose an unacceptable health risk to people living and working nearby. The rule would use the most up-to-date assumptions about the risk of compounds and would require the facility to take action to reduce its risk to a very low risk level. In the initial phase, the rule would require all facilities with a cancer risk in excess of 25 in a million (25/M) to reduce that risk below 10/M. In the second phase, all facilities not already addressed in the first phase with a health risk in excess of 10/M would be required to reduce the facility risk below 10/M. If the facility could not devise a means to reduce the risk below 10/M, the facility would be required to install best available retrofit control technology for toxic pollutants (TBARCT) on every significant source of TACs at the facility.

1.2 AGENCY AUTHORITY

The California Environmental Quality Act (CEQA), Public Resources Code §21000 et seq., requires that the environmental impacts of proposed projects be evaluated and that feasible methods to reduce, avoid or eliminate significant adverse impacts of these projects be identified and implemented. To fulfill the purpose and intent of CEQA, the Air District is the lead agency for draft Regulation 12, Rule 16 and draft Regulation 11, Rule 18 and will prepared a draft Notice of Preparation (NOP) of an Environmental Impact Report (EIR) and Initial Study (NOP/IS) to address the potential environmental impacts associated with the draft rules.

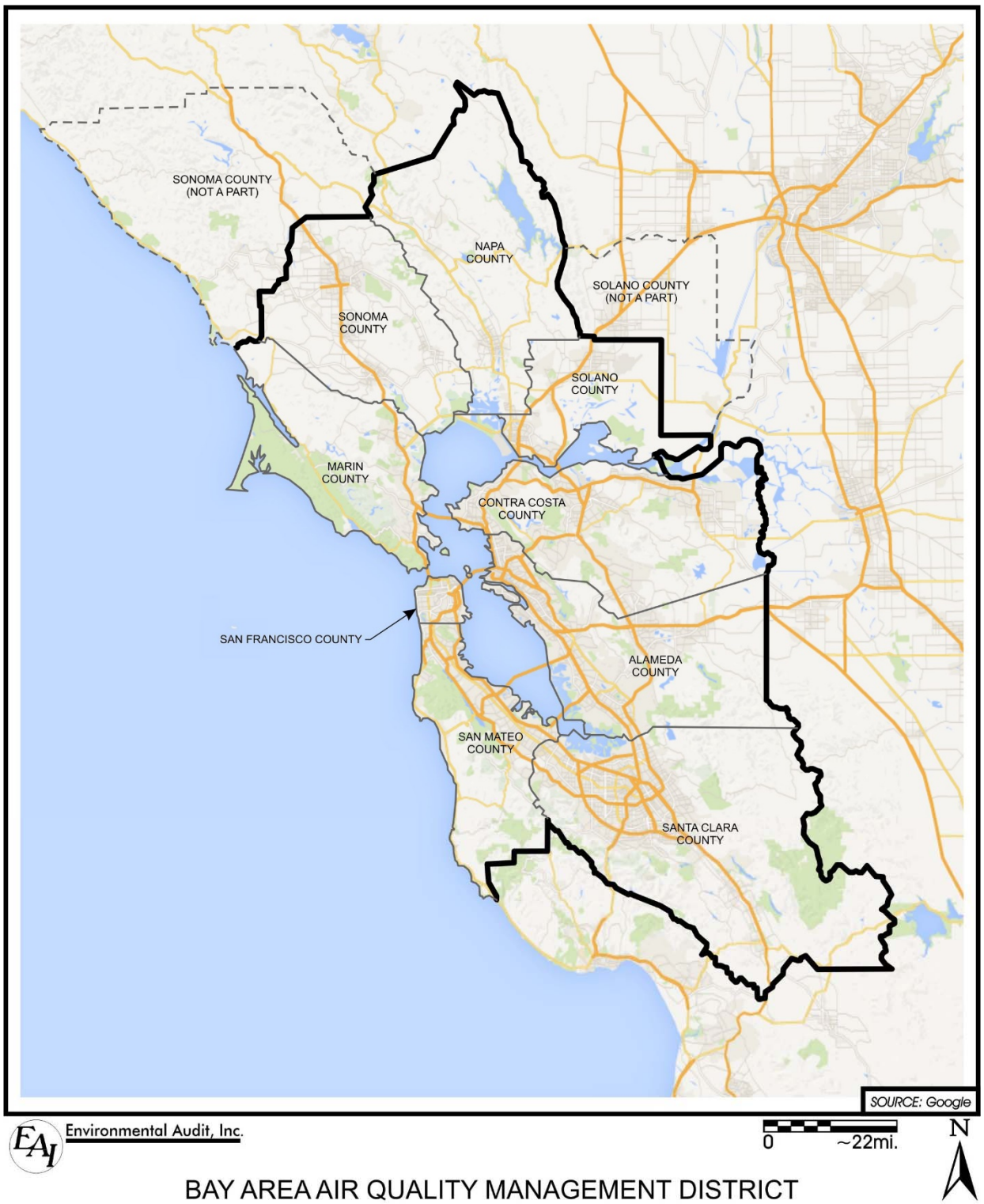
1.3 PROJECT LOCATION

The Air District has jurisdiction over an area encompassing 5,600 square miles. The Air District includes all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties, and portions of southwestern Solano and southern Sonoma counties. The San Francisco Bay Area is characterized by a large, shallow basin surrounded by coastal mountain ranges tapering into sheltered inland valleys. The combined climatic and topographic factors result in increased potential for the accumulation of air pollutants in the inland valleys and reduced potential for buildup of air pollutants along the coast. The Basin is bounded by the Pacific Ocean to the west and includes complex terrain consisting of coastal mountain ranges, inland valleys and bays (see Figure 1-1).

[1] GHG emissions are based on the 2011-2014 time period, since 2015 data is not available from the Air Resources Board yet.

Figure 1-1

Geographic Jurisdictional Boundaries of the Bay Area Air Quality Management District



1.4 BACKGROUND

Draft Rule 12-16 would affect the five petroleum refineries currently located in the Bay Area within the jurisdiction of the Air District:

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

The Draft Rule 12-16 would also affect three refinery-related facilities:

- Air Liquide (Richmond),
- Air Products (Martinez), and
- Martinez Cogen LP (Martinez).

