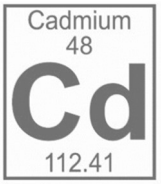
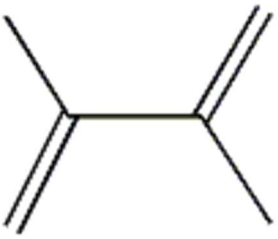
BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Proposed Regulation 11: Hazardous Pollutants, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities





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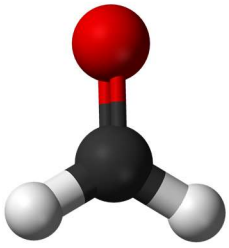
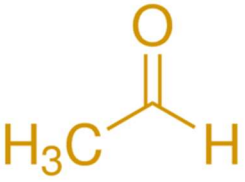


Formaldehyde



Acetaldehyde

STAFF REPORT

LEAD

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October 2017

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I. EXECUTIVE SUMMARY

Ambient toxic risk in the Bay Area has declined significantly in the last quarter century from about 4200 per million to less than 700 per million today. However, there are still many areas in the Air District that are impacted by elevated risk levels from both stationary and mobile sources. Many of these areas are considered Community Air Risk Evaluation (CARE) communities.

New proposed Regulation 11: Hazardous Pollutants, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities (Rule 11-18 or "Toxic Risk Reduction Rule") would apply to all facilities whose emissions of toxic air contaminants may result in a significant risk to nearby residents and workers. The purpose of Rule 11-18 is to focus on those facilities causing the highest health impacts across the Bay Area and to require these facilities to reduce that health risk.

Proposed Rule 11-18 is the next step in the Air District's efforts to protect public health from toxic air pollution. The rule is expected to substantially reduce health risks posed by various facilities by requiring the implementation of all technically and economically feasible risk reduction measures to significant sources of toxic air contaminants (TACs). The proposed rule would affect hundreds of facilities, from large facilities like petroleum refineries to much smaller businesses like some dry cleaners and crematoria. These facilities emit a variety of TACs that can adversely impact public health. These pollutants include compounds such as diesel particulate matter (DPM), benzene, polycyclic aromatic hydrocarbons (PAHs), and 1,3-butadiene.

Many of the facilities likely to be affected are located in Bay Area communities that face a variety of public health challenges. Risk reductions from existing facilities achieved by this rule are expected to provide greater benefit to these communities. In addition, Rule 11-18 would help to address some of the Air District's potential obligations under Assembly Bill 617 Nonvehicular Air Pollution: Criteria Air Pollutants and Toxic Air Contaminants, which was signed by the Governor in July 2017. The intent of AB 617 is "…to reduce emissions of toxic air contaminants and criteria pollutants in communities affected by a high cumulative exposure burden."[1] One requirement under AB 617 is for the Air Resources Board to select communities with high exposure burdens, with the air districts where the communities are located then obligated to prepare community emissions reduction programs for toxics and criteria pollutants.

Under Rule 11-18, Air District staff would do the work in identifying and assessing facilities. The Air District would identify significant sources of TAC emissions through the use of prioritization scores, which are rough approximations of risk based on preliminary data. The Air District would then conduct a health risk assessment (HRA) for any facility with a prioritization score that the Air District considers significant.

These health evaluations would use the latest science available and, because they would be performed by the Air District, would use a process that is both consistent and

transparent. During the risk evaluation process, the public would be allowed to review and provide input on the HRAs before they are finalized.

Any facility shown by a final HRA to pose a health risk at or above the risk action level in the rule would be required to take further steps to reduce risk. The risk action levels are tiered, starting at 25 per million upon rule adoption and dropping to 10 per million in 2020, to ensure that high risk facilities are addressed first and can begin risk reduction efforts as soon as possible.

Facilities with risk at or above the action level would be required to develop a risk reduction plan to reduce risk below the risk action levels within five years, if that timeline is feasible. If a facility can get below the risk action level, but technical or financial considerations make more time necessary, the Air District would be able to approve additional time, but no more than is needed, up to an additional five years. If it is not feasible for a facility to reduce its risk below the required levels, the rule provides a third option that would require the facility to install the best available retrofit control technology for toxics (TBARCT) on all significant sources of toxic emissions, thereby reducing risk to the lowest level feasible.

If a facility elects the second plan option (additional time) or the third plan option (installation of TBARCT), it would only be with the approval of the Air District based on a demonstration that the option is necessary to address a technical feasibility issue or to avoid imposing an unreasonable economic burden. The proposed rule defines "unreasonable economic burden" as imposing costs greater than ten percent of annual profits for a profit-making facility or one percent of the operational budget of a non-profit facility. Before final Air District review and approval of a plan, it would be made available for public review and comment.

After plan approval, the facility would be required to implement the risk reduction measures and comply with all other requirements in the plan. Facilities would be required to report annually on progress. If new information becomes available about risk or about the feasibility of a plan, the rule provides a mechanism for updating the plan.

If adopted, the proposed rule would help to reduce the health risk experienced by thousands of Bay Area residents and ensure the affected facilities continue to reduce their risk as new methods and technologies for risk reduction become available.

This staff report is a summary and explanation of the proposed rule, how the Air District staff would expect to implement this rule, and staff’s initial assessment of the effect of the proposed rule as required under California Health and Safety Code, Section 40725. The report will be published along with the proposed rule language and the Environmental Impact Report required under the California Environmental Quality Act, and the socioeconomic analysis. Staff seeks input from all impacted stakeholders on the proposed rule and our assessment its environmental and socioeconomic impacts.

II. BACKGROUND

A. Introduction

Proposed Regulation 11, Rule 18: Reduction of Risk from Air Toxic Emissions at Existing Facilities (Rule 11-18) would be the next step in the Air District's efforts to protect public health from toxic air pollution. Rule 11-18 is expected to substantially reduce health risks posed by various facilities through requiring the implementation of all technically and economically feasible risk reduction measures by significant sources of toxic air contaminants (TACs). The proposed rule would affect hundreds of facilities, including data centers, petroleum refineries, a cement kiln, etc. These facilities emit a variety of TACs that can adversely impact public health. These pollutants include compounds such as diesel particulate matter (DPM), benzene, polycyclic aromatic hydrocarbons (PAHs), and 1,3-butadiene.

Rule 11-18 is the next step to protect the public from toxic air contaminants (TACs). A pollutant is considered toxic if it has the potential to cause adverse health effects such as cancer, birth defects, respiratory ailments, or other serious illness.

Table 1 list the six top TAC that contribute the ambient risk levels in the Bay Area along with each compounds contribution to risk, cancer potency value, acute and chronic reference exposure levels (RELs), sources, and health effects based on information developed by the CalEPA Office of Environmental Health Hazard Assessment (OEHHA).

Table 1
Top TACs Contributing to Ambient Risk in the Bay Area Based on Monitoring Data and 2015 OEHHA Guidelines

Compound	Contribution to Ambient Risk[2]	2015 Annual Emissions (Stationary Sources)[3] (lbs)	Inhalation Cancer Unit Risk Factor (mg/kg-day)$^{-1}$)	Acute | Chronic RELs (µg/m^3)	Primary Sources	Health Effect Summary
Diesel Particulate Matter	64%	17,661	1.1	n/a | 5.0	Ships, trains, and trucks that operate in and around ports, rail yards, and heavily traveled roadways, and buses, construction equipment, diesel generators.[4]	Acute: Eyes, nose, throat and lungs, some neurological effects such as lightheadedness, coughing or nausea, asthma;[5] Chronic: Heart and lung disease, asthma, increased respiratory symptoms, and decreased lung function in children, and possibly new allergies. Carcinogen: Probable – lung cancer.[6]
Carbon Tetrachloride	11%	4,571	0.15	190 | 40	Landfill disposal, building materials, cleaning agents, contaminated ground water.	Acute: and central nervous system resulting in headache, weakness, lethargy, nausea, and vomiting; Chronic: Impacts liver, kidneys; Carcinogen: Probable.[7]

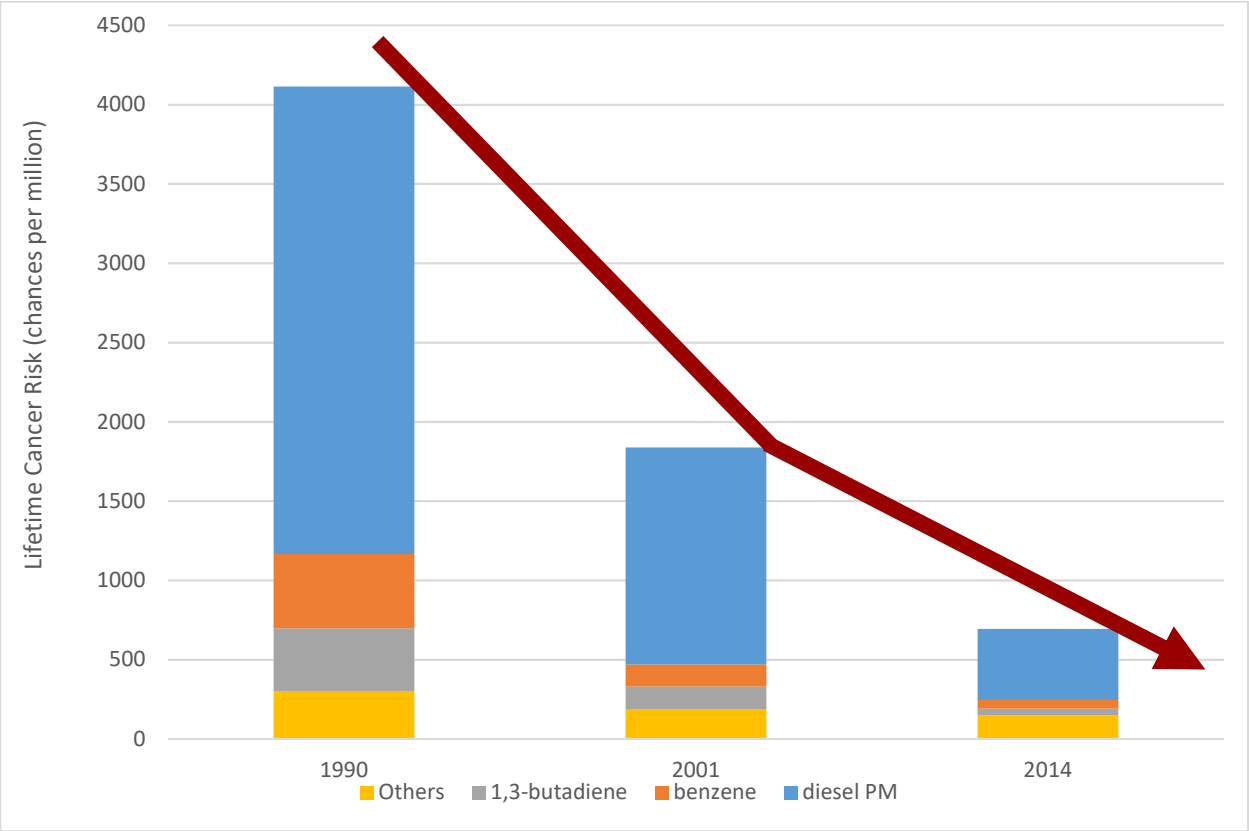
Compound	Contribution to Ambient Risk[2]	2015 Annual Emissions (Stationary Sources)[3] (lbs)	Inhalation Cancer Unit Risk Factor (mg/kg-day)$^{-1}$)	Acute | Chronic RELs (µg/m^3)	Primary Sources	Health Effect Summary
Benzene	8%	29,920	0.10	27 | 3.0	Crude oil, gasoline, and combustion sources such as automobile engines, refineries, power plants, boilers, heaters; and cigarette smoke, volcanoes and forest fires.	Acute: Drowsiness, dizziness, rapid or irregular heartbeat, headaches, tremors, confusion, unconsciousness, death (at very high levels), Chronic: Harmful effects on the bone marrow and can cause a decrease in red blood cells, leading to anemia;[8] Carcinogen: Known – leukemia.[9]
1,3-Butadiene	6%	1,494	0.60	660 | 2.0	Petroleum refining, gasoline, motor vehicle exhaust, manufacturing and processing facilities, forest fires or other combustion, and cigarette smoke.[10]	Acute: Irritation of the eyes, nasal passages, throat, and lungs, blurred vision, fatigue, headache, and vertigo; Chronic: cardiovascular diseases; Carcinogen: Known – leukemia, and tumors.

Compound	Contribution to Ambient Risk[2]	2015 Annual Emissions (Stationary Sources)[3] (lbs)	Inhalation Cancer Unit Risk Factor ($(mg/kg\text{-}day)^{-1}$)	Acute | Chronic RELs ($\mu g/m^3$)	Primary Sources	Health Effect Summary
Hexavalent Chromium	5%	8.8	510	n/a | 0.20	Electroplating, stainless steel production, cement manufacturing, welding, pigments and dyes, surface coatings, and leather tanning.[11]	Acute: Asthma, eye irritation, damage, perforated eardrums, respiratory irritation, upper abdominal pain, allergic skin reaction, called allergic contact dermatitis. Chronic: Kidney damage, liver damage, pulmonary congestion and edema, nose irritation and damage, skin irritation, dermatitis and skin ulcers, and erosion and discoloration of the teeth.[12] Carcinogen: Known – respiratory cancer.[13]

Compound	Contribution to Ambient Risk[2]	2015 Annual Emissions (Stationary Sources)[3] (lbs)	Inhalation Cancer Unit Risk Factor ($(mg/kg\text{-}day)^{-1}$)	Acute | Chronic RELs ($\mu g/m^3$)	Primary Sources	Health Effect Summary
Formaldehyde	4%	107,686	0.021	55 | 9.0	Resins used in composite wood products, building materials and insulation, household products, permanent press fabrics, paints and coatings, paper products, preservatives, cosmetics, dishwashing liquids and fabric softeners, fertilizers, and pesticides, emissions from power plants, fuel burning appliances, and cigarette smoke.[14]	Acute: Watery eyes; burning sensations in the eyes, nose, and throat; coughing; wheezing, chest pains, and bronchitis; nausea; and skin irritation;[15] Chronic: Respiratory symptoms and eye, nose, and throat irritation, repeated contact with liquid solutions of formaldehyde has resulted in skin irritation and allergic contact dermatitis;[16] Carcinogen: Probable – potentially leukemia and brain cancer.[17,18]

For almost 30 years, the Air District has implemented programs that are designed to identify and reduce the public's exposure to TACs. As shown in Figure 1, Air District and state programs have reduced the average Bay Area cancer risk resulting from exposure to TACs in our air by 83 percent over the last two decades.