Draft Rule 11-18 would affect up to 1000 facilities that emit TACs. The Air District has determined that these emissions need to be reduced in order to be more protective of public health. These facilities include data centers, petroleum refineries, a cement kiln, gasoline dispensing facilities, etc. These facilities emit a variety of TACs that can adversely impact public health. TACs include compounds such as diesel particulate matter (DPM), benzene, polycyclic aromatic hydrocarbons (PAHs), and 1,3-butadiene.

The primary focus of CBE's concern has been petroleum refineries. 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).

Air pollutants are categorized based on their properties, and the programs under which they are regulated. Air pollutants include: (1) criteria pollutants, (2) toxic pollutants (or TACs), and (3) climate pollutants (or GHGs). Additional categories of air contaminants include odorous compounds and visible emissions.

Criteria pollutants are emissions for which Ambient Air Quality Standards (AAQS) have been set and include: (1) carbon monoxide (CO), (2) nitrogen dioxide (NO_2) and NO_X, (3) PM in two size ranges – aerodynamic diameter of 10 micrometers or less (PM_{10}), and aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$), (4) volatile organic compounds (VOC), and (5) sulfur dioxide (SO_2). Each of these criteria pollutants are emitted by petroleum refineries.

TACs are emissions for which AAQS have generally not been established, but may result in human health risks. The state list of TACs currently includes approximately 190 separate chemical compounds and groups of compounds.

GHGs are emissions that include 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)), and are the major anthropogenic GHGs. GHGs emitted from petroleum refineries include CO_2, CH_4 and N_2O.

The regulatory approach for draft Rules 12-16 and 11-18 are summarized below and include the following basic elements.

Regulation 12, Rule 16

- Would apply to each of the Bay Area petroleum refineries and three support facilities.
- Would establish facility-wide emissions limits for GHGs, $PM_{2.5}$ and PM_{10}, NOx, and SO_2 at each of the affected facilities based on the following method:
    - Each facility emissions limit would be set at the maximum-annual emissions reported for that facility in the period from 2011 through 2015[2], and
    - Include an additional allowance or "threshold factor" that would equal seven percent over the maximum for GHGs, $PM_{2.5}$ and PM_{10}, NOx, and SO_2.
- Emissions from start-up, shut-down, maintenance and malfunction would be subject to the cap.
- Compliance with the emissions limits would be based on comparing the annual emissions inventory with the facility-wide emissions limit for each covered pollutant. Any annual emissions inventory that exceeds the established pollutant emissions limit for the affected facility would be a violation of the rule for the entire year that the inventory covers.

Regulation 11, Rule 18

- The Air District would screen all facilities that report toxic emissions. The Air District would conduct health risk assessments (HRA) for facilities with a cancer risk prioritization score of 10 or greater or a non-cancer prioritization score of 1.0 or greater. The HRAs would incorporate the new Office of Environmental Health Hazard Assessment (OEHHA) protocol and health risk values adopted in March 2015, the Risk Management Guidelines adopted in July 2015 by the California Air Resources Board (ARB) and the California Air Pollution Control Officers Association (CAPCOA) and revised Air District HRA guidelines.
- In the first phase of the rule, facilities that pose a cancer risk in excess of 25/M or a chronic or acute hazard index in excess of 2.5 must either:
    - Reduce the facility cancer risk below 10/M and reduce the chronic and acute hazard indices below 1.0; or
    - Install TBARCT on all significant sources of toxic emissions.
- In the second phase, facilities not already addressed in the first phase that pose a health risk in excess of 10/M or a chronic or acute hazard index in excess of 1.0 must either:

[2] Except GHGs, which are based on 2011 through 2014 emissions due to the current unavailability of 2015 data.

- Reduce the facility cancer health risk below 10/M and reduce the chronic and acute hazard indices below 1.0; or
- Install TBARCT on all significant sources of toxic emissions.

1.5 PROPOSED PROJECT DESCRIPTION

The description of draft Regulation 11, Rule 18 and Regulation 12, Rule 16 are provided below.

1.5.1 REGULATION 12, RULE 16

1.5.1.1 Pollutant Coverage

The draft Refining Cap Rule would limit the emissions of climate pollutants (GHGs) and three criteria pollutants (PM – both PM_{10} and $PM_{2.5}$, NOx, and SO_2) from refineries and other refining related facilities to a specific baseline plus an allowance; thereby establishing a "cap" for each of these emissions that the facility could not exceed.

Greenhouse Gases (GHGs): GHGs refer to gases that contribute to global warming. In addition to negative impacts on air quality as higher temperatures contribute to increased levels of ozone and PM, climate change may cause a wide range of ecological, social, economic, and demographic impacts at both the global and the local scale. GHGs include carbon dioxide, methane, nitrous oxide, and fluorinated hydrocarbons. CO_2 is released to the atmosphere when fossil fuels (oil, gasoline, diesel, natural gas, and coal), solid waste, and wood or wood products are burned. CH_4 is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from the decomposition of organic waste in municipal solid waste landfills and the raising of livestock. N_2O is emitted during agricultural and industrial activities, as well as during combustion of solid waste and fossil fuels. Fluorinated hydrocarbons: HFCs, PFCs, and SF_6, are generated in a variety of industrial processes. Although these gases are small in terms of their absolute mass, they are potent agents of climate change as expressed by their global warming potential.

Particulate Matter (PM): Particulate matter is a complex pollutant composed of an assortment of tiny airborne particles that vary in size and mass (ultrafine, fine, and coarse), physical state (solid or liquid), chemical composition, toxicity, and how they behave in the atmosphere. These particles originate from a variety of man-made and natural sources, including fossil fuel combustion, refining crude oil, residential wood burning and cooking, wildfires, volcanoes, sea salt, and dust. Because they are so small, these particles can bypass the body's natural defenses and penetrate deep into the lungs, bloodstream, brain and other vital organs, and individual cells. Health studies have shown that exposure to PM can have a wide range of negative health effects, including triggering asthma attacks, chronic bronchitis, impaired lung development in children, heart attack, stroke, and premature death. Residential wood burning is the largest source of PM in the Bay Area during the winter.

Nitrogen Oxides (NOx): Nitrogen oxides are a group of gases that form when nitrogen reacts with oxygen during combustion, especially at high temperatures. These compounds (including nitric oxide and nitrogen dioxide), can contribute significantly to air pollution, especially in cities and areas with high motor vehicle traffic. In the Bay Area, nitrogen dioxide appears as a brown haze. At higher concentrations, nitrogen dioxide can damage sensitive crops, such as beans and tomatoes, and aggravate respiratory problems.