Figure 1
Bay Area Lifetime Residential Cancer Risk[1] from TAC Exposure

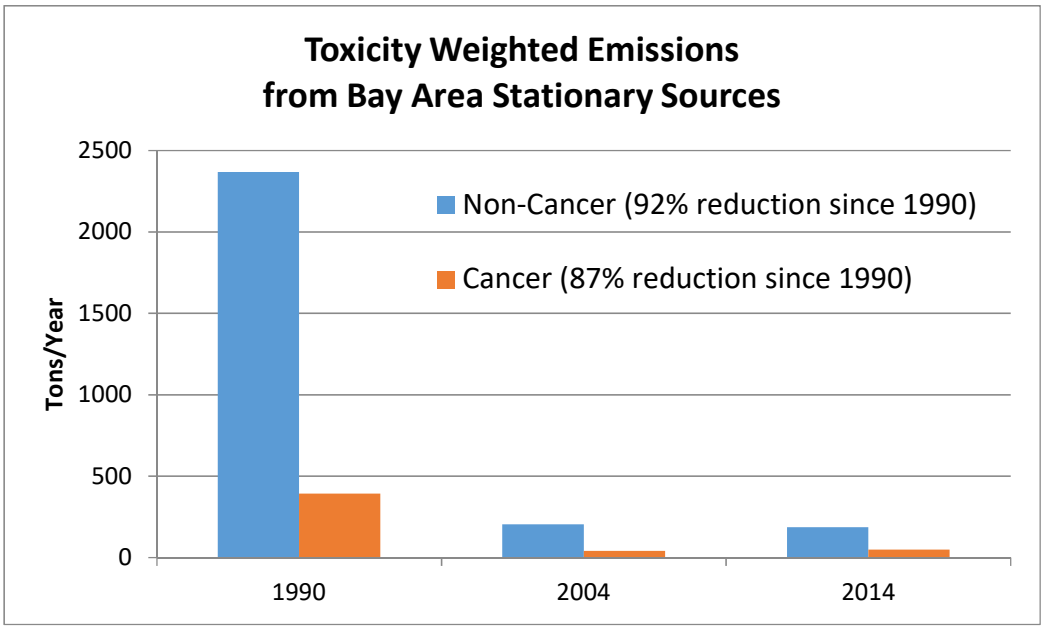


* Cancer risk is based on average ambient air monitoring data and the risk assessment methodology presented in the OEHHA's 2015 HRA Guidelines.

The Air District's long-standing Air Toxics Program is directed at reducing TAC emissions from stationary sources. Based on the Air District's TAC emissions inventories, toxicity weighted TAC emissions from Bay Area stationary sources have decreased by at least 87 percent since 1990 (see Figure 2).

[1] Cancer risk is based on average ambient air monitoring data and the risk assessment methodology presented in the OEHHA's 2015 HRA Guidelines.

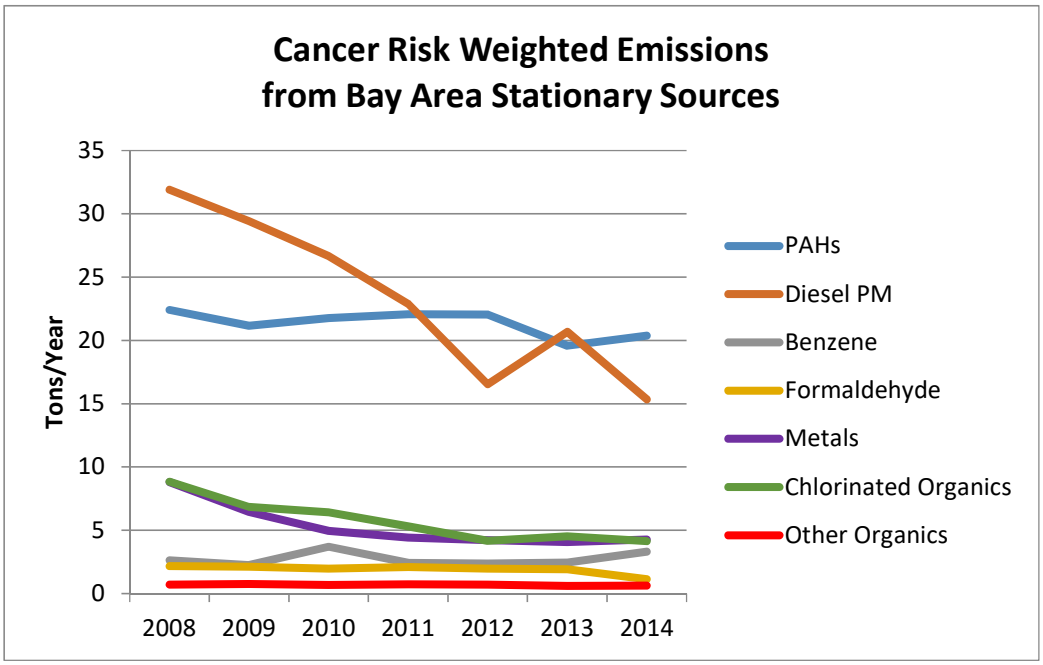
Figure 2:
Toxicity Weighted Emissions from Bay Area Stationary Sources



* The emission rates for several common TACs (diesel engine exhaust particulate matter, ethyl benzene, and isopropyl alcohol) were not available for the 1990 emission inventory.

The Air District's Air Toxics Program is successfully continuing this downward trend in cancer risks posed by stationary sources of TAC emissions. As shown in Figure 3, emissions are declining for many of the major contributors to stationary source cancer risks.

Figure 3
Cancer Risk Weighted Emissions from Bay Area Stationary Sources



B. Regulatory History

The Air District's existing Air Toxics Program currently includes three primary components.

1) The assessment and reduction of health risks from existing facilities (the Air Toxics "Hot Spots" program),
2) The preconstruction review of new and modified sources of TAC emissions (the Air Toxics New Source Review program or "Toxics NSR") and
3) The implementation of stationary source control measures, such as AB 1807 – state-developed airborne toxic control measures (ATCM) for specific categories of TAC sources.

Additional programs include the air monitoring networks and Community Air Risk Evaluation (CARE) Program.

<u>AB 2588 Air Toxics "Hot Spots" Program</u>

Proposed Rule 11-18 would enhance the Air District's current program, known as the Toxics "Hot Spots" program, to address risk from existing facilities. The program implemented California's Air Toxics "Hot Spots" Information and Assessment Act of 1987. The program is often called the "AB 2588 Program" after the enacted bill. The Hot Spots Act focused on addressing risk from sources of TACs that existed in the late 1980's. The Act required a round of toxic emissions inventory development, assessment

of risk, and, in the case of facilities that exceeded risk levels established by local air districts, notification of exposed individuals and risk reduction plans. The Act also required, and continues to require, toxics inventory updates every four years and the payment of fees by facilities to support district and ARB inventory efforts.

The air toxics emissions inventory is a database that contains information concerning emissions of TACs from permitted stationary sources in the Bay Area. The inventory includes routine or predictable releases, and is not intended to describe the potential for acute hazards from accidental and emergency releases. Information submitted by industry is reviewed for accuracy by Air District staff prior to inclusion in the inventory. This inventory, and a similar inventory for mobile and area sources compiled by CARB, is used to plan strategies to reduce public exposure to TACs.

Under the Hot Spots Act, the Air District established public notification risk levels at 10 per million (10/M) for cancer risk and 1.0 for chronic and acute hazard indices. For mandatory risk reduction, Air District policy set the risk action levels at 100/M for cancer risk and 10 for hazard indices. Subsequent legislation amending the Act provided several "off-ramps" for facilities that went through the initial round of review. Currently, there are no sources that pose a risk in excess of the risk reduction levels and, therefore, none that must comply with the program's risk reduction requirements.

Air District Regulation 2, Rule 5: Air Toxics New Source Review Program

The Air District adopted its Air Toxics New Source Review program at about the same time it started its activities to assess existing facilities under the Hot Spots Act. As a result, sources that existed in the late 1980's have been reviewed under the Hot Sports program and sources that were constructed or modified after the late 1980s have been reviewed under the Toxics NSR program. The Toxics NSR program achieves net health risk benefits by improving the level of control when existing sources are modified or replaced.

Control Measures for Toxics Air Contaminants

Under the California AB 1807 Air Toxics Identification and Control program, the ARB is responsible for developing and adopting airborne toxic control measures (ATCM) to reduce emissions for TACs from specific industrial sources and sectors, such as stationary diesel engines or perchloroethylene dry cleaning operations.

National Emission Standards for Hazardous Air Pollutants (NESHAPs), developed by U.S. EPA in accordance with Title III of the 1990 federal Clean Air Act Amendments, are also considered ATCMs in California. These rules generally focus on larger "major source" facilities, and require that emissions be reduced using the Maximum Achievable Control Technology (MACT). The focus of recent NESHAP development has shifted to rules that apply to smaller "area source" facilities. Under State law, the BAAQMD must implement and enforce all MACT Standards, or rules that are at least as stringent. The following table lists the ATCMs adopted for stationary sources.

Table 2
ATCMs Enforced by the Air District

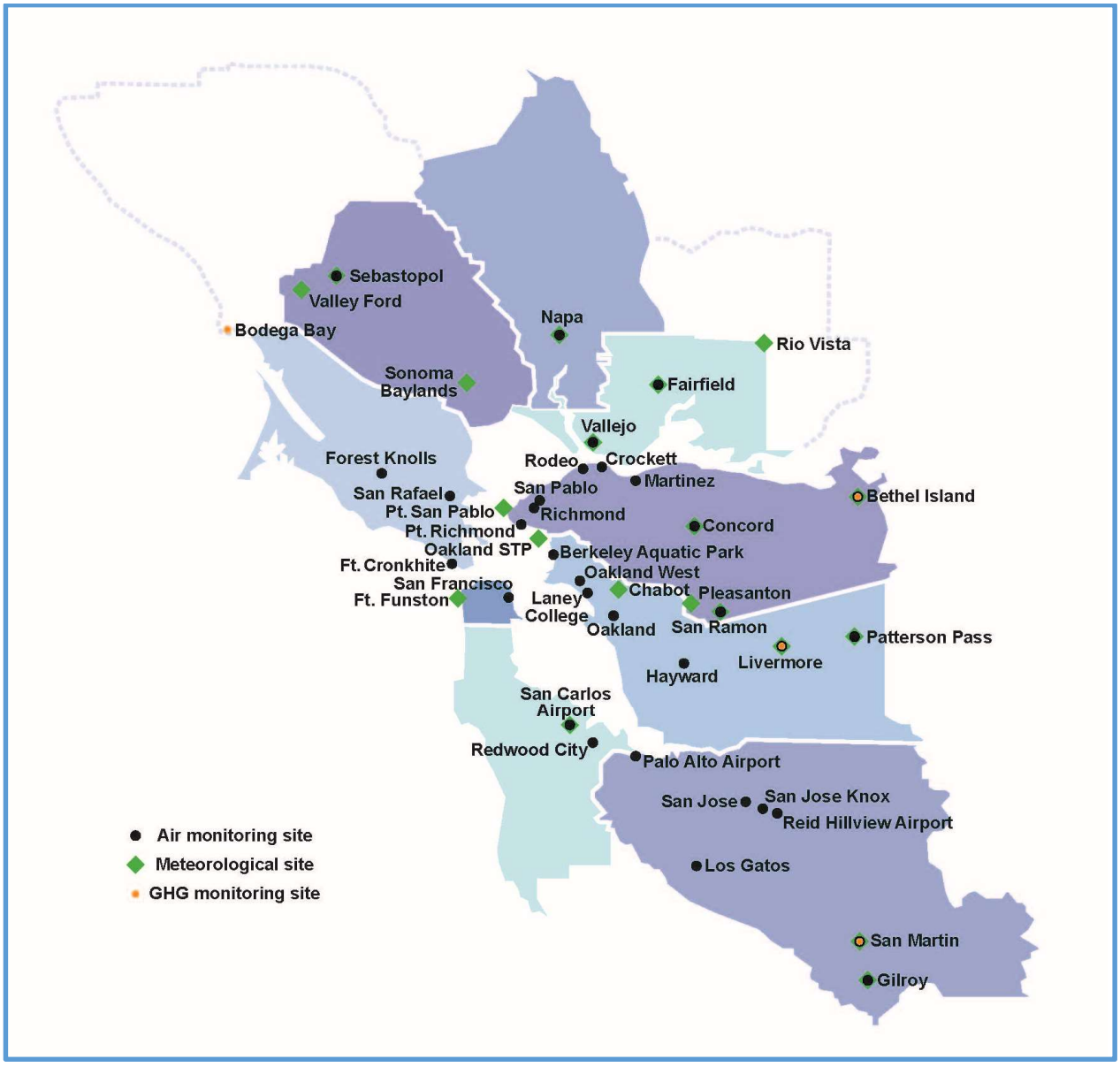
CCR Reference Number	ATCM Title	Adoption / Amended Date
17 CCR §93101	Benzene ATCM for Retail Service Stations	Adopted May 13, 1988
17 CCR §§93102-93102.16	Hexavalent Chromium ATCM for Decorative and Hard Chrome Plating and Chromic Acid Anodizing Facilities	*Adopted*: February 18, 1988 *Amended*: December 7, 2006
17 CCR §93101.5	ATCM for Thermal Spraying	*Adopted:* September 30, 2005
17 CCR §93103	Chromate Treated Cooling Towers	*Adopted*: March 9, 1989
17 CCR §93104	Dioxins ATCM for Medical Waste Incinerators	*Adopted*: July 13, 1990
17 CCR §93105	Asbestos ATCM for Construction, Grading, Quarrying and Surface Mining Operations	*Adopted*: July 26, 2001
17 CCR §93106	Asbestos ATCM for Surfacing Applications	*Adopted*: July 20, 1990 *Amended:* July 20, 2000
17 CCR §93107	ATCM for Emissions of Toxic Metals from Non-Ferrous Metal Melting	*Adopted*: January 14, 1993
17 CCR §§93108 & 93108.5	Ethylene Oxide ATCM for Sterilizers and Aerators - Parts 1 and 2	*Adopted*: May 21, 1998
17 CCR §93109	ATCM for Emissions of Perchloroethylene from Dry Cleaning Operations	*Adopted*: October 14, 1993 *Amended*: January 25, 2007
17 CCR §93110	Environmental Training Program Regulation for Perchloroethylene Dry Cleaning Operations	*Adopted*: October 14, 1993
17 CCR §93111	ATCM for Emissions of Chlorinated Toxic Air Contaminants from Automotive Maintenance and Repair Activities	*Adopted:* April 27, 2000
17 CCR §93112	ATCM for Emissions of Hexavalent Chromium and Cadmium from Motor Vehicle and Mobile Equipment Coatings	*Adopted:* September 20, 2001
17 CCR §93113	ATCM to Reduce Emissions of Toxic Air Contaminants from Outdoor Residential Waste Burning	*Adopted:* February 3, 2003
17 CCR §93114	ATCM to Reduce Particulate Emissions from Diesel-Fueled Engines -- Standards for Nonvehicular Diesel Fuel	*Adopted:* July 24, 2003
17 CCR §93115	ATCM for Stationary Compression Ignition Engines	*Adopted:* February 26, 2004
17 CCR §93116	ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 Horsepower and Greater	*Adopted:* February 26, 2004 *Amended*: February 19, 2011
17 CCR §93120	ATCM to Reduce Formaldehyde Emissions from Composite Wood Products	*Adopted:* April 18, 2008

California's air districts are required to either implement and enforce each ATCM as adopted by the ARB or adopt a control measure that is at least as stringent as the one adopted by the ARB. Under Regulation 11: Hazardous Pollutants, the Air District has adopted 17 ATCMs, either by reference or adopted rules more stringent than those adopted by the ARB. For example, the Air District adopted a more stringent local dry-cleaning rule (Regulation 11, Rule 16) to address concerns about high cancer risk from dry cleaners that operate in apartment buildings (co-residential facilities) in 1994 and Regulation 9, Rule 13: Nitrogen Oxides, Particulate Matter, and Toxic Air Contaminants from Portland Cement Manufacturing.

Ambient Monitoring Network

The toxic air monitoring network is operated by the BAAQMD, collecting samples over 24-hour periods, generally on a 12-day sampling frequency; however, several sites use a 6-day sampling frequency. The District's air monitoring network began in 1986 with six sites, and has gradually been expanded to its present size of 30 sites. Currently 18 sites are used to collect toxic samples. One of the air monitoring stations is portable and was temporarily located in Cupertino near Lehigh Southwest Cement Company to help assess the impact from this facility on the surrounding area. The California Air Resources Board (CARB) has collocated samplers at three BAAQMD sites to help determine precision and accuracy of the program. Figure 4 illustrates the locations of the Bay Area air monitoring sites and meteorological stations.

Figure 4.
Map of Bay Area State or Local Air Monitoring Stations, Special Purpose Monitoring Sites, GHG Monitoring Sites and Meteorological Stations in 2015



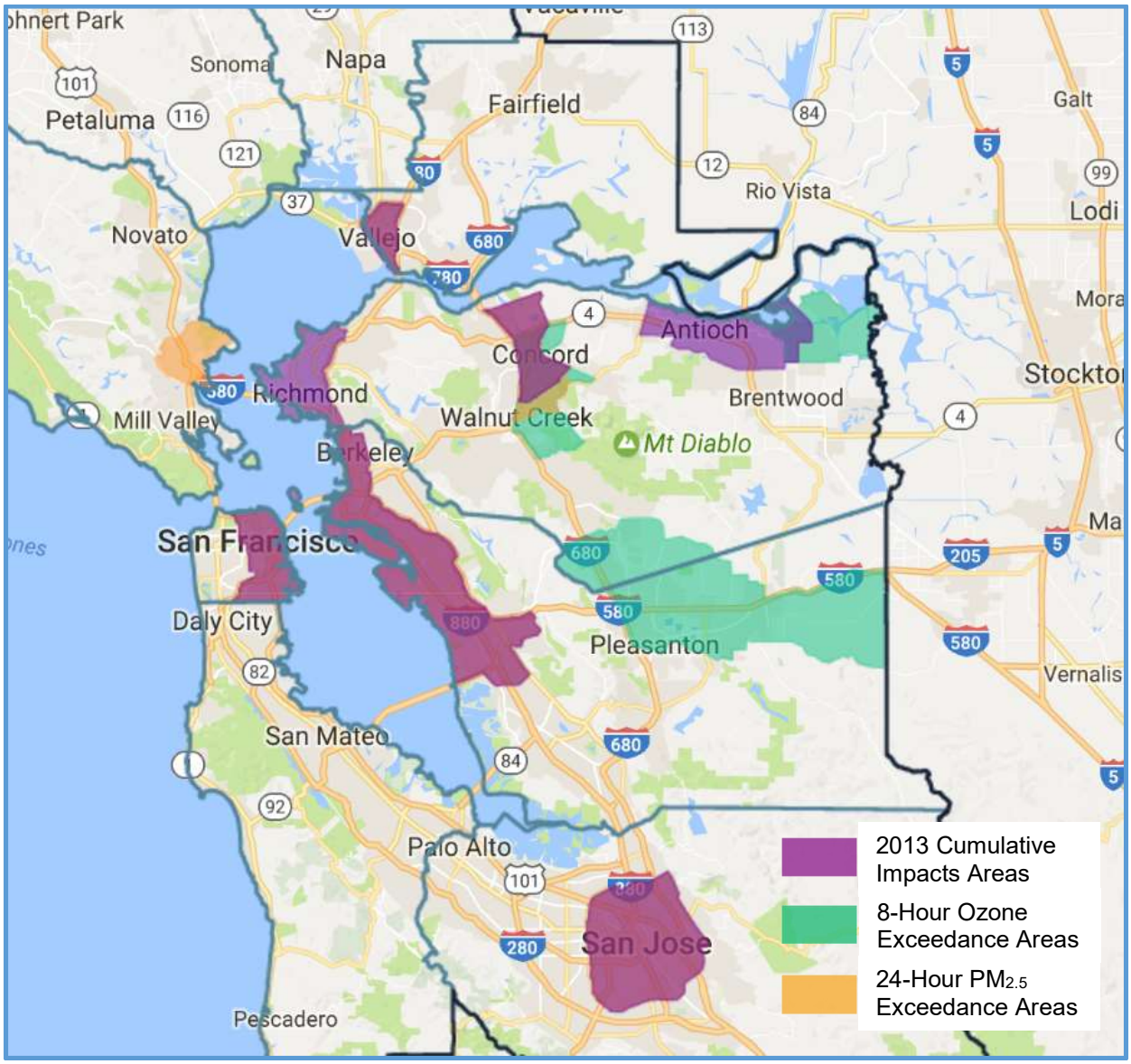
Annual summaries of the ambient toxics monitoring network data are available at: http://www.baaqmd.gov/research-and-data/air-toxics/annual-report.

Community Air Risk Evaluation (CARE)

The Community Air Risk Evaluation (CARE) program was initiated in 2004 to evaluate and reduce health risks associated with exposures to outdoor toxic air contaminants (TACs) in the Bay Area. The program modeled TAC emissions from stationary point and area sources, and on-road and off-road mobile sources, to identify areas where

vulnerable population would be exposed. The program then assisted in developing appropriate mitigation strategies for these areas. The map contained in Figure 5 shows areas where toxic air contaminants, fine particulate matter, and ozone are estimated to have the greatest impacts on health.

Figure 5
CARE Areas



Health Risk Assessments and Proposed Rule 11-18

In preparation for proposed Rule 11-18, the Air District would reevaluate over 6,000 existing facilities using current knowledge and procedures. This effort would rely on estimates of health risk using the latest science. To ensure the use of the best available understanding of health risk, the Air District follows updated state-wide guidance

regarding health risk assessment methodologies to evaluate public exposures to toxic air contaminants and to calculate and manage the resulting health risks. Proposed Rule 11-18 would rely on the same state-wide health risk assessment guidance (Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) Health Risk Assessment Guidelines) that is used in the current Toxics NSR program.

OEHHA periodically updates its Health Risk Assessment (HRA) Guidelines to reflect advances in science. OEHHA recently adopted a major update to the HRA Guidelines that focused on children's health protection: OEHHA's 2015 HRA Guideline Revisions. Both Rule 11-18 and the Air District's Air Toxic NSR programs will use these 2015 Guideline Revisions. More details on these revisions can be found in the Staff Report for the Air District's revisions to the Air Toxic NSR program.[2]

C. Industry Description

Currently, there are over 6,000 facilities that report their air toxic emissions to the Air District. Of these facilities, staff anticipates proposed Rule 11-18 would affect a wide range of commercial, industrial and municipal facilities including data centers, petroleum refineries, chemical plants, waste water treatment facilities, foundries, forges, landfill operations, hospitals, crematoria, power plants, colleges and universities, military facilities and installations, and airline operations. These facilities operate a wide variety of sources of toxic emissions, including diesel-fueled internal combustion engines, waste water treatment, combustion sources, evaporative and fugitive emissions, etc. The Air District estimates that hundreds of facilities could potentially be impacted by this proposed rule. Table 3 provides a general summary of the types of facilities that may be affected by this proposed rule and the major sources of toxic emissions.

Table 3
Summary of Toxic Air Contaminant Emitting Facilities and Sources

Facility	Sources	Primary Risk Driver(s)	Estimated Range of Health Risks (in a million)
Refineries	Fugitive Emissions Stack Emissions Diesel Engines Cooling Towers Waste Water Treatment Operations	Benzene Diesel PM Formaldehyde 1,3-Butadiene Chromium VI Nickel	13 – 56
Data Centers	Stationary Diesel Engines	Diesel PM	3 – 24
Cement Manufacturing	Stack Emissions Fugitive Emissions	Chromium VI	9 – 40
Chemical Plants	Stack Emissions Fugitive Emissions	Formaldehyde Carbon Tetrachloride	12

[2] See the Staff Report for Amendments to Regulation 2, Rule 5: New Source Review of Toxic Air Contaminants, September 2016.

Facility	Sources	Primary Risk Driver(s)	Estimated Range of Health Risks (in a million)
		Sulfuric Acid Mist Diesel PM	
Crematoria	Stack Emissions	Chromium VI Mercury	10 – 14
Landfills	Fugitive Emissions Diesel Engines	Vinyl Chloride Hydrogen Sulfide Benzene Diesel PM Acrylonitrile	11 – 23
Foundries / Metal Melting	Fugitive Emissions	Dioxins Manganese Lead Chromium VI Mercury Cadmium Nickel Arsenic PAHs Copper	17 – 40
Sewage Treatment Facilities	Fugitive Emission Stack Emissions	Diesel PM Hydrogen Sulfide Cadmium Mercury	9 – 40
Power Plants	Stack Emissions	Formaldehyde Ammonia Benzene Diesel PM	5 – 17
Gasoline Stations	Fugitive Emissions	Benzene Ethyl Benzene 1,3-Butadiene	10 – 31
Military Facilities	Diesel Engines	Diesel PM	n/a
Manufacturing	Diesel Engines	Diesel PM	7 – 14
Hospitals / Medical Facilities	Diesel Engines EtO Sterilizers Stack Emissions	Diesel PM EtO Formaldehyde	2 – 23

1. Diesel Engines

Diesel engines are compression-ignited (CI) engines. CI engines run lean (excess air) using diesel fuel or other longer-chained hydrocarbons, including fuel oil, distillate oil, or jet fuel. CI engines operate differently than spark-ignited engines in that they operate by compressing an air and fuel mixture, which increases the temperature of the mixture. (When a gas is compressed, its temperature increases with the increase in pressure.) A diesel engine uses this property to ignite the air-fuel mixture and power the engine. The exhaust from these engines contain both gaseous compounds and particulate matter. The particulate matter portion of the diesel exhaust was identified as a toxic air contaminant by the ARB in 1998. As shown in Figure 3, diesel particulate matter is one of the largest sources of risk from stationary sources. Diesel internal combustion engines are operated at a wide variety of facilities, including refineries; landfills; sewage

treatment facilities; chemical plants; hospitals; residential, commercial, governmental, educational, and industrial buildings; and is often the sole source of toxic emissions and health risk at many of these facilities. Table 4 provides a list of potential risk reduction measures for stationary diesel engines.

Table 4
Risk Reduction Measures for Stationary Diesel Engines

Pollutant / Emission Source	Risk Reduction Measure
DPM / IC Engine	Reduce Operating Hours
	Relocate Engine
	Adjust Stack Height
	Diesel Particulate Filter
	Active Diesel Particulate Filter
	Oxidation Catalyst

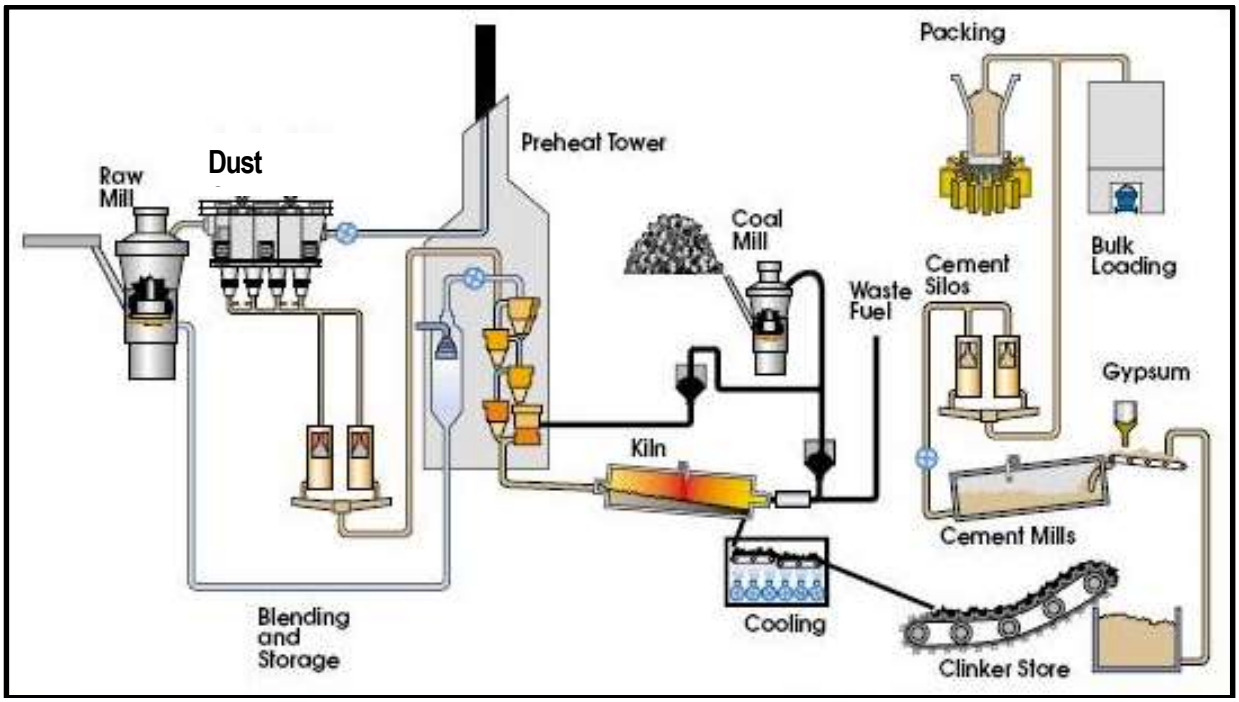
2. Portland Cement Manufacturing

Portland Cement Kiln Overview

Portland cement is a fundamental ingredient of concrete, consisting of calcium, silicon, aluminum, and iron. These materials are combined in several steps requiring careful control to ensure that the final product meets specific chemical and physical specifications required for building and construction needs. Figure 6 shows a schematic diagram of Portland cement manufacturing.

Figure 6

Schematic of Cement Manufacturing Process



Manufacturing Steps

Portland cement manufacturing is a series of steps which take place at a large industrial facility usually located adjacent to a source of raw materials. Raw materials consist of limestone, shells or chalk, clay, sand, alumina and iron ore. The bulk of these are mined at a quarry, blended, and ground to a powder. This blended material is subjected to intense heat in a kiln to cause a series of chemical reactions, transforming the powdered raw materials into something called cement clinker. Cement clinker consists of grayish-black pellets the size of marbles or golf balls, which is cooled, ground and mixed with gypsum and other additives to form powdered Portland cement.