Sulfur Oxides (SOx): Heating and burning fossil fuels (such as coal and oil) release the sulfur present in these materials. In areas where large quantities of fossil fuels are used, sulfur oxides can be a major air pollution problem. The most common kind of sulfur oxide is SO_2. This substance can react with oxygen to form sulfur trioxide, which can form sulfuric acid mist in the presence of moisture. These contaminants can damage vegetation and negatively impact the health of both humans and animals.

1.5.1.2 Affected Facilities

The draft Refining Caps Rule would apply to each of the Bay Area's five petroleum refineries and to three additional support facilities. The five refineries are Chevron Refinery in Richmond, Shell Refinery in Martinez, Phillips 66 Refinery in Rodeo, Tesoro Refinery in Martinez, and Valero Refinery in Benicia. The three affected support facilities are Air Liquide in Richmond, Air Products in Martinez, and Martinez Cogen LP in Martinez.

1.5.1.3 The Emissions Limits

The draft emissions limit for each covered pollutant and each affected facility are shown in Table 1. A numeric limit on the annual mass emission rate of each air pollutant specified is applied to each facility specified in the table. The limit is equal to the maximum-year actual emissions reported in 2011–2015[3] plus the additional allowance, or threshold factor, of seven percent that is intended to account for normal year-to-year variations in emissions.

[3] Except GHGs, which are based on 2011 through 2014 emissions due to the current unavailability of 2015 data.

Table 1.
The Enforceable Emissions Limits on Refinery-Wide Emissions [a]

Facility Name & Number	Pollutants				
	GHG[a] (thousands of metric tons)	**$PM_{2.5}$[b]** (tons)	**PM_{10}[b]** (tons)	**NOx[b]** (tons)	**SO_2[b]** (tons)
Chevron[c]: A-0010	4,770	502	526	963	394
Shell: A-0011	4,560	495	589	1,050	1,450
Phillips 66: A-0016	1,610	75.0	83.2	288	379
Tesoro: B-2758 / B-2759	2,620	77.7	97.0	1,010	626
Valero: B-2626	3,150	134	134	1,410	94.3
Martinez Cogen LP: A-1820	451	18.8	18.8	118	2.30
Air Liquide: B-7419	950	16.1	17.2	13.5	2.52
Air Products: B-0295	290	9.70	10.4	3.43	2.33

a. Annual facility-wide emission limits. GHG: greenhouse gas emissions (CO_2e) as reported under Air Resources Board Mandatory Reporting. PM: filterable and condensable particulate matter.
b. $PM_{2.5}$ ("fine" particulate matter as defined), PM_{10} ("respirable" particulate matter as defined), NOx: oxides of nitrogen; SO_2: sulfur dioxide as reported in the Facility's annual emission inventory.
c. Facility owners or operators, as of August 2016, shown for information and context.

1.5.1.4 Changes in Monitoring Methods

The proposed rule would incorporate a means to address potential changes in the quantities of emissions reported due solely to changes in monitoring methodologies to ensure consistent compliance with the emissions limits.

1.5.2 REGULATION 11, RULE 18

1.5.2.1 Administrative Procedures

The draft Toxic Risk Reduction Rule would utilize the annual toxic emissions inventories reported to the Air District by sources that emit toxic compounds. From the toxic emissions inventory data, Air District[4] would conduct a site-specific Health Risk Screening Analysis (HRSA). The HRSA assesses the potential for adverse health effects from public exposure to routine and predictable emissions of TACs. Procedures used for completing HRSAs are based on guidelines adopted by CARB/CAPCOA. From these HRSAs, the Air District would categorize each facility as high (a cancer priority score (PS) of 100 or greater or a non-cancer PS of ten or greater), intermediate (a cancer PS of ten or more but less than 100 or a non-cancer PS of one or more but less than ten) or low priority (a cancer PS less than ten or a non-cancer PS less than one). In establishing the priority level for a facility, the Air District would consider:

(1) The amount of toxic pollutants emitted from the facility;
(2) The toxicity of these materials;
(3) The proximity of the facility to potential receptors; and

[4] In order to complete the analyses in a timely manner. Some of the work may be completed by independent contractors working for the Air District under direction of Air District staff.