Emissions from Portland Cement Manufacturing

The manufacturing of cement requires the movement and processing of many tons of material as well as the combustion of large amounts of fuel in order to heat that material to extremely high temperatures. Emissions of pollutants are directly attributable to both the fuel combustion and materials processing. The formation of NOx during the manufacture of cement is due to the high temperature, oxidizing atmosphere necessary for clinker formation. Emissions of TACs arise from the presence of these compounds predominantly in the raw materials and to a lesser extent the fuel to fire the kiln. Predominant TACs emitted include mercury, hydrochloric acid (HCl), benzene, dioxins and furans, and dependent on the raw materials used, metals such as lead and hexavalent chrome. Particulate emissions arise from crushing, mixing and storage of

raw materials, clinker production and cooling, finish grinding, packaging, and from vehicle traffic.

For the most part, emissions of metallic TACs are limited at Lehigh, a Portland cement manufacturing plant located in Cupertino, California, due to low TAC levels in raw materials and fuel used at the plant, combined with the high level of control from fabric filtration systems in use at the plant. Mercury emissions are more significant than other metallic TACs due to relatively high mercury levels in the limestone quarried at the facility and because the metal is volatilized by the high temperatures of the kiln. Other TACs emitted from the kiln include hydrochloric acid (HCL), dioxins, furans, and benzene. Table 5 lists risk reduction measures available to reduce risk from Portland cement manufacturing operations.

Table 5
Risk Reduction Measures for Portland Cement Manufactoring

Pollutant / Emission Source	Risk Reduction Measure
Chromium VI / Kiln	1. Baghouse, Filterable PM<0.006 gr/sdcf for T>150F[xix] 2. Wet Scrubber for condensable PM2.5
Chromium VI / Silos, bins, mills	Baghouse, Filterable PM<0.0013 gr/sdcf for T>150F[xx]

3. 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. Petroleum refineries are very large industrial complexes that involve many different processing units and auxiliary facilities such as utility units and storage tanks. Each refinery has its own unique arrangement and combination of refining processes largely determined by the refinery location, desired products and economic considerations.

Health risks associated with petroleum refining are due primarily to the emissions of benzene, 1,3-butadiene, formaldehyde, and diesel particulate matter exhaust. Benzene and 1,3-butadiene, and other toxic compounds are emitted from storage tanks, waste water treatment operations, reformers, cooling towers, and from leaks from pumps, valves, and flanges. Benzene, along with PAHs, can also be emitted from the steam vent of the delayed coker. Diesel particulate matter is emitted from diesel generators and backup engines. Benzene and formaldehyde are emitted from refinery combustion operations.

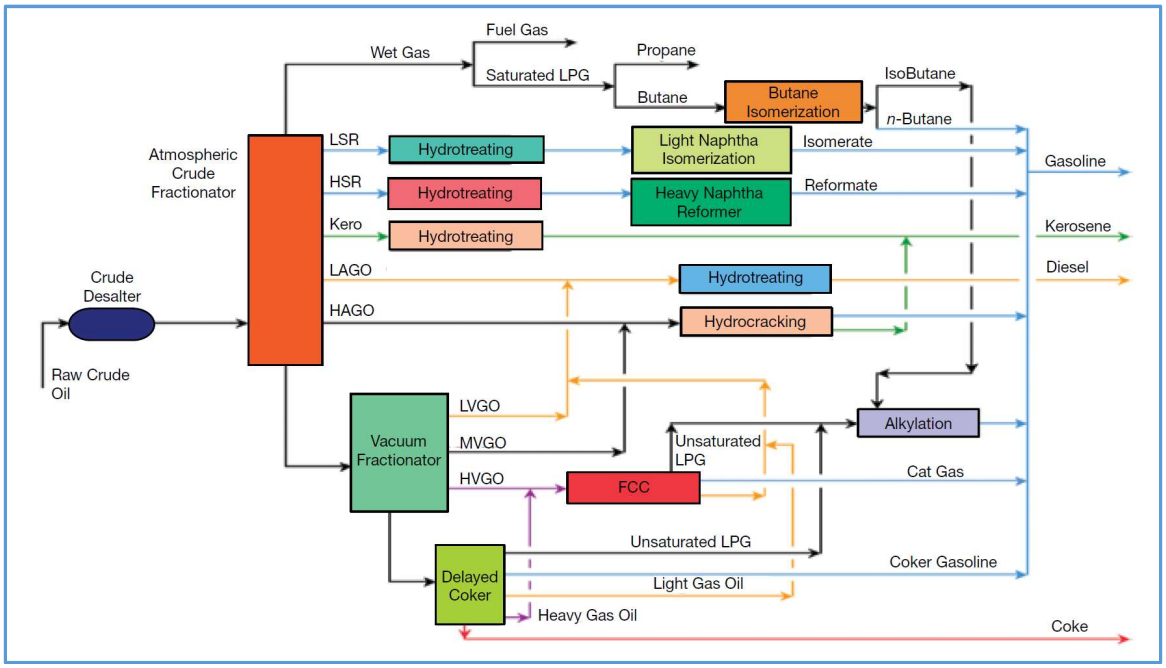
Currently, the five petroleum refineries located in the Bay Area within the jurisdiction of the Air District that would be affected by the rule are:

1. Chevron Products Company, Richmond (BAAQMD Plant #10)
2. Phillips 66 Company—San Francisco Refinery, Rodeo (BAAQMD Plant #21359)
3. Shell Martinez Refinery, Martinez (BAAQMD Plant #11)
4. Tesoro Refining and Marketing Company, Martinez (BAAQMD Plant #14628)

5. Valero Refining Company—California, Benicia (BAAQMD Plant #12626) and associated Asphalt Plant (BAAQMD Plant #13193)

These facilities process crude oil into a variety of products such as gasoline, aviation fuel, diesel and other fuel oils, lubricating oils, and feedstocks for the petrochemical industry. The diagram in Figure 7 illustrates how various process units at petroleum refineries convert raw crude oil (petroleum) into fuels and other products.

Figure 7
Refinery Flow Diagram



Legend: LSR = light straight-run naphtha; HSR = heavy straight-run naphtha; Kero = kerosene; LAGO = light atmospheric gas oil; HAGO = heavy atmospheric gas oil; LVGO = light vacuum gas oil; MVGO = medium vacuum gas oil; HVGO = heavy vacuum gas oil.

The processing of crude oil occurs in various process units or plants; some of the primary process units include:

- Crude Desalter: Crude oil is mixed with water to separate the salt and sediments from the crude.
- Crude Unit: The incoming desalted crude oil is heated and distilled into various fractions for further processing in other units.
- Gas Concentration Unit: Light hydrocarbons from the top of the crude unit are separated and distributed in the refinery fuel gas (RFG) system for use as fuel for heaters and boilers.
- Vacuum Distillation Unit: The residue oil from the bottom of the crude oil distillation unit is further distilled under heavy vacuum.
- Hydrotreater: Naphtha, kerosene, and gas oil are desulfurized from the crude unit by using hydrogen and converting the organically bound sulfur into hydrogen sulfide (a toxic compound).

- Fluidized Catalytic Cracker Unit: Longer chain, higher boiling hydrocarbons such as heavy oils are broken (or “cracked”) into lighter, shorter molecules at high temperatures and moderate pressure in the presence of a catalyst. This process is so named because the catalyst is so fine that it behaves like a fluid.
- Butane Isomerization Unit: Polymers of butane are reformed into isobutane for use in the alkylation process. Alkylates are used in blending gasoline to boost the octane rating. Alkylates are considered one of the highest quality refinery products.
- Light Naphtha Isomerization Unit: Benzene is saturated and short, straight-chain hydrocarbons are isomerized into branched-chain hydrocarbons.
- Heavy Naphtha Reformer and Hydrotreater: Low-octane linear hydrocarbons (paraffins) are converted into aromatics using a catalyst. The process also forms hydrogen - used in the refinery’s hydrocracking and hydrotreating units - and benzene, toluene, and xylene (BTX) feedstocks, used in other process units.
- Hydrocracker Unit: Hydrogen is used to upgrade heavier fractions into lighter, more valuable products, such as diesel and jet fuel, in a high-pressure system.
- Alkylation Unit: Butene and propene are reacted with isobutane into alkylate, a high-octane gasoline component.
- Delayed Coker: Very heavy residual oils are converted into end-product petroleum coke as well as naphtha and diesel oil byproducts.
- Claus Sulfur Plant: A two-step (thermal and catalytic) process for recovering sulfur from gaseous hydrogen sulfide (H_2S) derived from refining crude oil. In the thermal step, H_2S laden gas is combusted to form elemental sulfur and sulfur dioxide (SO_2). In the catalytic step, a catalyst is used to boost the sulfur yield. In this step, H_2S reacts with SO_2 to form elemental sulfur.

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."

Conversion Processes

Crude oil components such as residual oils, fuel oils, and other light fractions are converted to high-octane gasoline, jet fuel, and diesel fuel, gasoline 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.

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 de-asphalting. Elements such as sulfur, nitrogen, and oxygen are removed by hydrodesulfurization, hydrotreating, chemical sweetening, and acid gas removal.

Feedstock and Product Handling

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

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 steam boilers, wastewater 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.

Emissions from Refinery Processing

These primary process units, minor process units, auxiliary equipment (boilers, turbines, heat exchangers, etc.), and other refinery activities (such as truck and loader traffic) emit a variety of criteria pollutants, toxic pollutants (toxic air contaminants), and climate pollutants (greenhouse gases). Other sources of emissions include waste water treatment, tanks, leaking equipment, pressure release devices, flares, marine terminals, and product loading, which are collectively subject to at least ten different Air District regulations. Table 6 lists risk reduction measures available for many petroleum refining operations.

Table 6
Risk Reduction Measures for Petroleum Refining Operations

Pollutant / Emission Source	Risk Reduction Measure
Benzene & PAHs / Delayed Coker	Rule based: Depressurize each coke drum to a closed blowdown system until the coke drum vessel pressure or temperature measured at the top of the coke drum or in the overhead line of the coke drum as near as practical to the coke drum meets applicable coke drum vessel pressure or coke drum vessel temperature requirements for existing and new delayed coking units in MACT CC (63.657) prior to venting to the atmosphere, draining, or deheading the coke drum at the end of the cooling cycle. No proven technology for further reductions.

Pollutant / Emission Source	Risk Reduction Measure
Benzene & Naphthalene / Waste water treatment operations	Leak Monitoring: 1. Lower leak limit (e.g. from 500 ppm to 100 ppm) 2. Increased leak monitoring frequency (e.g. from semi-annual to quarterly or monthly) Technology: 1. Install water seals or equivalent technology on vents and drains open to atmosphere. 2. Collect and vent emissions to a control device (e.g. carbon adsorption or thermal oxidizer). 3. Enclose open weirs and lines with direct piping.
Benzene and 1,3 Butadiene / Catalytic Reforming Units	Rule based: For new and existing CRUs meet the emission limit in Table 15 of MACT UUU (63.1566) during the initial catalyst depressurizing and catalyst purging operations by routing vent emissions to a flare (option 1), or meet the less stringent of a total organic compound (TOC) or non-methane TOC percent reduction standard (98% by weight) or concentration limit (20 ppmv dry basis as hexane corrected to 3% O_2). No proven technology for further reductions.
Benzene & Naphthalene / Fugitives (pumps, valves, flanges)	Component Leak Monitoring (All Component Types): 1) Lower leak limit (e.g. from 100 ppm to 50 ppm or 25 ppm) 2) Increased leak monitoring frequency (e.g. from quarterly to monthly or weekly **Valves**: 1) welded bonnet flanges, 2) zero-emission seals and packing (manufacturer guarantee leaks < 10 ppm) **Pumps**: 1) rotating shaft shrouded and vented to a thermal oxidizer or furnace 2) double-mechanical seals, 3) zero emission seal packing **Pressure-Relief Valves**: 1) vented to recovery (process, fuel gas, etc.) or to abatement (thermal oxidizer, furnace, etc.) 2) equip with monitoring device (e.g. rupture disk indicator, magnetic sensor, motion detector on PRD valve stem, flow monitor, or pressure monitor) **Connectors**: 1) welded connections 2) shrouded and vented to abatement (e.g. oxidizer or furnace) 3) zero emission seals"
Benzene and 1,3 Butadiene / Cooling Towers	Rule based: Compliance with the leak detection, repair, and monitoring requirements in Reg. 11-10 and MACT CC (Section 63.654: Heat Exchange Systems) No proven technology for further reductions.
Benzene, 1,3-Butadiene, Naphthalene / Storage Tanks	Fixed Roof Tanks: 1) Internal floating roof and seals (60 to 99 percent control) 2) Vapor balancing (90 to 98 percent control) 3) Vapor recovery to process, oxidizer and/or scrubber (90 to 98 percent control) 4) Maintain the insulation of heavy fuel storage tanks in good condition

Pollutant / Emission Source	Risk Reduction Measure
	(reduces storage loss) 5) Reduce generation of dissolved gases by eliminating pressure drop in tank fill line 6) Reduce number of roof fittings 7) Re-paint tank <u>Floating Roof Tanks:</u> 1) Vapor recovery to an oxidizer and/or scrubber 2) Dome external floating roof tanks 3) Reduce number of roof fittings (e.g. remove rim vents, etc.) 4) Re-paint tank 5) Increased gap seal monitoring frequency 6) Decreased seal gap allowance (e.g. from 1/8" to 1/16", etc.) 7) Reduce number of roof fittings <u>Pressurized Tanks:</u> 1) Lower maximum allowable leak limit (e.g from 500 ppm to 100 ppm) for pressure vacuum valves 2) Increase leak monitoring frequency

4. <u>Metal Melting (Foundries and Furnaces)</u>

Foundries are metal melting operations that cast molten metals into a wide array of products, such as pipes, connectors, valves, engine parts, pump housings, ski lift and cable car castings. Foundries melt metal in furnaces using coke, electricity, or natural gas. Once the molten metal has the right properties, it is poured or "tapped" and transferred to molds in which the metal casting is formed into the shape of the final product. Foundries may operate one or more type(s) of furnaces, which include cupola, electric arc, reverberatory, sweat, and crucible.

Cupola Furnace

The cupola furnace is one of the oldest methods of making cast iron and is the most common furnace operating at iron and steel foundries for secondary steel production (steel made from scrap or ingots – not iron ore) in the District. A cupola is a cylindrical, water-cooled furnace that is lined with refractory brick made from heat resistant material such as aluminum oxide, magnesium oxide, silicon, or silicon carbide and is similar in appearance to a squat smoke stack. In the metal melting process, operators deposit layers of scrap iron or steel, coke and lime (used as flux) into the cupola near the top; this combination of materials is called the "charge." Air, often preheated, is blown in to the bottom of the furnace through tuyeres (nozzles though which air blasts are routed into the furnace to provide oxygen) to improve the combustion and heating of the furnace.

Electric Arc Furnace

The electric arc furnace (EAF) is also used in secondary steel production. This furnace relies on electricity to heat and melt metal rather than a fuel such as coke or natural gas. The furnace is lined with refractory material and is usually water-cooled. The

vessel is covered with a retractable roof through which typically three cylindrical, graphite electrodes descend into the furnace. When powered with a very strong electrical current, an electric arc forms between the charged metal and the electrode; the electrical arc that forms heats the metal to its melting point. Once the metal is molten and of the proper metallurgical properties, the electrodes are raised. The furnace is built on a tilting platform so that the liquid steel can be easily tapped. One facility in the Bay Area operates three EAFs.

Reverberatory Furnaces

The reverberatory furnace differs from a cupola furnace in that in a reverberatory furnace, the metal is isolated from contact with the fuel. Reverberatory furnaces rely on radiant and convective heating to melt the metal. These furnaces are not considered as energy-efficient as the cupola or electric arc furnaces. Reverberatory furnaces have historically been used for melting bronze, brass, and pig iron (an intermediate product of smelting iron ore with a high carbon content). In the Bay Area, these furnaces are used primarily for melting secondary aluminum, often from scrap.[xxi, xxii]

The basic design of an aluminum reverberatory furnace is a simple steel box lined with refractory bricks with a flue at one end and a vertically-lifting door at the other. The temperature in the furnace allows the aluminum to melt while leaving solid other metals that have a higher melting point, such as iron. The floor of the furnace slopes slightly to separate the molten aluminum from the solid metals.[xxi]

Sweat Furnace

Sweat furnaces provides an effective and cost-effective means to separate non-ferrous metals, such as aluminum, from iron and/or steel. These units are also commonly known as dry hearth furnaces. Sweat furnaces heat, typically using natural gas, commingled recyclable metals to a temperature that causes the non-ferrous metals, such as aluminum, to melt and run off (i.e., “sweat”) leaving behind steel and other materials that have a higher melting point.[xxiii] The floor of the furnace is slightly inclined to allow the melted metal to flow and be directed to either a holding furnace or into molds.

Emissions from Foundry Operations

Metal melting and processing operations emit particulate matter, including metals; volatile organic compounds (VOC) (which include odorous compounds such as phenols); and/or toxics compounds.

The casting of molten metals is the primary source of PM and odorous substances, such as phenolic compounds, at foundries. These emissions occur when the hot molten metals contact the molds and cores formulated with binders that contain phenols, urethane, furans or other organic compounds. Metal forges emit PM and may emit odors from heat and pressure applied to lubricating oils on the metals. Table 7 lists

the most common stages of production at foundries and forges and the types of emissions associated with those stages.

Table 1
Metal Production and Recycling Stages, Description and Emissions

Process*	Description	Emissions
Metal Management	Compilation, collection, storage and sorting of metals for metal management and the handling of byproduct and wastes.	PM, VE
Charging	Preheating the furnace and adding metal, flux, fuel and other compounds to furnace	PM
Furnace / Oven Operations: Metal Melting	Heating until the metal mixture is molten and reaches the proper temperature and metallurgic properties.	PM, VOC, carbon monoxide, oxides of nitrogen, toxics
Tapping	Molten metal is poured from furnace into a ladle for transfer to the casting area.	PM, toxics
Casting / Pouring	The tapped metal is transferred to the casting area and poured into the molds to form castings.	PM, VOC, toxics
Cooling	The cast metal is allowed to cool to close to ambient temperatures. While cooling, the metal cast shrinks often pulling away from the mold.	PM, VOC, toxics
Shakeout	Removing the casting from the mold – which can often involve destruction of mold.	PM, VOC, toxics
Grinding / Finishing	Once the casting is removed from the mold, it may have to be finished by grinding excesses of metal.	PM
Mold / Core Making	Making the mold / core from sand and binders and other substances such as clay, starch, charcoal.	PM, VOC, toxics

* The listed metal melting processes – metal management through grinding / finishing – are sequential steps in the production of cast metal parts. Mold / core making, however, is an essential parallel process that is not specifically a sequential step in the production of cast metal parts.

Table 8 lists risk reduction measures for foundry and forging operations.

Table 8
Risk Reduction Measures for Foundry and Forging Operations

Pollutant / Emission Source	Risk Reduction Measure
Chromium IV / Secondary Metal Process (Chrome Plating).	ESP and High Efficiency Wet Scrubber Install plating bath covers and meshpad mist eliminators
Chromium IV / Secondary Metal Furnace	Baghouse, Filterable PM<0.0013 gr/sdcf for T>150F

Pollutant / Emission Source	Risk Reduction Measure
Chromium IV / Fugitive Emissions	Total furnace enclosure & high efficiency cartridge filtration/baghouse Direct evacuation control (DEC), hood, and baghouse (99.00 percent control efficiency) Direct-shell evacuation control system with adjustable air gap and water-cooled elbow and duct to baghouse Baghouse followed by wet scrubber Baghouses equipped with broken bag detectors

5. Crematoria

A crematory (also known as a crematorium, cremator or retort) is a machine in which people's bodies or remains are burned down to the bones, eliminating all soft tissue. Crematories are usually found in funeral homes, chapels, cemeteries, or in stand-alone facilities. A facility which houses the actual crematory units is referred to as a crematorium.

Emissions from Crematories

The flue gases from the crematory chamber are usually vented to the atmosphere through a refractory-lined flue. Hexavalent chromium and mercury (from dental amalgam) are the major sources of risk from crematories. Filtration systems, such as baghouses, are used to control PM (which can contain both chromium and mercury) from the flue stack emissions at crematories. Activated carbon adsorption can also be used for mercury abatement. Table 9 lists various measures that could reduce risks from crematoria.

Table 9
Risk Reduction Measures for Crematoria

Pollutant / Emission Source	Risk Reduction Measure
Chromium IV and Mercury / Crematory Retort.	1) Increase stack height and prohibit two retorts from operating concurrently. 2) Require the following: minimum exhaust temperature of 400^{o}C, a stack diameter of 0.46 meters, a minimum exit velocity of 15meters/second, and a minimum stack height of 10 meters. 3) Require one or more of the following control technologies: co-flow filter, gas scrubber, honeycomb catalytic adsorber, sodium bicarbonate and activated carbon control systems, and solid-bed filters using absorbants such as cokes or zeolites.

6. Waste Water Treatment Facilities

Waste water treatment is the process of removing contaminants from wastewater, primarily from household sewage. Its basis function is to speed up the natural processes by which water is purified. It includes physical, chemical, and biological processes to remove these contaminants and produce environmentally safe treated wastewater (or treated effluent). A by-product of sewage treatment is usually a semi-

solid waste or slurry, called sewage sludge, that must undergo further treatment before being suitable for disposal or land application.[xxiv]

Emissions from Waste Water Treatment Facilities

Toxic air contaminant emissions from waste water treatment operations include hexavalent chromium, mercury, and cadmium from incineration; hydrogen sulfide from anaerobic digestion of organic matter; and formaldehyde from natural gas engines and diesel particulate matter from diesel generators. Table 10 lists various measures to reduce risk from waste water treatment operations.

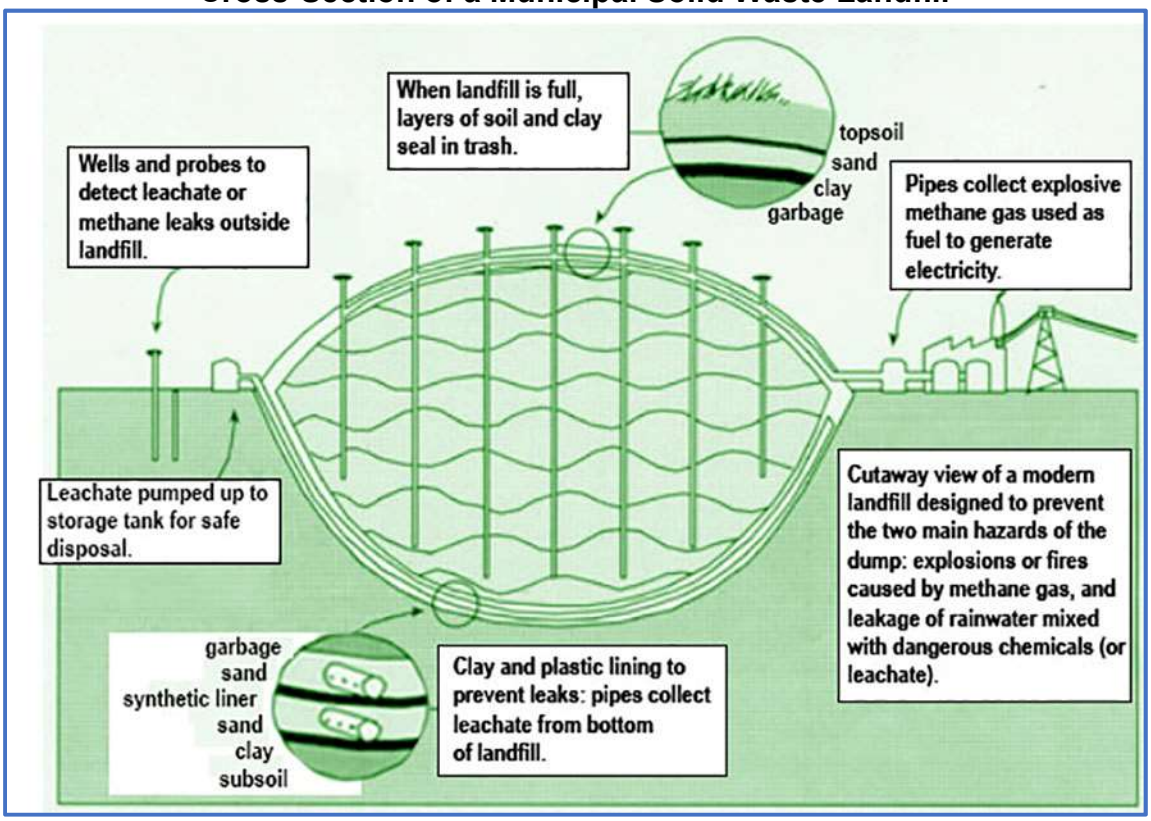
Table 10
Risk Reduction Measures for Waste Water Treatment Facilities

Pollutant / Emission Source	Risk Reduction Measure
Chromium IV, Mercury, Cadmium / Incinerator	1. Increase stack height 2. Oxidation catalyst
Hydrogen Sulfide, / headworks	1. Covering the headworks 2. Injecting ferric chloride 3. Injecting peroxide
Formaldehyde / Natural Gas Engine	1. Oxidation Catalyst

7. Landfills

A solid waste disposal site, or landfill, is an area of land or excavation that receives household waste. A landfill may also receive other types of nonhazardous wastes, such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and industrial nonhazardous solid waste.[xxv] Figure 8 illustrates the basic configuration of a solid waste landill.

Figure 8
Cross-Section of a Municipal Solid Waste Landfill



Source: EPA: https://www.epa.gov/sites/production/files/2016-03/landfillpicjpg_revised2.jpg

Emissions

Solid waste disposal sites, or landfills, are sources of organic compound emissions. As solid waste decomposes, it produces landfill gas via a naturally occurring anaerobic bacterial process. Landfill gas contains mainly methane and carbon dioxide plus small amounts of nitrogen, non-methane organic compounds (NMOCs) including ethylbenzene, and hydrogen sulfide (H_2S). Most of the NMOCs are precursor organic compounds (POC) and many are toxic air contaminants, such as ethylbenzene and H_2S. If left uncontrolled, landfill gas may seep through the landfill surface and cause significant emissions of POC and toxic compounds. Uncontrolled landfill gas also poses fire, health, and safety hazards. Table 11 provides a listing of potential risk reductions measures for landfills.

Table 11
Risk Reduction Measures for Landfills

Pollutant / Emission Source	Risk Reduction Measure
Ethylbenzene / Active Landfill – LFG Combustion	Compliance with Rules (8-34 and state landfill methane control rule). All active landfills are currently subject to the enhanced monitoring in the state rule. Possible additional measures: add synthetic covers to improve capture, faster collection system installation in new fill areas, enhanced monitoring.

III. PROPOSED RULE REQUIREMENTS

A. Exemptions:

Proposed Rule 11-18 contains two exemptions:

Emergency-Use, Stationary Diesel Engines: Proposed Rule 11-18 would not apply to facilities for which the only source of toxic emissions is one or more stationary diesel engines only if the facility prioritization score is less than 250.

Retail Gasoline Dispensing Facilities: The proposed rule would also exempt retail gasoline stations with a prioritization score less than 250.

These exemptions are included because the ARB and CAPCOA are in the process of developing industry-wide risk management guidelines for these industrial sectors, in which the Air District is participating.[xxvi]

B. Major Definitions:

Best Available Retrofit Control Technology (TBARCT): This definition is modeled after the definition of “Best Available Control Technology” contained in Air District Rule 2-5: New Source Review of Toxic Air Contaminants.

Exposed Individual (EI): This is a person - a resident, student, or worker who is not an employee of or a contractor for the affected facility - who is exposed to toxic air

contaminant emissions from a facility. This terminology is used in discussing the results of a a health risk assessment. Health risk assessments use air dispersion models to determine how toxic air contaminants emitted from a facility will move into the surrounding community. The air dispersion model results in concentrations of air pollutants at many locations around the facility. An exposed individual is someone who lives, works, or attends school at one of these locations of toxic air contaminant concentrations.

Maximally Exposed Individual (MEI): This is the person who is located at the highest point of exposure toxic emissions from a source or facility.

Priority Community: A priority community where the levels of toxic compounds are higher than other areas and where people may be particularly vulnerable and may bear disproportionately higher adverse health effects. This can include Community Air Risk Evaluation communities. The Air District is interested in ensuring these communities benefit most from this Rule.

Risk Action Level: This definition sets the cancer and non-cancer risk action levels as shown in the following table.

Table 12
Proposed Rule 11-18 Risk Action Levels

	Tier I Before January 1, 2020	Tier II Beginning January 1, 2020
Cancer Health Risk:	25 per million	10 per million
Chronic hazard index:	2.5	1.0
Acute hazard index:	2.5	1.0

Facilities with health impact in excess of one or more of the initial tier risk actions levels must reduce the facility risk below all of the final Tier II values within the time prescribed in the Risk Reduction Plan. The Tier II health risk levels were chosen because they reflect the most health protective levels achievable.

Risk Reduction Plan: This is a detailed plan developed by the affected facility that identifies how the facility will reduce its risk below the risk action levels or demonstrate compliance with TBARCT through the implementation of various risk reduction measures such as the installation of control technology or changes in operation. The plan includes a schedule for implementation. Once a plan is approved by the Air District, all of its elements (control measures, schedules, etc.) become enforceable.

Significant Risk Threshold: This definition sets the cancer and non-cancer risk action levels for individual sources of toxic emissions as follows:

Cancer: 1.0 per million (1.0/M)
Chronic hazard index: 0.2
Acute hazard index: 0.2.

Source: This definition clarifies what is a source, which can include a grouping of like or related sources, such as a grouping of diesel engines at a facility or sources whose exhaust may be manifold and, together, mitigated by a single control unit.