(4) Any other factors that the Air District deems to be important.

The Air District would conduct HRAs for facilities in the high priority category. The HRAs would be conducted in accordance with the OEHHA HRA Guidelines and the CARB/CAPCOA Risk Management Guidelines that were updated in 2015. These Guidelines were updated pursuant to the Children's Environmental Health Protection Act (Senate Bill 25), which required that OEHHA develop health risk assessment procedures that ensure infants and children are protected from the harmful effects of air pollution. Using the results of the HRAs, the Air District would compile two lists of facilities:

- Facilities that pose a cancer risk in excess of 25/M or chronic or acute hazard index in excess of 2.5; and
- Facilities that pose a cancer risk between 10/M and 25/M or chronic or acute hazard index in excess of 1.0 but no greater than 2.5.

Facilities for which the HRA indicates a cancer risk value in excess of 25/M would be required to develop and submit to the Air District for review and approval a plan that would detail how the facility would either reduce the health impacts below the rule thresholds (10/M cancer risk and 1.0 HI) within three years of Air District approval of the plan, or install TBARCT on all significant sources of toxic emissions within the same three-year period.

1.5.2.2 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 that people and communities may be experiencing due to specific sources or facilities or that may occur in the future due to proposed projects or proposed changes at a facility. 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. The Air District HRAs would be prepared in accordance with the most recent guidelines adopted by OEHHA in March 2015.

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 draft rule would require that the Air District conduct HRAs utilizing the most recent OEHHA HRA Guidelines along with more refined emissions inventories.

1.5.2.3 Pollutant Coverage

The draft Toxic Risk Reduction Rule would address TAC emissions from existing stationary sources. TAC emissions from new and modified sources are addressed under Air District Regulation 2, Rule 5. The California Health and Safety Code section 39655 defines a TAC as “an

air pollutant which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health. A substance that is listed as a hazardous air pollutant pursuant to subsection (b) of Section 112 of the federal act (42 U.S.C. Sec. 7412(b)) is a toxic air contaminant." For the purposes of this rule, TACs consists of the substances listed in Air District Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants, Table 2-5-1.

Some of the key pollutants to be addressed under the Toxic Risk Reduction Rule include the following:

Benzene: Benzene is highly carcinogenic and occurs throughout the Bay Area. Most of the benzene emitted in the Bay Area comes from motor vehicles, including evaporative leakage and unburned fuel exhaust. Stationary sources contribute 13 percent of the benzene statewide. The primary stationary sources of benzene emissions include gasoline stations, petroleum refining, electricity generation, and cement production.

1,3-Butadiene: 1,3-butadiene is another carcinogen, with similar origins to benzene, namely mainly from gasoline evaporation and motor vehicle exhaust, biomass burning, petroleum refining and electricity generation.

Polycyclic aromatic hydrocarbons (PAHs): PAHs are a set of hydrocarbons formed of multiple benzene rings. Several PAHs have been shown to be carcinogenic, the best-studied of which is Benzo(a)pyrene. Although in the Bay Area, PAHs are emitted during petroleum refining, the vast majority derive from fossil fuel and wood combustion.

Diesel Particulate Matter (DPM): DPM is the primary source of ambient risk based on risk analysis, followed by benzene and 1,3-butadiene. DPM emissions sources mainly include mobile sources, such as heavy-duty trucks, buses, construction equipment, locomotives, and ships, but also stationary sources such as stationary diesel engines and backup generators.

1.5.2.4 Source Coverage

The draft Toxic Risk Reduction Rule would apply to all sources of TAC emissions from "stationary sources" in the Bay Area. Stationary sources, as opposed to mobile sources such as trucks and other vehicles, are the sources over which the Air District has regulatory jurisdiction.

The draft Toxic Risk Reduction Rule would apply to a wide variety of sources and facilities located throughout the Bay Area, including data centers, petroleum refineries, chemical plants, waste water treatment facilities, foundries, forges, landfill operations, hospitals, crematoria, gasoline dispensing facility (GDF) i.e., gasoline stations, colleges and universities, military facilities and installations and airline operations. The Air District estimates that up to 1000 facilities could be impacted by this rule.