Toxic Risk Facility: This definition indicates what types of facilities would be affected by this proposed rule – any facility that has the potential to emit or release TACs.

Unreasonable Economic Burden: This definition provides an indication of the criteria Air District staff would consider when evaluating the cost of compliance and technical feasibility in determining whether to provide an extension beyond five years for reducing a facility's health risk below the risk action level as discussed in Subsection 404.6.

C. Major Provisions:

Section 11-18-301 – Compliance with Risk Reduction Plan: Once a facility is notified by the Air District that the facility poses a health risk greater than the risk action level the facility must:

1. Submit to the Air District for approval, a risk reduction plan that details how the facility would reduce its health risk below the risk action level in the specified timeframe, or if the facility risk cannot reduce its risk below the risk action level, demonstrate to the Air District that all significant sources of risk are controlled with TBARCT;
2. Obtain and maintain approval of the risk reduction plan; and
3. Implement an Air District-approved risk reduction plan.

Once a Plan is approved by the Air District it becomes fully enforceable and the facility is required to implement its elements and maintain approval. Reasons for the Air District to withdraw approval include non-compliance with Plan elements or the Plan's inability to adequately reduce risk levels.

Section 11-18-401 – Health Risk Assessment Information Requirement: The Air District may need additional information from the facility to conduct an HRA. If so, the facility would have up to 60 days to provide that information. That Air District would allow additional time to provide the information if necessary.

Section 11-18-402 – Early Application of Risk Action Levels: This provision allows the Air District to take expeditious action in areas that are highly impacted by toxic emissions, such as priority communities and CARE Areas to reduce health risks from stationary sources. Under the provision, the Air District can conduct an HRA for or apply the risk action levels to any toxic risk facility located in a Priority Community to ensure the facility reduces its risk as quickly as possible in these areas.

Section 11-18-403 – Notification of HRA Results and Submission of Plan: Within 180 days of the Air District notifying a facility that the results of a final HRA indicates that the facility poses a health risk in excess of any of the risk actions levels (until January 2020: 25 per million or a hazard index of 2.5; starting January 2020: 10 per million or a hazard

index greater than 1), the facility must submit a draft risk reduction plan to the Air District for approval. The requirements for the plan are found in Section 11-18-404.

Section 11-18-404 – Risk Reduction Plan Content Requirement: The Risk Reduction Plan must contain certain elements, such as:

- A characterization of each source of toxic emissions, including information from the toxic emissions inventory and the health risk assessment, and identification of the emissions points that contribute to the risk;
- An evaluation of risk reduction measures to be implemented, including a description of the measure, the anticipated toxic emissions reductions, and anticipated risk reductions associated with the measure;
- A schedule for implementing the risk reduction measures as expeditiously as feasible, including dates for filing permit applications, installation dates, completion of process changes, demonstrating the effectiveness of the risk reduction measures;
- An estimate of the remaining risk following the implementation of the risk reduction measures; and
- If the Plan cannot reduce the risk below the action level, a demonstration that either all sources of risk do not pose a health risk in excess of the significant risk level or that they are controlled with TBARCT; a demonstration of the technical infeasibility or unreasonable economic burden associated with reducing the facility risk below the risk action level or the installation of TBARCT within five years (if applicable).

Section 11-18-405 – Review and Approval of Risk Reduction Plans: The section details the process the Air District would use to review and approve the submitted Risk Reduction Plans, including:

- Conducting a completeness review to ensure the Plan contained all the elements required by the rule;
- Posting the Plans (without confidential information) for a 45-day public comment period;
- Approval or disapproval of the plans. If a plan is disapproved, the Air District would identify its deficiencies and the facility would have 45 days to revise and resubmit the plan. If the deficiencies are not corrected, the Air District would disapprove the Plan.

Section 11-18-406 – Updated Risk Reduction Plan: The section allows the Air District to require facilities to update the facility Risk Reduction Plan if information becomes available following approval of the Plan regarding the facility health risk or emission / risk reduction technology that may be used to significantly reduce the health risk to exposed people.

Section 11-18-501 – Progress Reports: The Rule requires the facility to report annually to the Air District progress on the emissions reductions achieved by the Plan until it is fully implemented. This allows the Air District to monitor and analyze the facility's risk reduction progress and make changes if the progress is determined to be insufficient in

meeting the risk reduction goals. If it is determined that a Plan is not meeting its intended goals or if the implementation timeline proves infeasible, the facility could petition the Air District to revise the Plan to ensure that the risk reduction goals are achieved.

D. Proposed Rule Implementation

The proposed Toxic Risk Reduction Rule would use the annual toxic emissions inventories reported to the Air District by sources that emit toxic compounds. From the toxic emissions inventory data, the Air District would calculate a site-specific prioritization score (PS). 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) Any other factors that the Air District deems to be important.

The Air District will consult with facility operators prior to finalizing a prioritization score to ensure that the data used by the Air District is accurate and up-to-date.

The Air District would conduct[3] HRAs for all facilities with a cancer PS of ten or greater or a non-cancer PS of one or greater. The Air District would conduct HRAs for facilities 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. The Air District would create a model that incorporated the latest health risk values and protocols. Once the model is created, the Air District would validate the model using site specific parameters, including but not limited to meteorological data, receptor type and location, toxic emission rates and stack location and heights, and topography. The facility owner or operator will be consulted in this validation step. Once the model is validated, the Air District would conduct HRAs to obtain preliminary results that would be shared with the interested public for review and comment before finalization.

Using the results of the HRAs, the Air District would determine whether a facility would be affected by Rule 11-18. The rule would affect facilities with health risk impact that exceeded any of the risk action level thresholds – 25 per million (25/M) or a chronic or acute hazard index of 2.5 until January 1, 2020, and ten per million (10/M) cancer risk or a chronic or acute hazard index of 1.0 beginning January 1, 2020. The Air District would notify facilities of their health risk score. Facilities that pose a health risk that exceeds the risk action level threshold would be required to reduce that risk below the threshold or demonstrate that all significant sources of toxic emissions are controlled by TBARCT through the implementation of a Risk Reduction Plan approved by the Air District within

[3] 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.

five years of approval of the plan or demonstrate that all significant sources of toxic emissions are controlled by TBARCT.

The rule would be implemented in four phases based on either a facility's PS or the toxic emissions source type as illustrated in the following table.

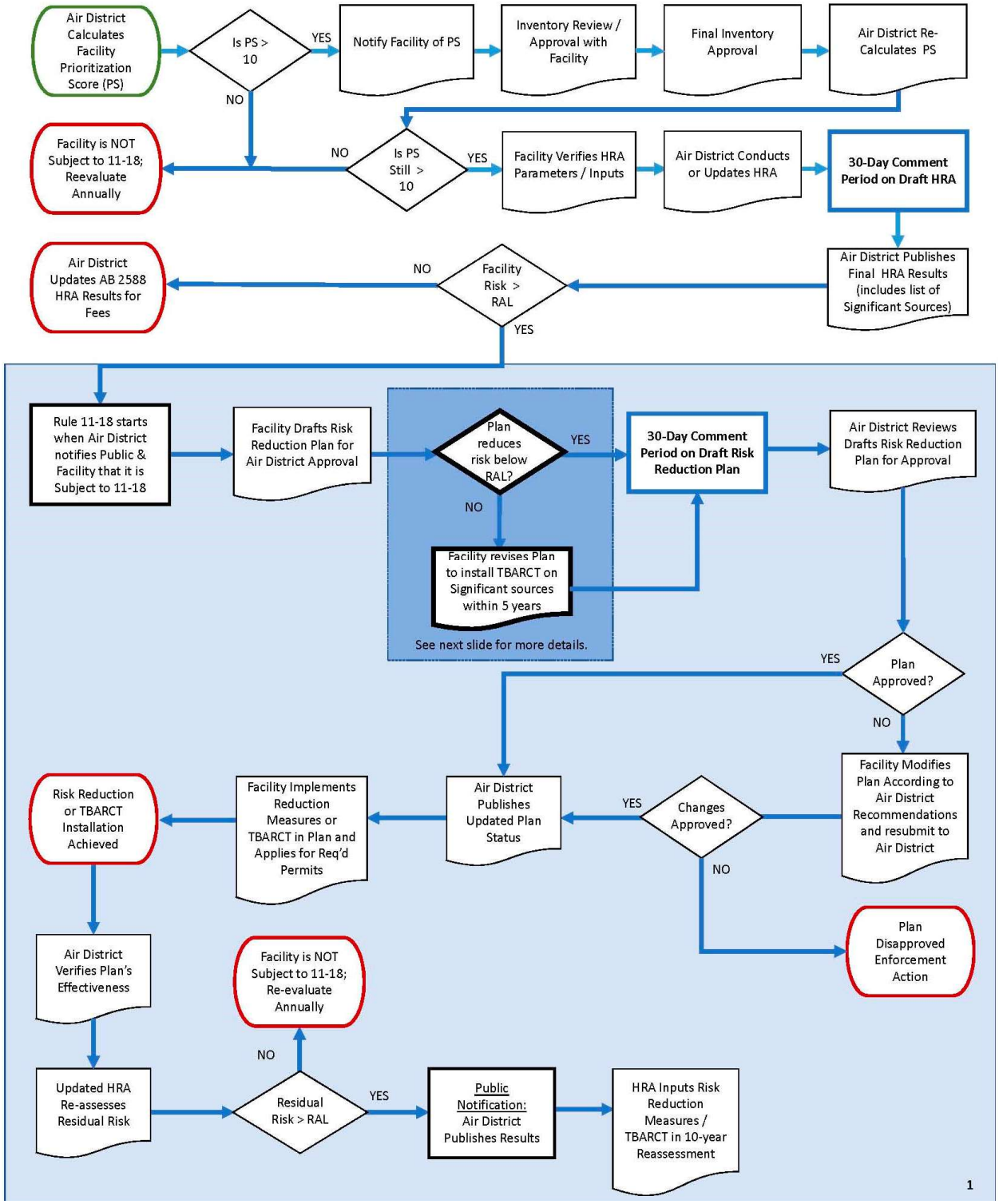
Table 13
Implementation Phases

Phase	Criterion	Number of Affected Facilities*	HRAs	Risk Reduction Plans	Plan Implemented
1	PS > 250 Cancer OR PS > 2.5 Non-Cancer	58	2017 – 2018	2018 – 2019	2019 – 2022
2	PS > 10 Cancer OR PS > 1.0 Non-Cancer	334	2019 – 2023	2021 – 2024	2022 – 2027

* These are preliminary estimates based on initial screenings and are subject to revision.

A flowchart summarizing the process of developing the health risk assessments and implementation of proposed Rule 11-18 is shown in Figure 13.

Figure 13
Rule 11-18 Process Flowchart



E. Determining Best Available Retrofit Control Technology for Toxics (TBARCT)

In making any case-by-case TBARCT determination, Air District staff would ensure any technology or measure met the definition in the proposed Rule:

11-18-204 **Best Available Retrofit Control Technology for Toxics, or TBARCT:** For any existing source of toxic air contaminants, except cargo carriers, the most stringent of the following retrofit emission controls, provided that under no circumstances shall the controls be less stringent than the emission control required by any applicable provision of federal, State or District laws, rules, regulations or requirements:

204.1 The most effective retrofit emission control device or technique that has been successfully utilized for the type of equipment comprising such a source; or

204.2 The most stringent emission limitation achieved by a retrofit emission control device or technique for the type of equipment comprising such a source; or

204.3 Any retrofit control device or technique or any emission limitation that the APCO has determined to be technologically feasible for the type of equipment comprising such a source, while taking into consideration the cost of achieving emission reductions, any non-air quality health and environmental impacts, and energy requirements; or

204.4 The most stringent emission control for a source type or category specified as MACT by U.S. EPA, or specified in an ATCM by CARB.

In general, the two major criteria that apply to both best available control technology (BACT) and best available control technology for toxics (TBACT) would also apply to TBARCT determinations, 1) technologically feasible, and 2) achieved in practice. The first category is a more stringent level of control and is technology forcing; it generally refers to advanced control devices or techniques. The second requires that control equipment or technology must be commercially available and demonstrated to be effective and reliable on a full-scale unit. Air District staff in reviewing TBARCT performance information must make the engineering determination that the control would be reasonably expected to perform for a sufficient duration to make the option viable as technologically feasible. Often, considered control techniques are technology transfers from successful application on similar types of equipment or emissions streams. In this case, the control has been “achieved in practice” on a similar source or equipment category, but has not been used for the particular source or equipment in question. In this case, a feasibility and cost impact analyses would then be necessary.

In most cases, the application of TBARCT on all significant sources of toxic emissions will result in residual health risks that are within acceptable levels. In some cases, however, the residual risk may exceed the risk action levels. The need for risk reduction measures is generally related to a source's proximity to residential receptors or other areas where the public exposure may occur. The need for, and extent of, additional risk reduction measures is determined on a case-by-case basis through site-specific health risk assessment. While TBARCT is driven by risk reduction and there are no specific cost effectiveness triggers, the economic impact of achieving the toxic emission

reductions must be considered. Similarly, the criteria of commercial availability, reliability, and demonstrated full scale operation and performance apply to TBARCT and TBACT as well as BACT. The Air District would consider sources such as the EPA's MACT Database and CARB's Air Toxic Control Measures (ATCMS) guidance documents.

There is a large variety of control technologies and measures that could be used to reduce the health risk posed by a facility. Table 14 provides a general listing of these control measures that could be considered by the Air District in determining TBARCT for various sources of toxic emissions. This is not intended to be an exhaustive list.

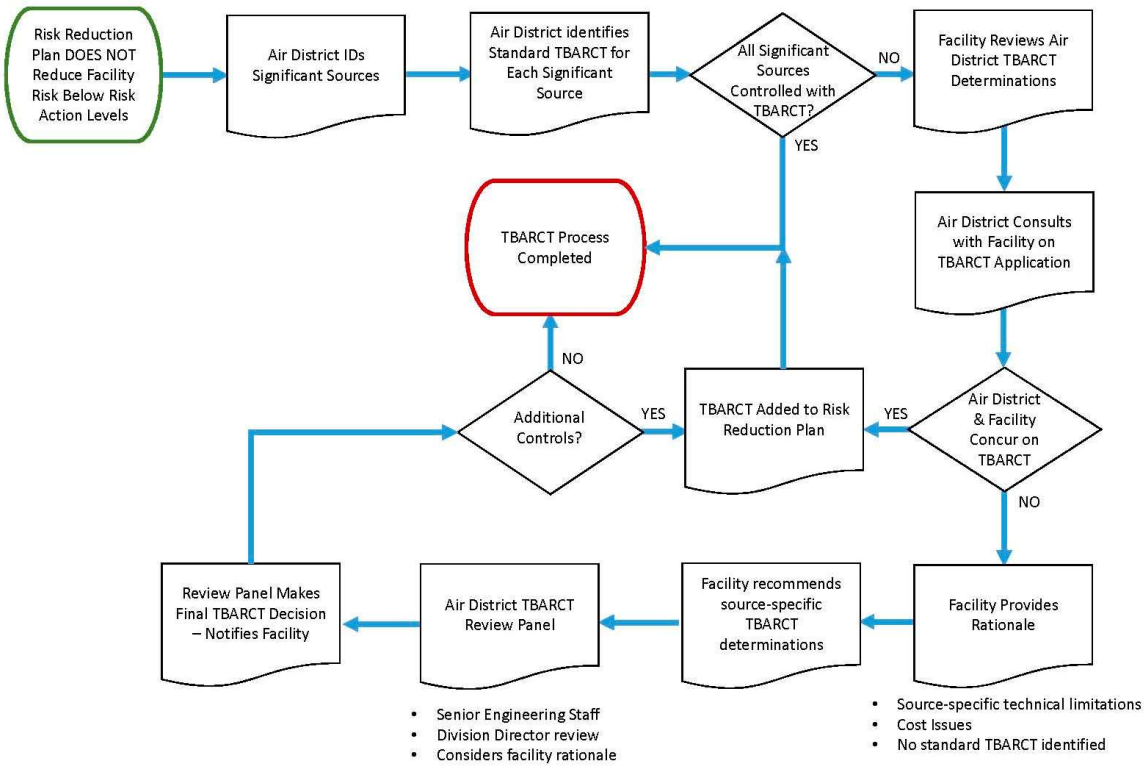
Table 14
Example Risk Reduction Measures and Target Substances

Risk Reduction Measure	Substance Group	Control Efficiency
Enclosures	Particulates	Varied
Capture and Collection Systems	VOCs and Particulates	Varied
Diesel Particulate Filter	Particulates	85%
Baghouse	Particulates	99-99.9%
HEPA filter and pre-filter	Particulates	99.9-99.99%
Carbon Adsorption	VOCs	90-99%
Thermal and Catalytic Oxidizers	VOCs and Inorganic Gases	98-99.9%
Reduced Throughput or Operating Time	VOCS and Particulates	Varied
Alternative Technologies	Particulates	Up to 100%
Product Substitution	VOCs	Up to 100%
Relocate Source or Stack	All TAC Types	Not Applicable
Stack Modifications	All TAC Types	Not Applicable

In reviewing and approving risk reduction measures contained in required Risk Reduction Plans, the Air District would consider on a case-by-case basis the economic impacts of any recommendation the Air District makes for the plans. This consideration would include the overall impacts on the profitability of the facility and the potential for job loss because of implementation of the plan. Figure 14 provides a flowchart that summarized the TBARCT process.

Figure 14

Air District TBARCT Process Flowchart



F. Informing the Public

The Air District will use several methods to keep the public informed about risks from toxic facilities in their neighborhoods and on how and when those risks are being reduced. These methods include email notices, social media outreach, posting on the Air District website, opt in mailing via the U.S. Postal Service, and community meetings. The Air District will develop and maintain a list of emails of individuals and organizations who have indicated they are interested in being notified of events and updates regarding facilities that pose a toxic risk. Notices received via email would direct the recipient on how to access updated information on the Air District website. Similar notices would be sent via social media sources such as Facebook or Twitter. Individuals who prefer to receive notices via letters sent through the U.S. Postal Service would have the opportunity to sign up for a mailing list. The Air District would provide all public information on toxic risk facilities on the Air District website, including facility names and locations; draft health risk assessments; facility health risks levels; draft risk reduction plans; risk reduction plan approvals and final plans; plan updates, such as risk reduction measure implementation and potential changes to plans; and completion of plan implementation and final facility health risk. The Air District is also planning community meetings to update people on the status of Rule 11-18 implementation in their area.

IV. RISK AND RISK REDUCTION

A. Benefits of Setting the Risk Action Level at 10 per Million

Proposed Rule 11-18 has the potential to significantly reduce the toxic risk posed by affected facilities. An Air District staff review of the toxic emissions from the potentially affected facilities indicates that these risk levels range from approximately 56/M to 10/M at the maximally exposed individual (MEI) and that approximately 400 facilities would be impacted under the proposed rule. This rule would require that these facilities either reduce the facility health impacts below the risk action level, or install the best available retrofit control technology for toxics on all significant sources of risk. This would have the result of reducing health risk from the affected facilities to lowest levels achievable. Preliminary analyses indicate that the 400 potentially affected facilities may pose risks of 10/M or more that impact tens of thousands of Bay Area residents. This rule would require that those risk levels be reduced to the lowest levels achievable.

B. Ten per Million v. 25 per Million – What's the Difference?

Stakeholders have suggested the risk action level be set at 25/M instead of 10/M. Staff does not believe that 25/M would be as health protective as 10/M, especially because 10/M is achievable and has been and continues to be demonstrated in practice in at least ten air pollution control districts, including Sacramento Metropolitan Air Quality Management District, Santa Barbara County and San Luis Obispo County Air Pollution Control Districts. Further, Air District staff estimated the numbers of residents that would be included under each risk action level scenario and determined that the 10/M action level would serve to reduce risk to about 10 to 15 times as many people as the 25/M action level.

V. ECONOMIC IMPACTS

A. Introduction

This section discusses the estimated costs associated with the proposed rule. The purpose of Rule 11-18 is to reduce the health risk of stationary sources to the lowest levels achievable. This involves several areas of potential costs:

- Risk Reduction Plan development costs;
- Risk Reduction Plan implementation and TBARCT costs;
- Air District Impacts:
    - Updating Emissions Inventories and Prioritization Scores for facilities,
    - One-time cost of conducting the HRAs, and
    - Review of Risk Reduction Plans.

The total costs of the rule are uncertain, because actions taken by affected facilities will depend on the HRA results and on what the facilities decide to do in their Risk Reduction Plans. Because of the lack of certainty in the number of facilities that may be affected and their choices for reducing risk, this cost analysis performed for this rule looks at the general cost ranges in each associated industry category. The Air District

believes that the cost range analysis is conservative, in that it tends to overestimate the overall economic impacts of the proposed rule. The anticipated costs and their impacts are discussed in greater detail:

B. Development of a Risk Reduction Plan

The cost of developing a Risk Reduction Plan (Plan) is dependent on the number of processes and operations that an affected facility must address. For each of the applicable subject areas, a facility must conduct an evaluation to determine whether the practices and equipment currently in place are adequate to ensure reduction. Staff estimates that an evaluation of each affected toxic emission source would require two to four man-hours. This estimation includes:

- Identifying which sources and operations would be best suited for risk reduction measures;
- Determining the risk reduction measures and technologies that could be applied to these sources and operations;
- Analyzing those risk reduction measures and technologies to determine their efficacy in reducing emissions and risks; and
- Identifying and incorporating best risk reduction measures and technologies for those sources and operations that would be best suited for risk reduction.

The number of potentially affected toxic emission sources range between one and 525 for each potentially affected facility and the evaluation of each toxic source would require up to three hours. Using a value of $100 per hour for the cost (wages and benefits) of an environmental engineer,[xxvii] the cost of developing a risk reduction plan would range between $500 and $158,000 if done by facility personnel. These values could double if the risk reduction plan development were contract out to a professional engineering service.

C. Risk Reduction Plan Implementation and TBARCT Costs

To illustrate the potential cost impacts of proposed Rule 11-18 on potentially affected facility, the Air District staff has identified a range of compliance measures for potential impacted projects. These include the following:

- Limiting Throughput or Operating Hours
- Baghouses
- Carbon Absorption
- Oxidation Catalysts
- Diesel Particular Filters
- New Diesel Internal Combustion Engines
- Thermal Oxidizers
- Wet Gas Scrubbers
- Electrostatic Precipitators
- Improved Equipment/Enhanced Monitoring/Other Process Improvements
- Increasing Stack Height

Given the large number of locations that may be impacted and limited knowledge regarding the actual compliance measures and associated costs that may be chosen at particular sites, it was not feasible to generate precise estimates of the costs for each potentially affected facility. Instead, staff has provided general estimates of the compliance measures and associated costs by major facility type/activity presented in Table 15 below. Low and high costs estimates are provided for applicable measures, to show the range of potential cost impacts.

As indicated in Table 15, the Air District believes that not all facilities will perform substantial equipment upgrades or expenditures to achieve the risk reductions required by the proposed Rule. Instead, staff expects that many sites will meet the Rule risk reduction requirements through operating time restrictions, stack height increase or other no- or low-cost measures.

Table 15
Air Pollution Control Equipment Expected to Be Installed under Rule 11-18

Industrial Sector	Number of Facilities	Diesel Particulate Filter	New Diesel ICEs	Baghouse with HEPA Filters	Carbon Adsorption	Oxidation Catalyst	Thermal Oxidizer	Wet Gas Scrubber	Electrostatic Precipitators
Annualized Control Costs per Source:		$14k – 168k	$500k – $1 MM	$70k – $2.1 MM	$42k – 480k	$120k – $230k	$32k – $630k	$1MM – $3MM	$500k – $5.6MM
Cement Mfr.	1			1					1
Chemical Plants	4				2			4	
Chrome Plating	1			1					
Coating Ops	1								
Concrete Batch Ops	1								
Crematoria	12			5					
Data Centers	3	10	10						
Emergency Engines	37	18	20						
Engines & Other Sources	50	42	42						
Hospitals	40	10	4						
Landfills	27					4	4		
Loading / Tank Ops	1				1				
Metal Melting	5			1	2				1
Metal Recycling	1								
Misc. Mfr.	15	6	8						
Power Plants	18			2					
Refineries	5	4		2				3	3
Research	1		1						
Sewage Treatment	31				1	3	4	3	
Other	130	10	15			3	2		
Total	**384**	**100**	**100**	**12**	**6**	**10**	**10**	**10**	**5**

1. Impacts on Affected Industries

Given the large number of potentially affected facilities, the broad range of industries, the wide variability in costs for various risk reduction measures, and the lack of information available on the potential choices facility operators may make to reduce the facility risk, the analysis here does not “drill down” to the level of individual facilities. Instead, it provides a measure of the number of facilities that might be *potentially* impacted, with the understanding that many of these potentially impacted facilities would not necessarily need to engage in the expenditures as shown above in Table 15.

Air District staff estimated the annualized costs for various risk reduction measures, as shown above in Table 15, in the form of a minimum and maximum cost for each measure. This table also provides an estimate by major industry sector of the number of point sources requiring the listed risk reduction measures. These values were used to generate low, median, and high cost estimates by major industry sector, which were then applied to each private-sector facility listed in the database.

Finally, the potential impacts of these costs on rate of return as estimated per publicly available data to determine whether the cost impacts met the criterion of a greater than 10 percent impact on the rate of return.

2. Affected Industries and Regional Impacts

Table 16 below shows the proportion of facilities in each major industrial sector with potential significant impacts due to an over 10 percent impact on the estimated rate of return. The proportion is calculated for low cost, median cost, and high cost scenarios as discussed above.

There is considerable variability by sector and cost level in the proportion of potentially impacted facilities; for example, cement manufacturing and chemical plants show no significantly impacted facilities for the low-cost scenario, but all facilities could be significantly impacted under the median and high cost scenarios. Other sectors, such as chrome plating, crematories, and power plants show a high proportion of potentially impacted facilities even under the low-cost scenario.

For a particular business establishment, though, these factors may vary considerably from the assumptions here. In particular, to the extent that mitigation costs are fixed, larger firms would be better able to absorb these costs. It is also likely that larger facilities would face higher costs due to more point sources requiring abatement.

Table 16
Percent of Potentially Impacted Facilities by Major Industrial Sector

	Low Cost		Median Cost		High Cost	
Industry Sector	Total Facilities	Percent Impacted	Total Facilities	Percent Impacted	Total Facilities	Percent Impacted
Cement Manufacturing	1	0%	1	100%	1	100%
Chemical Plants	4	0%	4	100%	4	100%
Chrome Plating	1	100%	na	na	na	na
Coating	1	0%	1	0%	1	0%
Concrete Batch Operations	1	0%	1	0%	1	0%
Crematories	10	90%	7	100%	7	100%
Data Centers	1	0%	na	na	na	na
Emergency Engines	12	33%	na	na	na	na
Engines and Other Sources	26	19%	21	81%	21	95%
Hospital / Medical	26	0%	22	45%	22	91%
Landfills	14	50%	14	100%	14	100%
Loading/Tanks	1	0%	1	100%	1	100%
Metal Melting	5	20%	3	67%	3	67%
Metal Recycling	2	0%	na	na	na	na
Miscellaneous Manufacturing	16	0%	15	80%	15	93%
Power Plants	9	89%	8	100%	8	100%
Refineries	3	0%	3	0%	3	67%
Research	1	100%	na	na	na	na
Other	53	28%	44	61%	44	84%
Total	**187**	**27%**	**145**	**71%**	**145**	**90%**

Notes:
The percent impact represents the percent of total facilities that might be impacted if they had to install control equipment at the cost level estimated. Thus the percent impacted provides an upper threshold indicator of potential impacts. Not all such facilities will need to implement these control measures, as they might be able to undertake no- or low-cost alternatives such as increased stack height or reduced operating hours. The actual number and proportion of impacted facilities thus might be less than indicated here. See text for explanation of cost definitions. A facility is considered impacted if the costs are greater than 10 percent of estimated profit. Excludes public sector facilities. See text for explanation. Includes only facilities for which data on employment, total revenues, and profit margins were available.

Sources: BAAQMD; Dun & Bradstreet; Internal Revenue Service; U.S. Census Bureau Economic Census; BAE, 2017.

It is important to note that given the available data, it is not possible to predict precisely which of the potentially affected facilities will actually be significantly impacted, since some facilities will be able to forgo the improvements and meet the requirements of the Rule through no- or low-cost solutions. The above table should be used as an indicator of the highest potential impacts which represent the worst cast scenarios; for example, given the estimates here, no more than 27 percent of the privately-operated facilities should have their profits significantly impacted by Rule 11-18; the proportion goes up substantially under the median and high cost scenarios. The Air District strongly believes that actual proportion impacted under each scenario will likely be lower, especially to the extent smaller facilities with lower revenues are able to implement no- or low-cost solutions and the flexibility in compliance (the lead time for conducting the HRAs and the Air District notifying each facility whether Rule 11-18 applies, risk reduction plan development, risk reduction measures chosen, timeline for implementation, and conditions for the implementation of TBARCT) that is allowed under Rule 11-18.

D. Air District Impacts

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, the Air District would assess fees for facilities for which the Air District would conduct HRAs pursuant to proposed Rule 11-18. The risk screening fees in Regulation 3: Fees, Schedules B, C, D, E, F, H, I or K have recently been updated (effective July 1, 2016) to address Facility-Wide Health Risk Assessment required under Rule 11-18.[iv] Section 3-341: The Fee for Risk Reduction Plan would cover the cost of Air District staff review of the risk reduction plans required by proposed Rule 11-18.[v] The Air District does not anticipate a need to make any additional adjustments to risk screening fees at this time.

VI. REGULATORY IMPACTS

Section 40727.2 of the Health and Safety Code requires an air district, in adopting, amending, or repealing an air district regulation, to identify existing federal and District air pollution control requirements for the equipment or source type affected by the proposed change in air district rules. The air district must then note any differences between these existing requirements and the requirements imposed by the proposed change. Table 17 provides the Air District's regulatory impacts analysis of proposed Rule 11-18.

[iv] **3-342** **Fee for Facility-Wide Health Risk Assessment:** Any person required to submit a health risk assessment (HRA) pursuant to Regulation 11, Rule 18 shall pay a risk assessment fee for each source pursuant to Regulation 3-329 and Schedules B, C, D, E, F, H, I or K. The maximum fee required for any single HRA of a facility conducted pursuant to Regulation 11, Rule 18 shall not exceed a total of $150,000.

[v] **3-341** **Fee for Risk Reduction Plan:** Any person required to submit a Risk Reduction Plan in accordance with Regulation 11, Rule 18 shall pay the applicable fees set forth below:

- 341.1 $1,500 for facilities with one source subject to risk reduction pursuant to Regulation 11, Rule 18, including gasoline dispensing facilities;
- 341.2 $3,000 for facilities with 2 to 5 sources subject to risk reduction pursuant to Regulation 11, Rule 18;
- 341.3 $6,000 for facilities with 6 to 10 sources subject to risk reduction pursuant to Regulation 11, Rule 18;
- 341.4 $12,000 for facilities with 11 to 15 sources subject to risk reduction pursuant to Regulation 11, Rule 18;
- 341.5 $24,000 for facilities with 16 to 20 sources subject to risk reduction pursuant to Regulation 11, Rule 18;
- 341.6 $32,000 for facilities with more than 20 sources subject to risk reduction pursuant to Regulation 11, Rule 18.

Table 17
Regulatory Impacts Analysis Pursuant to H&SC Section 40727.2

Section 11-18-	Description	Comparable State / Air District Rule or Program	Discussion
101	Description: The purpose of the proposed rule is to ensure facilities the emit TACs do not pose an unacceptable health risk to nearby people.	AB 2588: The goals of the Air Toxics "Hot Spots" Act (AB 2855) are to collect emission data, to identify facilities having localized impacts, to ascertain health risks, to notify nearby residents of significant risks, and to reduce those significant risks to acceptable levels.	The stated goals of both Rule 11-18 and the AB 2588 programs are similar; however, the levels of acceptable risks differ. Under Rule 11-18, the risk action level for risk reduction would be set at 10/M for cancer risk and 1.0 for acute and chronic hazard indices (HI), whereas under the Air District AB 2588 program, the risk action level was set at 100/M for cancer risk and 10 for acute and chronic hazard indices.
102	Applicability: The rule would apply to facilities that report their toxic emissions to the Air District as required by the AB 2588, H&SC Section 44340 et seq.	AB 2588: This is the same as the Air District AB 2588 Program.	No actionable requirements
103	Stationary Diesel Engines Exemption: Diesel engines which have a health screening prioritization score less than 250.	N/A	While the AB 2588 program has no similar exemption, at its current action levels, these facilities would not be included under its risk reduction program (SB 1731). Further, the ARB intends to address back-up diesel generators in collaboration with CAPCOA: "develop Industrywide Guidelines for sources that support essential goods and essential public services where their emissions may result in cancer risk estimates above District thresholds (e.g., gasoline dispensing facilities, emergency standby diesel engines)."[28]
104	Retail Gasoline Dispensing Facilities Exemption: All retail gasoline stations would be exempted from the requirements of the Rule.	N/A	The rule would not apply to retail gas stations because these facilities already are controlled with technology that would be considered TBARCT and they will also be addressed by industrywide guidelines that would be developed by the ARB and CAPCOA.
201-220	Definitions	N/A	No actionable requirements
301	Compliance with Risk Reduction Plan: • Obtain Air District approval of a Risk Reduction Plan, and	SB 1731 – H&SC §44392: Implementation of plan. This is essentially the same as Section 301 with the exception that Rule 11-18 allows the	Rule 11-18 establishes risk action levels that are significantly more stringent that those of the Air District AB 2588. The risk level at which triggers the plan requirements differ – Under Rule 11-18, the risk action level for risk reduction would be set at 10/M for cancer risk and 10 for hazard indices, whereas under

Section 11-18-	Description	Comparable State / Air District Rule or Program	Discussion
	• Implement the Plan to ensure either: ○ Reduce facility-wide risk below 10/M or Control significant sources with TBARCT	installation of TBARCT if a facility cannot reduce its risk below the risk action levels.	AB 2588, the risk action level is set at 100/M and 1.0. The affected facility would have the option of reducing its risk below the risk action level for risk reduction or installing TBARCT on all significant sources (1.0/M or 0.2 HI) of risk. Further, the rule require incorporation of the OEHHA's new health risk values and protocols into the HRA process that would be used to evaluate all toxic sources of risk, which would not be required under the current AB 2588 program.
401	Health Risk Assessment Information Requirement: Affected facilities must provide requested information necessary to complete an HRA within 60 days or Air District request.	N/A	The AB 2588 process lacks a similar requirement because under AB 2588, the affected facilities are responsible for conducting the HRAs, whereas, under Rule 11-18, the Air District is responsible for conducting the HRAs for all affected facilities and therefore, may need additional information from the affected facilities to complete the HRAs.
402	Early Application of Risk Action Levels: This provision would allow the Air District to expedite action on risk reduction for facilities located in highly impacted areas such as Priority Communities.	N/A	The AB 2588 Hot Spot Program has no equivalent provision and treats all facilities equally despite the risk posed or the background risk level in which they operate.
403	Notification of HRA Results and Submission of Plan: The Air District would notify facilities if they are subject to Rule 11-18.	N/A	The AB 2588 Hot Spots Program has no equivalent provisions because the affected facilities are responsible for conducting their HRAs and notifying the public, if applicable.
404	Risk Reduction Plan Content Requirement: Any facility required to develop and have approved a risk reduction plan must implement the approved plan elements as specified in the plan. Including basic identifying information on the facility and its processes and emissions sources and risk reduction measures, including emissions and risk reduction	SB 1731 – H&SC §§44391(a) & 44392: Implementation of Risk Reduction Plan: The facility must implement measures set forth in the plan as specified by H&SC §44391(a).	These requirements are essentially equivalent, except for the risk level at which they are triggered: 10/M or 1.0 HI for Rule 11-18 and 100/M or 10 HI for AB 2588 / SB 1731.

Section 11-18-	Description	Comparable State / Air District Rule or Program	Discussion
	potentials, implementation schedule, TBARCT implementation, residual risk.		
405	Risk Reduction Plan Submission Requirements: - Plans must be submitted within six month of notification from the Air District, - Plan implementation within five years of plan submission, - Plan implementation period may be extended up to an additional five years because of technical or economic issues, or Plan implementation period may be reduced if technically or economically feasible.	SB 1731: H&SC §44391 (a)-(c) & (f), (g): - Plan submission: six months, Plan implementation: within five yrs. - Plan implementation period may be reduced, - Plan implementation period may be extended up to an additional five years, - Plan implementation period may be reduced if technically and economically feasible.	Equivalent requirements.
406	Update of Risk Reduction Plans: The rule would require updates to the risk reduction plans if information becomes available that indicates health risk at the affected is greater or if technologies become available that could be used to further reduce the facility risk.	N/A	AB 2588 / SB 1731 contain no update requirements.
501	Progress Report: Affected facilities must report annually to the Air District progress made on risk reductions achieved by the RRP until the plan is fully implemented or all significant sources of emission are controlled with TBARCT.	SB 1731: H&SC §44391 (h): Progress on the emission reductions achieved by the plan shall be reported to the district in emissions inventory updates. Emissions inventory updates must be prepared as required by the audit and plan.	The provision in Rule 11-18 is more specific about the reporting schedule, whereas the one under SB 1731 relies on a schedule outlined in the approved plan, which may be more or less stringent than that of Rule 11-18.

VII. ENVIRONMENTAL IMPACTS

The California Environmental Quality Act (CEQA), Public Resources Code Section 21000 et seq., requires that the potential environmental impacts of proposed projects be evaluated and that feasible methods to reduce or avoid identified significant adverse environmental impacts of these projects be identified.

A. Notice of Preparation / Initial Study

The Air District prepared a Notice of Preparation and an Initial Study (NOP/IS) for the Draft EIR for Rule 11-18, the Toxics Risk Reduction Rule, and Rule 12-16, the Refinery Caps Rule (included as Appendix A of the draft EIR). The NOP/IS was distributed to responsible agencies and interested parties for a 30-day review on October 16, 2016. A notice of the availability of this document was distributed to other agencies and organizations and was placed on the Air District's web site, and was also published in newspapers throughout the area of the Air District's jurisdiction. Six public comment letters were submitted on the NOP/IS to the Air District and are included in Appendix A of the draft EIR.

The NOP/IS initially identified the following environmental resources as being potentially significant, requiring further analysis in the draft EIR:

- air quality,
- greenhouse gases,
- hazards and hazardous materials,
- hydrology and water quality, and
- utilities and service systems.

Public comments received on the NOP/IS indicated that wet gas scrubbers could be used to control TAC emissions from some sources, such as large refinery equipment. Thus, water demand impacts were also evaluated in the draft EIR.

The following environmental resources were considered to be less than significant in the NOP/IS:

- aesthetics,
- agriculture and forestry resources,
- biological resources,
- cultural resources,
- geology/soils,
- land use/planning,
- mineral resources,
- noise,
- population/housing,
- public services,
- recreation, and
- transportation/traffic.

B. Draft Environmental Impact Report and Conclusion

Pursuant to CEQA, the Air District has prepared a draft Environmental Impact Report (EIR) under the requirements of CEQA Guidelines §15187 to address the potential environmental impacts associated with the proposed Rule 11-18. Prior to making a decision on the adoption of the proposed Toxic Risk Reduction Rule, the Air District Governing Board of Directors must review and certify the EIR as providing adequate information on the potential adverse environmental impacts of implementing the proposed new Rule 11-18. The draft EIR only addresses the potential adverse environmental impacts associated with proposed Rule 11-18 and does not include any discussion of the potential impacts associated with Rule 12-16. The DEIR concludes that there could be potential adverse environmental impacts in the areas of air quality, greenhouse gas emissions, hazards and hazardous materials, and hydrology and water quality. Table 18 summarizes these impacts, mitigation measures, and the residual impacts.

Table 18
Summary of Environmental Impacts, Mitigation Measures and Residual Impacts

Impact	Mitigation Measures	Residual Impacts
Air Quality		
The construction activities that may be required to implement Rule 11-18 may result in ROG, NOx, PM10, and PM2.5 emissions that would exceed the significance thresholds resulting in potentially significant air quality impacts.	Develop a Construction Emission Management Plan; to minimize emissions from vehicles and trucks; limit truck idling; maintain construction equipment to manufacturer's recommendations; identify construction areas served by electricity; Use cranes rate 200 hp or greater with Tier 4 engines or equivalent (if available); and use off-road equipment rated 50 to 200 hp with Tier 4 or equivalent engines (if available).	ROG, NOx, PM10, and PM2.5 emissions during construction activities are potentially significant under Rule 11-18 following mitigation, but would cease when construction activities are complete.
Operational activities that may be required to implement Rule 11-18 are expected to result in emissions of ROG, NOx, PM10 and PM2.5 that would be less than significant.	None Required	Operational emissions of ROG, NOx, PM10 and PM2.5 would be less than significant.
TAC emissions associated with implementation of Rule 11-18 are expected to be less than significant.	None Required	Potential TAC emissions under Rule 11-18 are less than significant.
Greenhouse Gas Emissions		
Air pollution control technologies that would most likely be implemented under Rule 11-18 could generate GHG emission impacts that would be considered significant.	None identified but some GHG emissions may be offset under the AB32 Cap and Trade Program.	GHG emissions are expected to remain significant under Rule 11-18.
Hazards and Hazardous Materials		
Fire or explosion impacts from the use of baghouses under	Mitigation measures include a comprehensive dust control	Hazards impacts from the use of baghouses are expected to

Impact	Mitigation Measures	Residual Impacts
Rule 11-18 are potentially significant.	program; ground filter elements; install explosion rupture panels; remove dusts from filters prior to replacing filters; perform hot work away from collectors; do not use power tools in areas with high dust concentrations; and ensure adherence to applicable NFPA standards.	be less than significant following mitigation.
Fire or explosion impacts from the use of dry ESPs under Rule 11-18 are potentially significant.	Mitigation measures include using CO sensors; digital electronic controls; covering wires with shrouds; and conduct routine inspections.	Hazards associated with the use of dry ESPs are expected to be less than significant following mitigation.
Transportation and use of hazardous materials in WGSs are expected to remain less than significant under Rule 11-18.	None Required	Transportation and use of hazardous materials would remain less than significant.
Hydrology and Water Quality		
The potential water demand created by the need for new air pollution control equipment, particularly refinery wet gas scrubbers, would result in a significant impact on water demand associated with Rule 11-18.	Mitigation measures include the requirement to use recycled water, if available.	Water demand impacts are expected to remain significant as the use of reclaimed water cannot be assured under Rule 11-18.
Wastewater generated from the installation of air pollution control equipment to comply with Rule 11-18 is not expected to exceed any applicable water quality significance thresholds. Therefore, no wastewater impacts are expected.	None required.	Wastewater impacts are expected to remain less than significant.

VIII. RULE DEVELOPMENT | PUBLIC PARTICIPATION PROCESS

The publication of this document is intended to support the initial public comment portion of the development of these two rules. Key milestones dates for the rest of the process are as follows:

November 9, 2016	Open House in Richmond
November 10, 2016	Open House in Oakland
November 14, 2016	Open House/Scoping Meeting in San Francisco
November 15, 2016	Open House in San Jose
November 16, 2016	Open House/Scoping Meeting in Martinez
November 17, 2016	Open House in Fremont
December 2, 2016	Comment deadline for draft rules and NOP/IS
February 21, 2017	Foundries and Forges Workgroup Meeting
March 9, 2017	Bay Area Clean Water Agencies (BACWA) Workgroup Meeting
March 2017	Final rules, staff report, draft EIR published for comment
March 27, 2017	Workshop in Cupertino
March 28, 2017	Workshop in Benicia
March 29, 2017	Workshop in Hayward
March 30, 2017	Workshop in Richmond
April 17, 2017	California Council for Environmental and Economic Balance (CCEEB) Meeting
April 2017	Comment deadline for final rules
May 22, 2017	Hospitals Workgroup Meeting
May 2017	Board consideration of final rules
June 8, 2017	Foundries and Forges Workgroup Meeting
June 21, 2017	BACWA Workgroup Meeting
August 17, 2017	BACWA Workgroup Meeting
August 23, 2017	Foundries and Forges Workgroup Meeting
August 28, 20	CCEEB and Bay Area Refiners
August 30, 2017	Hospitals Workgroup Meeting
August 31, 2017	Proposed rule language and draft EIR released
September 5, 2017	CCEEB and Bay Area Refiners

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